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4. ULUSLARARASI EĞİTİM TEKNOLOJİLERİ VE ÇEVRİMİÇİ ÖĞRENME KONFERANSI

[FULL PAPER PROCEEDINGS]

[TAM METİN BİLDİRİ KİTABI]

15-17 MAY 2024

Anadolu University, Eskişehir, TÜRKİYE

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Initial Teacher Training e-Mentoring Model: ITTeM

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Abstract

The Initial Teacher Training e-Mentoring Model (ITTeM) is presented in this study. The model was developed using a mixed methodology in three stages. During the planning phase, the conceptual framework of a formal e-mentoring relationship was developed, and relevant academic publications and digital mentoring platforms were examined. In addition, a survey was conducted to determine the issues that initial teachers need support for and their expectations regarding the e-mentoring relationship. At the end of the planning phase, a formal e-mentoring program was designed so that experienced teachers would e-mentor initial teachers. The program was implemented for six months during the implementation phase, and data to evaluate the process and results were collected and analyzed. Studies in the implementation phase were supported within the scope of the Scientific and Technological Research Council of Türkiye (TÜBİTAK). In the evaluation stage, the results were interpreted holistically, and an e-mentoring model to be used in initial teacher training was developed. In this paper, the model is explained in detail, and its components and the relationships between these components are discussed.

Keywords: Initial teacher training, e-mentoring, model development.

Introduction

Teachers are one of the most important components of education. However, it is known that there are some problems in the process of training qualified teachers. Some of these are related to teachers working in the first years of their profession. In the literature, the terms 'candidate teacher', 'novice teacher', 'initial teacher', and 'beginning teacher' are used to identify these teachers (Darling-Hammond, 2017; Kardos et al., 2001; MEB, 2022; OECD, 2014). The problems faced by initial teachers are similar in education systems all over the world (Marable and Raimondi, 2007; Tanabe, 2007), so programs to train and support initial teachers are implemented in many countries (Hobson, et al., 2009). It is known that these programs increase the success of initial teachers and have a positive impact on their continuing career (Breaux and Wong 2003; Smith and Ingersoll, 2004; Ingersoll and Kralik, 2004).

Initial teacher training programs are structured around experienced teachers mentoring new teachers. Mentoring is defined as *"a set of activities carried out to support the career and psychosocial development of employees through an experienced person"* (Higgins and Kram, 2001). The experienced person who shares his knowledge and experiences is called a 'mentor', and the inexperienced person is called 'mentee' (Andrews and Wallis, 1999; Kraiger et al., 2018; Singh et al., 2002). Regardless of the sector, mentoring an employee who is new to the profession is important for that person's success, productivity, and development of a positive attitude towards the institution (Marabesi and Kelsey, 2020; Huart et al., 2022). Employees who have received mentoring services on personal and career development compared to those who have not experienced such a process are more committed to the institution they belong to, are less likely to think about quitting their jobs, are promoted in a shorter period of time, and have the potential to receive higher wages (Allen et al., 2004). Similar positive effects of mentoring are mentioned for the teaching profession. According to Tynjälä and Heikkinen (2011), the transition to the working world after university education is more difficult for teachers than other professions, and working with a mentor can make the transition to the profession easier (Bakioğlu et al., 2013).

The development of information and communication technology (ICT) has led to the transfer of the mentoring process to the electronic environment and the emergence of the concept of 'e-mentoring' (Single and Single 2005). The terms 'tele-mentoring', 'virtual mentoring', 'online mentoring', 'distance mentoring', 'computer-based mentoring' and 'cyber mentoring' are also used (Çobanoğlu and Ceylan, 2020; Foster, 1999; Pollard and Kumar, 2021). Whichever naming is preferred, the common point is the emphasis on moving the interaction to an electronic environment (Bierema and Merriam, 2002; Single and Muller, 2001). However, this should not create the

misconception that face-to-face meetings cannot be a part of e-mentoring, because in e-mentoring, mentors and mentees can meet face to face when desired and needed (Kahraman, 2012; Kumar et al., 2013). As a matter of fact, Thompson et al. (2010) explain e-mentoring as *"a relationship in which electronic communication tools are used primarily and aimed to contribute to the development of the mentee"*. The aim of this research is to develop an e-mentoring model to be used in training initial teachers. The process includes the following sub objectives:

1. to create a conceptual framework by determining the basic components of formal e-mentoring relationships organized for professional development purposes,
2. to plan, implement, and evaluate a formal e-mentoring program in accordance with the conceptual framework to support the professional and psychosocial development of initial teachers, and
3. to present an e-mentoring model with appropriate qualities to be used in the training of initial teachers by interpreting the scientific results obtained from the implementation.

Methodology

It is known that the grounded theory method can be used for studies developing a new theory or model (Glaser and Strauss, 2006; Patton, 2002). However, this method, in which intensive qualitative data is collected, has some limitations regarding bias and generalization of results (Can and Himmetoğlu, 2021). In order to reduce the effects of these limitations, this research was planned using a mixed methodology. In this context, the research was undertaken in three stages as shown in Figure 1.

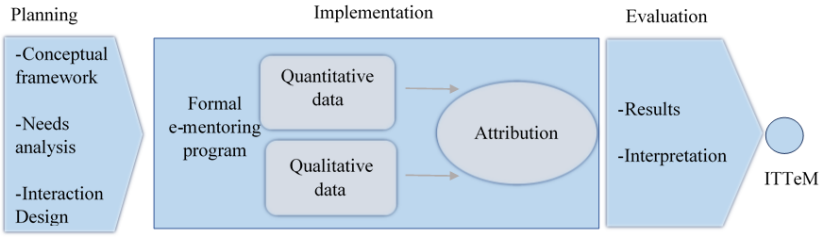

Figure 1. Mixed methodology research process.

During the planning phase, a literature review was conducted on mentoring, e-mentoring, and training of initial teachers, and mentoring programs that had previously been implemented for similar purposes were examined. All concepts related to the use of e-mentoring in vocational education were included. Themes were determined in which each concept could be classified in terms of its time of inclusion in the process, its effects on the process, and its relationships with other concepts. Also at this stage, a survey was conducted to gather up-to-date data on the needs of initial teachers, which revealed the issues that these teachers needed support for and their expectations regarding the e-mentoring relationship. Another study carried out during the planning phase was the examination of academic publications about e-mentoring and digital mentoring platforms (commercial software and learning management systems), with the aim of discovering the qualities that an e-mentoring interaction platform should have. In line with these planning studies, an e-mentoring program that aims to support the professional and psychosocial development of initial teachers was designed.

During the implementation phase, a short-term formal e-mentoring program was organized in which initial teachers were paired with experienced teachers (https://ementorluk.com/). The term 'mentoring program' as used here means *"under the auspices of academic or non-academic institutions or organizations […] any structure organized for individuals (undergraduate students, graduates, faculty, staff, employees, and other stakeholders) and created to guide and assist them in their lives, responsibilities, or careers"* (Christiansen and Busenbark (2023). Throughout the six-month implementation phase, data regarding the process and outcome evaluations were collected and analyzed, specifically on the components of the conceptual framework, the interpretation of the relationships between these components, the suitability of the designed interaction environment, and the used ICT.

In the evaluation phase, the results obtained were interpreted in the context of each component of the conceptual framework, the elements of that component, and the relationships between the components. Thus, a model that can be used in the design of formal e-mentoring programs that will support the development of initial teachers is presented.

Working Groups

During the planning phase, 124 initial teachers from 16 different educational disciplines participated in the survey, including 63 women (50.8%) and 61 men (49.2%). Convenience sampling was used and the social network groups and discussion platforms of which the initial teachers were already members were used for easier communication (Öngöz, 2019). In the document analysis, 24 academic publications and 21 digital platforms were examined to

determine the qualities that the planned e-mentoring platform should have (Erümit et al., 2021; Özmen, 2021). During the implementation phase, the e-mentoring program participants were determined by criterion sampling, one of the purposeful sampling types. Among those who applied to the program, 58 secondary school teachers who met the conditions to become mentors and mentees were studied. 34 of the teachers took part in the program as mentees and 23 as mentors (Kelleci, 2022; Öngöz et al., 2021).

Data Collection and Analysis

A large amount of qualitative and quantitative data was gathered during the study's planning and implementation stages. All data collection tools used in this process were developed with advice from experts. During this time, three papers and master's theses were added to the literature, and a report was prepared for TÜBİTAK. Table 1 lists the types of data collection tools, the purposes of the data collection, the sample/study group information, when the data were collected, and citations to publications containing scientific results.

Table 1. Data collection procedures and related publications.

Approach and Stage	Aim	Data collection method	Group or sample	Related publications
Qualitative Planning	Examining e-mentoring platform designs	Document analysis	24 academic publications, 21 mentoring platforms	Erümit et al., 2021; Özmen, 2021.
Qualitative Implementation	Getting to know the mentees	Program application form	34 mentees	Kelleci, 2022; Öngöz et al., 2021; Öngöz et al., 2020.
		'My Strengths and Weaknesses' activity form	30 mentees	
		Mentee evaluation form	23 mentors	
	Getting to know the mentors	Program application form	23 mentors	
		Mentor needs and requests form	Mentors in need	
	Identifying activity preferences and gathering feedback about the activities	Activity calendar	23 mentors	
		Activity suggestion form	Mentors in need	
		Activity evaluation form	23 mentors	
	Getting feedback on the e-mentoring program	Semi-structured interview	8 mentors	Kelleci, 2022; Öngöz et al., 2021.
			8 mentors	
	Examining the e-mentoring learning environments	Semi-structured interview	11 mentees	Aydın, 2022; Öngöz et al., 2021.
			11 mentors	
	Getting feedback on the e-mentoring platform and the ICT used in interactions	Structured interview	20 mentees	Öngöz et al., 2020; Özmen, 2021; Özmen et al., 2022.
			21 mentors	
Quantitative Planning	Identifying initial teachers' needs	Survey	124 initial teachers	Öngöz, 2019.
Quantitative Implementation	Getting feedback on the e-mentoring program	Monthly evaluation form	34 mentees	Kelleci, 2022; Öngöz et al., 2021.
		Monthly evaluation form	23 mentors	
		Program evaluation survey	34 mentees	
		Program evaluation survey	23 mentors	
	Examining the e-mentoring learning environments	Learning environments survey	34 mentees	
		Learning environments survey	23 mentors	

The approval of the Trabzon University Social and Human Sciences Scientific Research and Publication Ethics Board (dated 08.06.2020, numbered 81614018-000-E.179) was received for the studies carried out in this research. Permission from the Republic of Türkiye Ministry of Health (06.06.2020) was obtained for the applicability of the e-mentoring program during the pandemic. For the participation of initial teachers, permission was received from the Republic of Türkiye Ministry of National Education (21.08.2020) and the Trabzon Provincial Directorate of National Education (26.06.2020).

Results and Conclusions

The ITTeM consists of six interconnected stages called planning, design and development, pairing, interaction, separation, and evaluation. There are two reasons for the overlap of these stages. The first is that some work packages are related to the previous or next phase. Additionally, since the model requires constant evaluation and improvement within itself, the evaluation phase has work packages spread throughout the entire process. Secondly, the process is unique for each mentor–mentee pair. While the majority of participants proceed in accordance with the program calendar, there is always the possibility that some pairs may go outside the calendar. For example, if a mentee fails to adapt to his or her mentor in the interaction phase, the pairing process for that mentee needs to start again by returning to the previous phase's work packages. Figure 2 shows the stages of the model.

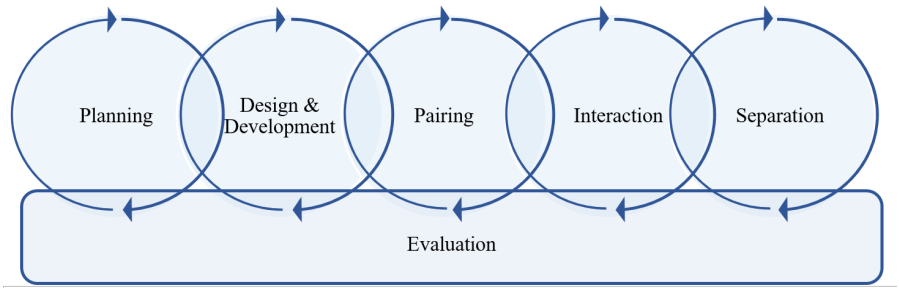

Figure 2. Phases of the ITTeM.

In order to realize the e-mentoring relationship systematically, certain work packages are expected to be completed at each stage.

- The work to be done during the planning phase are: forming the commission and preparing a work schedule; determining program goals (mentor, mentee, institution); determining roles and responsibilities in the program; determining the formal duration of the e-mentoring relationship; determining the method of receiving applications; preparing contracts or determining commitments for participants; deciding on mentor–mentee pairing and separation methods; planning training and orientation activities; defining common areas to be used for interaction; identifying possible problems and developing solution suggestions; and developing strategies for measurement and assessment.
- In the light of the information and findings collected during the planning phase, the tasks expected to be completed in the second phase, design and development, are: preparing the program handbook; developing activities, activity suggestions, and relevant materials; creating the forms and application receiving system; making the necessary plans for training and orientation (activities, environments, etc.); selecting or creating a virtual interaction platform (if necessary); creating program-specific social network accounts (if necessary); creating a technical service infrastructure to support the participants throughout the program; activating the coordinator's communication and interaction channels; selecting/developing data collection tools; and preparing a program-specific website integrated with all related elements and subsystems.
- The work to be done in the pairing phase includes receiving mentor and mentee applications; examining applications and making criteria-based selections; informing applicants about the results; formal matching of suitable mentor–mentee pairs; observing the compatibility of pairs; and making new matches for incompatible pairs.
- The work packages in the interaction phase are: commission meetings (administrative area); interaction between the coordinator and mentors (mentor area); interaction between the coordinator and mentees (mentee area); program activities (mentor–mentee common areas); technical support to mentors and mentees; solving problems that arise during the program; and support to mentees and mentors (new activities, seminars, trainings, etc.).
- The separation phase tasks are as follows: officially ending the pair interactions; officially ending the use of common areas; ending the formal relationship of mentors and mentees with the institution/organization; and providing flexibility for pairs to continue meeting if they wish.
- Each phase of ITTeM has its own measurement and evaluation cycle in the context of the successful completion of the work packages to which it relates. In addition, a general opinion should be reached regarding the achievement of the program's goals. In this regard, qualitative data to focus on specific situations and quantitative data to form a general opinion should be collected. If the model will only be used in a one-off e-mentoring program, there is no need for an assessment of sustainability. If it will be used in a program that will be repeated at regular intervals, work packages should be created to monitor and evaluate sustainability. It is possible to summarize the tasks expected to be carried out within the scope of the final stage, evaluation, as follows: checking whether mentors and mentees maintain their commitments; observing the progress of the

program as planned; examining the effectiveness of the solutions put in place to solve the problems experienced; gathering feedback from mentors and mentees on the program's effectiveness; collecting data regarding the achievement of the program's goals in terms of mentors, mentees, and organization; analyzing the collected data and presenting the results; writing the final report and sharing it with relevant people/organizations.

The participants and components of a formal e-mentoring process to be carried out using ITTeM and the relationships between these components and the common areas that need to be created are shown in Figure 3.

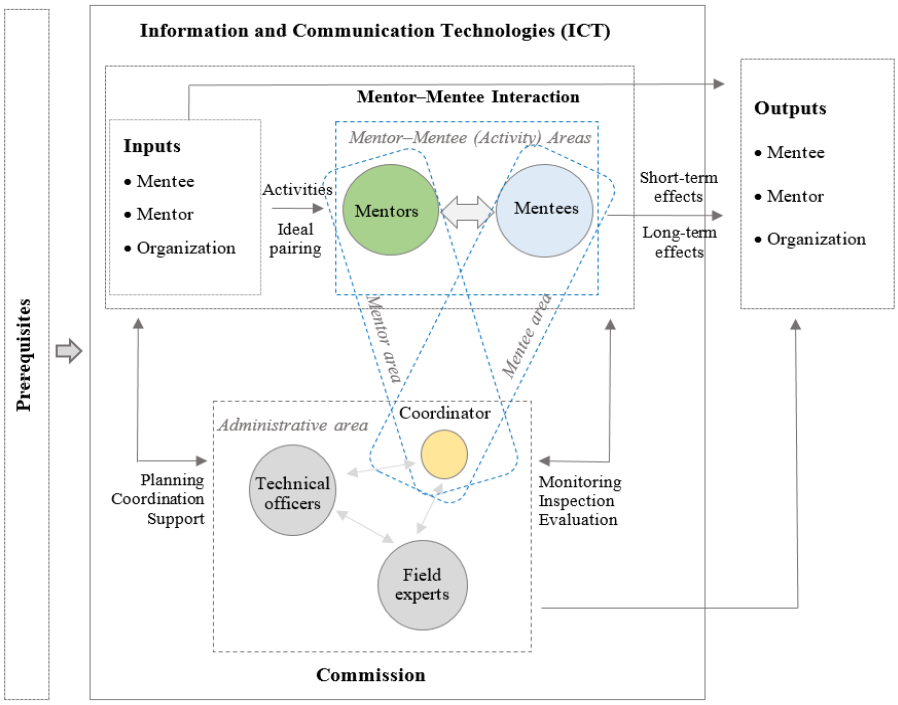

Figure 3. ITTeM components and the relationships between components.

ITTeM is a model structured on the three basic roles of mentee, mentor, and coordinator. As can be seen from Figure 3, the focus of the model is on the mentor–mentee interaction. The effective use of common areas created between pairs directly affects the quality of the interaction established. It also relates to the suitability of the activities, the situation in which ideal mentor–mentee pairs are brought together, and the efficiency of the relationship established with the coordinator. The coordinator, field experts, and technical staff together form the 'commission'. The first job of the commission should be to clearly state the rationale, purpose, and objectives of the e-mentoring program. If there is already an established formal mentoring culture in the educational institution where the e-mentoring program will be organized, the program designed with ITTeM can be used by integrating it into the existing infrastructure. In this case, the commission can be formed in cooperation with the existing team. This will provide benefits in terms of time, labor, and cost.

The coordinator is the person who interacts with all roles and chairs the commission. On the one hand, the e-mentoring process should serve as a guide and problem solving tool at every stage of the interaction between the mentor and mentee; on the other hand, it is intended to coordinate a managerial process in which institutional policies and academic discourses will predominate. The coordinator is of key importance as he or she coordinates the process from beginning to end and creates a bridge between the commission and the participants. The performance of the coordinator will directly affect the success of the program. When selecting a coordinator, consider a background in educational technologies, familiarity with the program's host institution (preferably through employment there), academic consulting experience (projects, theses, etc.), and formal distance education course design and administration experience. If there is more than one candidate for the position of coordinator, the decision should take into account any situation that has a positive impact on a candidate's ability to fulfill the responsibilities of this role, such as being a researcher working on mentoring/e-mentoring in education or having previously coordinated a formal e-mentoring program.

Since the ITTeM was developed for a specific target audience, there are some prerequisites for participation in a program designed with this model. In the most basic terms, mentors should be experienced teachers, and mentees should be new in the profession. However, as ITTeM is intended for formal mentoring relationships, it is also

suitable for corporate programs led by a coordinator. ICT opportunities are important for the implementation of the model, both individually and institutionally. In addition, everyone who will take part in the process must be technologically literate at the level required by their roles. If the number of candidates meeting the prerequisites is high, additional criteria can be introduced to select the ideal ones. Criteria for mentees should focus on determining whether they need support in professional and personal matters and whether they are willing to participate fully in the program. If there are a large number of mentor candidates, additional criteria can be applied to select teachers who can be 'better teachers', 'better friends' and 'better role models'. Applications can be received through an online form that includes questions regarding meeting prerequisites. For example, candidates can be asked to add short videos introducing themselves and letters of intent to this form. Another method of getting to know the candidates better is an interview.

The inputs of the ITTeM are divided into three groups in terms of the characteristics of the mentee, mentor, and institution. Examples of mentee input include demographic information, attitude towards the profession, and degree of self-confidence, technology literacy level, and desire to learn. Professional satisfaction, leadership skills, e-mentoring skills, and communication skills are among the demographic data points to collect about mentors. The main information needed for institutional inputs are the competence of the coordinator, the technological infrastructure of the organization, and financial possibilities. The outputs of the model are classified according to the effects of the process on the mentor, mentee, and institution, in parallel with the inputs. Another classification criterion is the time frame of outcomes, which could be short-term or long-term. Examples of short-term outputs related to mentees are program satisfaction, enjoyment, career awareness, development of ICT skills, acquisition of new professional knowledge, increased professional motivation, and reduced stress. Financial gains, improvement of teacher qualifications, and a change in a participant's sense of institutional belonging are some of the long-term institutional outcomes.

The success of a program designed with ITTeM is related to the pairing of mentees with mentors who can meet their needs. For this reason, the model requires a systematic pairing method, as seen in Figure 4.

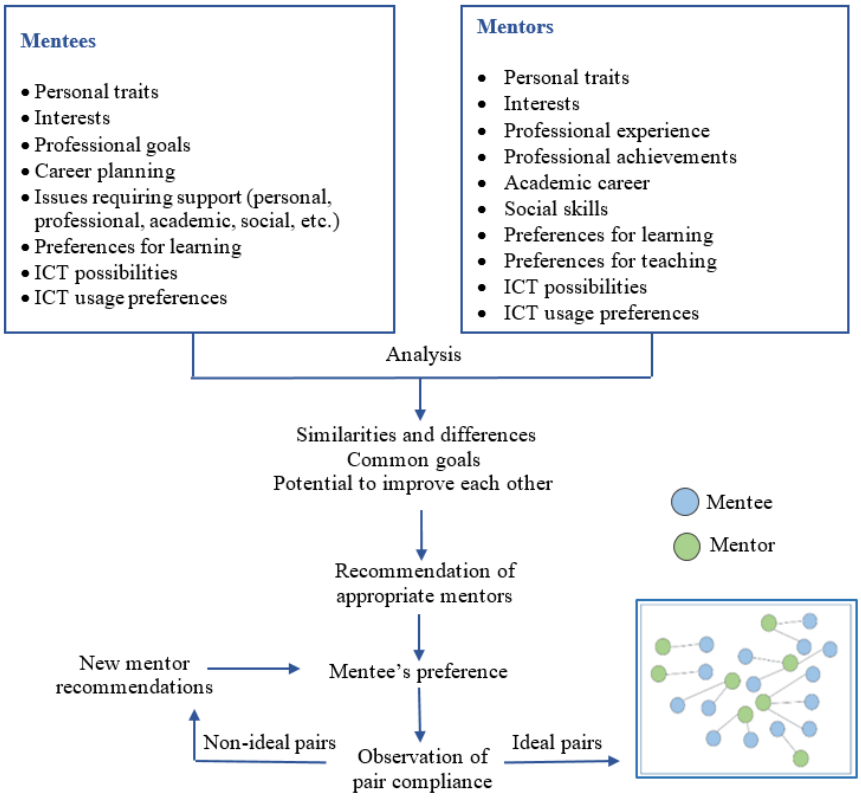

Figure 4. The ITTeM mentor–mentee pairing method.

The application process should be designed to provide mentors and mentees access to the information in Figure 4. In this way, it will be possible to see the strengths of mentors and the weaknesses of mentees. The information obtained should be used to make a list of mentor–mentee pairs with a high potential to develop each other. While this analysis is being carried out, mentees should also be provided with access to information about all of the mentors. To support this, face-to-face or online activities where mentees and mentors come together can be

extremely beneficial. Afterwards, each mentee should be asked which mentor he/she would like to be paired with. If the mentee's choice is one of the mentors on the created list, the matching should be formalized. If there is some incompatibility, the mentee should be informed that there is a more suitable mentor(s) for him/her. However, the final decision should be left to the mentee and pairing should be made accordingly. In the next stage, it is necessary to follow the compatibility of the pairs. This period may vary depending on the duration of the mentoring program's formal interaction. However, even in short-term programs, it would be appropriate to follow up for at least two weeks. If a pair's potential to benefit each other is low or if there are any unforeseen incompatibilities between them, their interactions should be formally terminated. A new mentor assignment period should be started for the mentee, and this process should be planned so that the mentee is left unpaired for the shortest possible amount of time.

In an e-mentoring program organized using the ITTeM, activity suggestions should be presented to both mentors and mentees. Considering the needs of the mentees is essential to determine the scope of the activities. However, due to the nature of the mentoring philosophy, the development of mentors should also be supported. Furthermore, the country's initial teacher training policies should also be taken into account, and if there is a formal program that is carried out face-to-face, the goals of that program should not be ignored. Task-based e-mentoring activity suggestions developed with this understanding should be made available to all participants, but they should not be limited to these activities; each pair should be able to develop and implement their own activities in the context of the mentee's needs. The coordinator should not hesitate to plan and implement additional activities to meet the needs identified in the process. In a program designed using the ITTeM, mentors and mentees should be able to carry out their activities with a flexible understanding in accordance with the process shown in Figure 5.

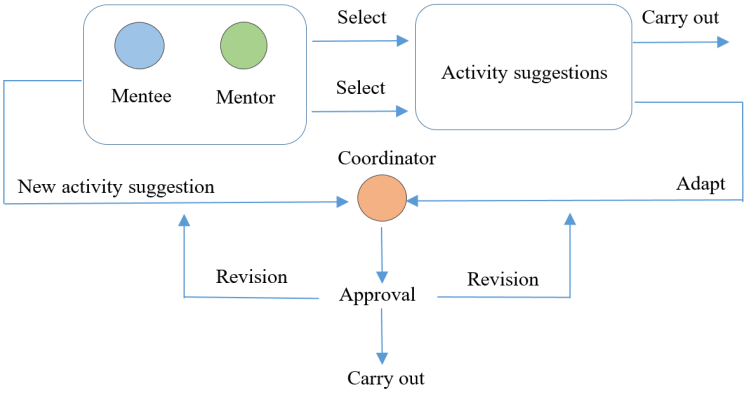

Figure 5. The ITTeM procedure for carrying out activities.

According to Figure 5, pairs can choose and implement the activities offered by the program, adapt these activities to their needs, or develop and use their own new activity. It is important for the pair to communicate with the coordinator in the adaptation and new activity development processes so as to not deviate from the general goals of the program.

There are four types of common areas that need to be created for interaction purposes in ITTeM. Three of these are the administrative area, mentor area, and mentee area that are created by the coordinator. The fourth type of common areas is the activity area, which is created for the purpose of mentor–mentee pair meetings and activities; the number of activity areas may vary from pair to pair and from program to program. These areas should be primarily digital. However, if necessary, face-to-face meetings can be conducted. It is also possible to design common areas that blend face-to-face and ICT environments.

Among the common areas in Figure 6, the first area that needs to be created is the administrative area, which should be available from the moment the program planning begins. In order to ensure interaction between mentees, mentors, and the coordinator, two separate common areas should be created, designated as a mentee area and a mentor area. The timing of the creation of these areas will vary depending on whether any prestudy or training services are organized for mentors or mentees. Finally, there should be numerous spaces designated as mentor–mentee areas or activity areas. Because confidentiality is so important in a mentoring relationship, no one, including the coordinator, should be allowed into these areas without the permission of the pairs, and no audio or video recordings should be made.

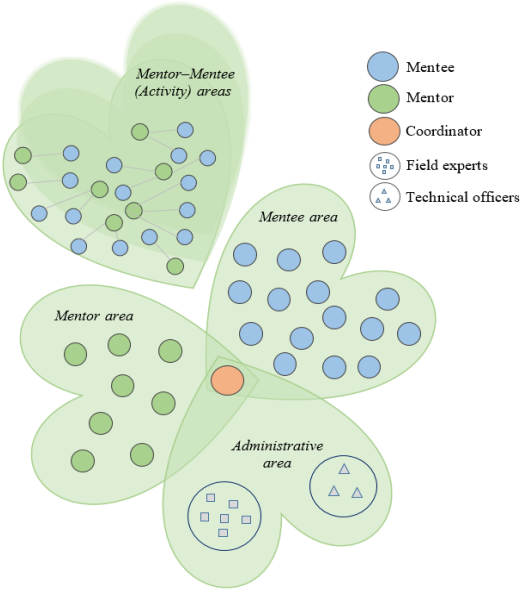

Figure 6. Common interaction areas in the ITTeM.

ITTeM was developed to support the development of a special target group and for formal mentoring relationships where the main interaction environments will be created with ICT. The model also supports one-on-one mentoring, group mentoring (where a mentor is paired with more than one mentee), situational mentoring, and gradual mentoring (including e-mentoring relationships). A mentor can be paired with more than one mentee, but this does not mean that all activities can be done in group mentoring. In addition, group mentoring can be impractical as it can be difficult to group mentees given all the variables that need to be considered, such as their time, motivation, ICT preferences, personal characteristics, and academic qualifications. Other variables that need to be taken into account are the purpose of the program, its objectives, its interdisciplinary status, and the number of participants. Of course, mentors can organize or participate in events with large groups of mentees. However, the number of mentees they are responsible for and need to regularly interact with during the program should be limited. Unless there is an interdisciplinary structure or a special reason, there should be a single mentor with whom a mentee will interact continuously throughout the program. This limitation does not mean that the mentee cannot participate in interim activities, workshops, or seminars organized by other mentors or experts.

The ITTeM is not suitable for face-to-face and informal mentoring relationships that occur spontaneously between initial teachers and experienced teachers in schools. Its validity has not been tested in different professional groups. Additionally, when the prerequisites for being a mentor and mentee are examined, it can be understood that the model cannot be used in its current form for reverse mentoring, peer mentoring, or self-mentoring. If the model is used in a short-term program, the ideal mentor–mentee interaction frequency is once a week. In programs that last longer than six months, the organizers may decide on the frequency of meetings, not less than once a month, by evaluating the conditions. Meeting sessions should be at least one hour in length.

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Empowering Cancer Education: A Comprehensive Analysis of the E-oncología Platform

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Abstract

The escalating global cancer burden, characterized by a 2.3% increase in incidence and a 2.4% rise in mortality in 2022, underscores the critical need for robust cancer care strategies. These strategies should not only focus on prevention, diagnosis, treatment, or support but also on training. This study delves into the transformative role of education and training in the field of oncology, focusing on the e-learning platform "e-oncología" from the Institut Català d'Oncologia, a comprehensive cancer center located in Catalonia (Spain). Aligned with European Commission guidelines, the platform, with a rich two-decade history, spans 104 countries, serving more than 82,000 students through 110 courses and 2,350 educational hours. The research utilizes a comprehensive approach, incorporating retrospective analysis, to delve into the origins of "e-oncología" and identify the success factors guiding its evolution. It scrutinizes the pedagogical methodology within the e-learning context and closely examines key contributors, such as collaborations and partnerships, contributing to its global reach. Likewise, "e-oncología" actively contributes to cancer education research projects, receiving support from both industry and national/international public funding. The findings highlight the platform's efficacy in providing evidence-based and multidisciplinary training aimed to all healthcare professionals involved in the care of cancer patient. The study concludes by forecasting future trends in oncology distance education and advocates for innovative approaches to elevate the training of healthcare professionals. Recommendations include sustained collaboration across academia, industry, and public sectors to ensure the enduring impact and expansion of e-learning initiatives and the associated research.

Keywords: e-learning, academic partnership, cancer training

Introduction

In 2022, new cancer cases increased by 2.3% to 2.74 million, with a 2.4% increase in cancer-related deaths, mostly in EU member states. Geographic variations and specific regional challenges necessitate a targeted and adaptable approach to cancer education and highlight the need for accessible, quality education around this disease, as outlined in the European Commission's new recommendations.

ICO is a comprehensive public cancer centre covering prevention, patient care, specialist training and research – the first centre of its kind in Spain. It is a public company established in 1995 by the Department of Health of the Catalan Government. ICO comprises a regional network with four cancer centres that collaborate with four university hospitals - Bellvitge, Dr Josep Trueta, Germans Trias i Pujol and Joan XXIII – and 20 other hospitals. ICO works to bring the specialists to where the patient is and to ensure the best healthcare provision possible.

ICO is currently the referral cancer centre for almost 45% of the adult population of Catalonia and has more than 1,000 permanent and temporary staff. Its physicians, nurses and researchers are internationally recognised for conducting high quality research. In 2020, ICO was actively involved in 991 clinical trials – 11 of which were ICO-initiated/led – with 951 patient participants.

Since 1993, our Training Unit has demonstrated expertise in the field of cancer training and education by incorporating innovative approaches to lifelong learning for healthcare professionals and creating e-learning activities.

In 2004, in collaboration with the Universitat Oberta de Catalunya (UOC), ICO launched a web-based, e-learning platform for professionals called e-oncología. It expands the boundaries of traditional training and generates knowledge networks among specialists, teachers and all professionals interested in oncology. Its mission is to create a dynamic environment where oncology specialists, educators and healthcare professionals can foster knowledge networks for the betterment of patient care.

The platform covers an extensive range of oncology disciplines, including medical and radiation oncology, palliative care, nursing, cancer epidemiology, research methodology and nutrition. With initiatives such as the

HPV and Head and Neck Cancer Prevention Program, as well as specialised training programs in Geriatric Oncology and Cancer Immunotherapy Care, e-oncología delivers comprehensive education in the field.

In recent years, e-oncología has transitioned into research projects supported by industry and public funding and made strides in innovative content creation. The platform's commitment to customisation for different regions has established it as a global leader in oncology training. With over 81,000 students across the world, and leveraging the expertise of more than 270 professionals to deliver a diverse array of courses spanning over 2300 hours of virtual instruction (some of them accessible in 8 languages), e-oncología is a key player in advancing oncology education and expanding its reach on a global scale.

This paper aims to provide an overview of the evolution of e-oncología (www.e-oncología.org), an e-learning platform from the Catalan Institute of Oncology (ICO) which has been delivering research-based cancer education for more than 20 years. It will detail the factors that have contributed to its success, as well as its international reach and dissemination.

Methodology

In this section, we will discuss the educational strategies and practices implemented by e-oncología in their oncology training program. We will explore how teaching is tailored to meet the individual needs of students and provide an overview of the various training programs available. Additionally, we will highlight the collaboration with experts, the adaptation to different contexts, and the financial sustainability of the program.

Pedagogical and Teaching Methodology

The pedagogical model of e-oncología is focused on the student, adapting to their profile, interests, and educational needs. From a conceptual point of view, e-oncología offers various educational programs with topics related to oncohematology and related subjects (research, prevention, nutrition and cancer, multidisciplinary, and continuing education). These programs are divided into different levels and formats, ranging from webinars (1 hour in duration) to postgraduate degrees (60 ECTS), including mostly MOOC (Massive Open Online Course) type courses (up to 40 hours).

As for the teaching professionals involved, we have experts and specialists in each subject, not only from the national level but also from Europe and internationally. The experts are the ones who direct and coordinate the program together with the e-oncología team, selecting the topics as well as the appropriate teachers.

Regarding tutoring, academic monitoring, and student progress, we have two types of formulas depending on the type of training and evaluation, previously designed with the course directors and coordinators: proactive tutoring and reactive tutoring. Proactive tutoring is applied to courses with a precise schedule and continuous evaluation, where tutors propose assignments throughout the course, including a final project and/or a knowledge exam. On the other hand, reactive tutoring is limited to courses with an open and flexible schedule, allowing students to learn at their own pace and adapt their learning to their needs, but always with the presence of the expert in case of any doubts or comments. The role of the tutor is essential, as a minimum of 70% of the activities must be completed to obtain certification, surpassing the standard of traditional MOOC models, which usually have completion rates below 40% (Daniel et al., 2015).

Another important aspect to highlight about the pedagogical and teaching model is the implementation of a Cascade Model (Lindo, 2021).

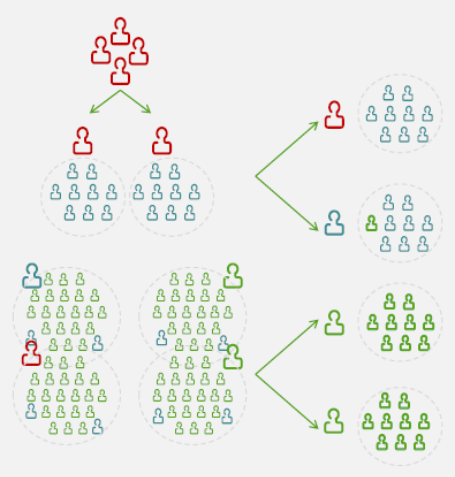

Figure 1. Cascade Model deployment

Figure 1 showcases the Cascade Model, which is used in various courses and training programs known for their innovation and significant impact in their respective fields. The model specifically emphasizes the Train the Trainers edition, which is facilitated by e-oncología/ICO. This edition aims to train professionals who will then serve as tutors for localized versions of the training, allowing for the widespread sharing of knowledge. Expert consultants are also available throughout this process to address any questions or concerns, ensuring the training initiatives are of high quality and effectiveness.

Other relevant methodological aspects of the program

Below are other factors and aspects that have contributed to the success of the program.

Strategic partnerships

Since its inception, e-oncología has been a program led by the ICO, with its professionals serving as teachers in our training courses (approximately 50% of the faculty of authors and tutors in e-oncología are experts from our institution). However, in our pursuit of excellence in our training programs, the remaining authors are also specialists of recognized prestige from other reference centers.

We also have partnerships with multiple national and international universities and scientific institutions. These collaborations include, among others, the partnership with the Universitat Oberta de Catalunya since the project's inception, as well as partnerships with the Spanish Society of Medical Oncology and the University of Girona, among other scientific societies in the field of oncology-hematology at the national level, and partnerships with the International Agency for Research on Cancer (IARC), the Javeriana University of Colombia (PUJ), the Virtual University of Cancer of the International Atomic Energy Agency (IAEA), the Virtual University of Cancer in Africa (VUCCnet), the American Cancer Society (ACS), the National Cancer Institute (NCI), and NGOs such as Cancer City Challenge at the international level.

Adaptation of contents to the environment

In line with the previous point, in order to meet the educational needs of the different institutions we work with, a fundamental aspect of e-oncología's mission is to make quality education accessible to as many professionals and regions as possible. In this regard, one of our strategic lines is to offer our training programs to countries and regions with fewer economic resources. While initially the focus has been on Latin America, programs have also been implemented in Africa and other European countries with medium or low incomes. To achieve this, it is important to consider that in order to offer quality education that is useful to the recipients in these regions, it is essential, in addition to translating the materials into the students' language, to adapt and calibrate the content to the reality of the country or region, and to have a methodology that guarantees the appropriate dissemination of the content, support from the teachers, and follow-up of the students.

For this purpose, we have developed a methodology based on the following:

- The content is reviewed and/or developed by local professionals who incorporate both specific cultural aspects and the adaptation of procedures to the existing resources.
- Through the exchange between the authors of e-oncology and local reference professionals, a consensus is reached on the final content of the course, incorporating the latest internationally accepted scientific evidence.

- After the first edition of the course, which is tutored by e-oncology tutors, key participants (such as management figures, clinics, or representative teachers from the region, or those with logistical resources and/or personal commitment and dedication) are selected to become tutors for subsequent editions in their region. This is known as the "Train the trainers" model, for which a personalized classroom is provided (see Figure 1).
- At the same time, logistical and/or internet accessibility difficulties in these regions are taken into account, so downloadable materials or offline access are provided to facilitate the completion of the training in printable versions or when internet access is not available.

Research projects in education

In recent years, and specifically since 2016, e-oncología has increased its participation in research projects, some of which are supported by the industry and others by public funds, such as European funds. Initially, our participation focused on being the dissemination platform for the training resources projects, and then moved on to the development of innovative content (such as the EPIMUC project on microlearning in urothelial cancer, supported by Pfizer - Pfizer tracking number 68346785), and currently includes participation in pilot projects involving more than 13 countries, such as the EU4H DigiCanTrain or EU4H-2022-PJ06 "TRANSiTION - Digital Transition and Digital Resilience in Oncology" 2022 (reference: 101101261) projects, among others.

Academic program by areas of knowledge

Likewise, focusing on e-oncología's training program, we can highlight its main lines, which are aimed at specialized, interdisciplinary, and continuous training in different areas:

- Medical Oncology
- Palliative Care
- Oncology Nursing
- Epidemiology and Cancer Prevention
- Radiation Oncology
- Research Methodology
- Nutrition and Cancer

It is worth noting that one of the most impactful and widely disseminated training programs is the Master's in Medical Oncology, which we carry out in collaboration with SEOM and the University of Girona. The majority of medical residents in Medical Oncology in Spain participate in this program, with the aim of homogenizing knowledge and providing a forum for discussion and learning.

Accreditations and endorsements

In relation to the previous point, all of our training programs are accredited by the Catalan Council for Continuing Education of Health Professions and the Continuing Education Commission of the National Health System (09/035488-MD). Additionally, many of our training programs have the scientific endorsement of the corresponding society, such as the Society of Radiation Oncology, the Society of Medical Oncology, the Spanish Society of Clinical Nutrition and Metabolism, among others, which guarantees the quality of the content offered.

Sustainability and financial model

From an economic point of view, there were several premises for the project to be successful:

- Although the ICO is a non-profit institution, the project should not be a financial burden for the ICO and should generate sufficient income to maintain the structure and invest in new content.
- Healthcare professionals (especially the medical profession) are not accustomed to paying for their continuing education. This situation is even more pressing in countries in Latin America or Africa with fewer resources. Therefore, from the beginning, it was decided to try to ensure that students did not have to pay for the courses, thus ensuring that high-quality scientific information reaches as many professionals as possible, regardless of their resources.
- To offer high-quality scientific content, it was necessary to ensure that the authors and tutors were adequately remunerated for their teaching collaborations. To achieve these objectives, it has been necessary to allocate part of e-oncología's resources to fundraising.

The main sources of funding have been:

- Competitive national and international scholarships.
- Institutional agreements: SEOM, IARC, IAEA, ACS, C/Can.

- Educational grants from private companies such as pharmaceutical companies. This allows us to fulfill the aforementioned objectives, be self-sustainable, achieve maximum economic accessibility in all courses, and foster loyalty among authors/tutors, not only through remuneration but also by facilitating academic and teaching growth.

Pedagogical team

In order to meet all these needs of the training program and guarantee the development of content with pedagogical and scientific quality, our team includes specialized professionals, including:

- Project managers responsible for coordinating and managing the training projects from conception to completion. This team includes specialists in pedagogy and educational psychology with extensive experience in the conceptualization of training projects and their scientific dissemination.
- Graphic designer with expertise in digital production and graphic editing of educational and informative materials.
- Academic and scientific direction, with experts in the field of oncology-hematology who ensure the scientific calibration of the programs, such as Dr. Assumpta Company Serrat, an oncologist with over 17 years of experience in e-oncology, and currently Dr. Deborah Moreno-Alonso, who has recently joined the program.
- Program direction, led by Dr. Xavier Bosch, currently Honorary Consultant of the Cancer Epidemiology Research Program at the Catalan Institute of Oncology.

Dissemination and Outreach

In addition to the aforementioned Cascade Model, the sending of newsletters, mailings, institutional communications, social media, participation in conferences, etc., also allow us to disseminate and promote our training programs.

Results

Over the past 20 years, e-oncología has made significant strides in the field of education. We have developed over 2300 hours of educational materials, reaching a staggering 81,000 students from 100 different countries. Our team of experts consists of more than 270 internationally renowned professionals.

It is not only important to highlight the educational impact of our platform, with an overall satisfaction rate of 85%, but also the accessibility it provides to students. We have assisted 95% of our students in securing funding and grants to pursue their courses, ensuring that financial constraints do not hinder their educational journey. Additionally, we guarantee full remuneration to our academic collaborators, fostering a sense of loyalty and commitment to the teaching profession. This, in turn, contributes to the academic credentials of the professionals involved and indirectly enhances the overall educational impact of our institution.

Furthermore, e-oncología plays a pivotal role in transforming the traditional teacher-student model. Our approach emphasizes active mentorship from experienced experts, addressing the individual needs of each student, both academically and personally. The online platform allows for dynamic and prompt responses, taking into consideration factors such as time commitment and other personal obligations.

Our collaborative projects, both at national and international levels, also contribute to the international recognition of our research and development activities. Participation in these projects enhances our visibility, impact, leadership, and institutional internationalization. It fosters educational and research alliances with other organizations and entities, furthering our reach and influence in the field.

Conclusions

As we discussed earlier, the development and maintenance of our platform have presented various challenges that we have had to overcome in order to meet the diverse needs in areas such as finance, logistics, education, and the ever-evolving field of e-learning.

Currently, due in part to the COVID-19 pandemic, we are faced with a significant number of health-related platforms and educational content, varying in scientific accuracy, quality, and accessibility (Avendaño et al., 2021). Therefore, innovation and scientific rigor have become crucial tools in securing funding. Additionally, the return to in-person activities after the pandemic poses a challenge as professionals, both educators and students, as well as sponsors, are beginning to explore this modality again, preferring hybrid or in-person encounters over purely virtual ones (Martínez-Novillo & Feito, 2021). This preference may also impact funding opportunities.

Another aspect to consider, indirectly related to COVID-19, is the burden faced by clinical professionals and the non-clinical staff in terms of workload and fatigue. This makes it difficult for them to find time for content development and review, despite the previously mentioned compensation.

Despite these challenges, e-oncología is currently focusing on certifying its academic quality through accreditation systems such as EACCME (European Accreditation Council for Continuing Medical Education) which is part of the UEMS (European Union of Medical Specialists), as well as analyzing and updating our pedagogical model.

At this exciting moment, e-oncología is moving towards the future, aligning with emerging trends and committed to meeting the changing needs of healthcare professionals. Our vision includes the integration of innovative trends in healthcare professional education, such as personalized learning paths, ensuring that the content aligns with advancements in medical treatments and the digital transformation in healthcare. We anticipate future challenges, including the need for continuous learning in a constantly evolving healthcare environment, and we are dedicated to addressing them with flexible and relevant solutions. Through strategic collaborations with other healthcare institutions and the active involvement of our users through surveys and regular consultations, we plan to achieve key milestones in the platform's development. We embark on this journey with enthusiasm and express our gratitude to our audience and educators for their participation, trusting that the e-oncología platform will continue to be a vital contributor to the ongoing education of healthcare professionals.

Acknowledgements

We would like to express our sincere gratitude to all the current members of the e-oncología team: Olga Romero Clarà, Mireia Montserrat Moreno, Francisco Javier Ruiz Carrasco, and Marta González Morcillo. Their expertise and dedication have been invaluable in enhancing the platform. Furthermore, we would like to extend our heartfelt appreciation to the founding members of e-oncología, Assumpta Company Serrat and Xavier Bosch José. Their pioneering efforts have laid the foundation for our progress, and without their collective vision and hard work, our achievements would not have been possible.

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Performance Level on System Scalability for Online Learning delivery in Open Distance Learning

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Abstract

There is an urgent call for transitioning our educational system to online open distance learning without face-to-face mode of teaching and learning methods. This call for has persisted in the pre and post covid 19 era, emphasizing the feasibility of implementing technology-enhanced learning. The purpose of this paper is to develop and analyse the performance level of system scalability for open distance learning platform that makes knowledge acquisition processes easier for learners. This paper makes use of mixed method as the adopted methodology. Therefore, the data collection is via teachers as the teaching content provider and learners as the learning content consumer. The system testing is on system scalability, with the following testing metrics: stability, time of request for learners, time localhost receives request, time to response, roundtrip, and network usage. The metrics testing is achieved using wireshark application for analyze the network, Apache benchmarking console and gnuplot application to generate the data captured and performance graph. The results findings on the system scalability shows stability based on graph from 50-80% at 2ms, 90-95% at 3ms, 95-98% at 4ms, and 99-100% at 5ms and it can be deduced that the scalability system can accommodates changes. The longest roundtrip is 8seconds because of network congestion with multiple packets request from various sources trying to access the localhost at the same time while the fastest is 1second. In conclusion, the result means that the performance level has a positive impact for leaners on time of response for content management processes. Hence, the recommendation is to adopt technology enhanced learning in respect of teaching and learning methodology approaches.

Keywords: knowledge acquisition, Open distance learning, Educational system and Content managemnt processes

Introduction

It is impossible to overstate the influence technological advancements have in every aspect of our lives including information communication technologies. Specifically, advancements in information and communication technologies and the recent impact of COVID 19 made it necessary to overhaul our system of education due to advancements in technology. Nonetheless, to promote learning that can be obtained by the sharing of knowledge, concepts, and events and by making the most of ICT technologies—which is usually not relevant to conventional learning methods Bamigboye & Olusesan, (2010). For an online electronic learning system, proactive approaches and suggested approaches are therefore required· According to Huang et al, (2011) and uman et al, (2017) who designed and implemented a meaningful learning-based method for ubiquitous. The framework was assessed, and its effectiveness was examined using both macro and micro methods in this article. Nonetheless, in addition to other sources of data, the assessment criteria for respondent views on the framework has to be strengthened. Proposing an assessment approach that can integrate developing technology into the curriculum is also necessary. Thus, it is essential to create fresh educational concepts to facilitate the acquiring of knowledge. This study addressed the problem it cited by developing an online electronic learning system that allows learning to occur anytime, anyplace, regardless of restriction on time using any kind of technological devices, including mobile phones, desktop computers, and laptops· Huang et al, (2015) reported evaluated the effectiveness of a meaningful learning-based model for context-aware mobile learning using Context-Aware Mobile Learning (CAML) through metrics validity, value, and sustainability. Expert insight as well as an in-depth review of the data were used in evaluating the framework, and the article's analytic hierarchical technique was used. The hierarchical method was used to examine the learning theory (AHP). Cardenas & Pena, (2018) also ascertained through systematic reviews that some metrics can be improved technologically. Nevertheless, in order to overcome parts of the modeling's shortcomings, additional data sources might be employed, for instance an analytical theory for system assessment and testing using different metrics. This can then be used to assess additional models on commonplace tasks to confirm their practicality.

As previously stated, to assess this system, this article develops a quantitative performance level criteria for an online electronic learning system and tests its capacity for expansion to determine whether learners can reliably

retrieve information while needed, in terms of the durability during modifications and the amount of period it takes for the network to respond. Mehmood et al, (2017) reported UTiLearn: A Personalized Ubiquitous Teaching and Learning System for Smart Societies. This essay seeks to determine whether the teaching and learning environment urgently needs to change to fuel the expansion of the world economy. Also, as we move closer intelligent society and increasingly digital natives enter the workforce, the use of open distance learning (ODL) systems for e-teaching and e-learning is growing. Nevertheless, several issues, including insufficient analysis of data, student's system collaborative scheduling, flexibility, and expansion, prevent the DTL from reaching the required level of competence. This paper's idea is to close the deficiencies in the online educational system which were previously noted by many researchers. Through the help of modern technology, these can be accomplished at any point in time from any place concurrently using online tools like cellphones, desktop computers, and laptops. This necessitate for developing a cutting-edge online educational delivery system for online distance education (ODL) is examined in this study. The aim of this work is to create and analyze the system scalable performance level for an open-access electronic learning platform.

Methodology

This study used a hybrid methodology, including qualitative and quantitative methods, to conduct its research. While quantitative methods involve students as the material consumers, qualitative methods engage teachers as the source of learning content. To assess the system according to system capacity, metrics and variable measures are quantified using a quantitative approach. Based on the response time, round trip time, network usage, and time of response, teachers or students can modify the system's stability.

Research Design

This paper makes use design science research for the design method for the implementation of the system scalability for open distance leanring

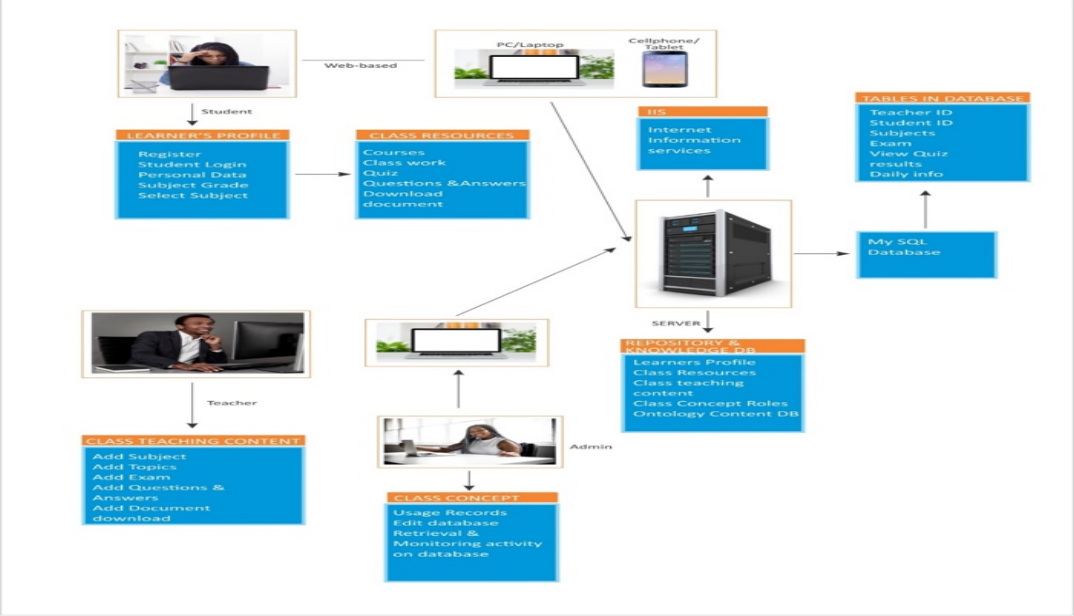

Figure 1: Develop System for E-learning Open Distance Learning

Figure 1 shows the student as the content consumer with login detail to access the learning content and uploading of learning content in a more collaboration way. While the teacher is the content provider and provide accessment to the contents student uploaded. Administrators on the other have full control on the e-learning system to assign user role to either teachers or students and also manage the database repository using My SQL from the server end or back-end.

Data Analysis and Results

In order to get the % ratings for each metric, data collected from console testing and Apache benchmark software was analyzed using the Wireshark and Gnuplot applications. The timestamps for every request received by the localhost, when it reached the system, when it was responded to, and the duration of the roundtrip were all determined using Wireshark and a network analyzer. To handle the increasing volume of work that needs to be done, it is crucial to verify the system's scalability in case more information has to be added. The document's size rose along with the number of topic categories introduced to the system. The following variables were used in the system testing: request time, response time, round trip time, and the time at which the localhost receives the request.

Results

It is crucial to assess the system's scalability, which involves determining whether more data can be added to the system to handle the increasing volume of work that has to be handled. The system now contains more topic areas, and the length of the documents has grown. The system's scalability was evaluated in terms of processing round trip time, response time, time it took for the request to reach the server, and amount of network utilization. In order to demonstrate how the system handled and processed the data in response to the document's increasing length and size, phased testing was also conducted on the client and local host systems. Therefore, using the Wireshark application and the Apache benchmarking command interface, performance testing was conducted to determine the scalability of the system on both the local host and client host. One tool provided with the WAMP server installation is Apache benchmarking, which was included specifically for system testing. An open-source program called Wireshark is useful for network analyzers. Time to request, time localhost gets request, time to answer, and network use were all generated using Wireshark.

```
:\wamp\bin\apache\apache2.4.9\bin>ab -n 100 -c 5 http://localhost/ulearning\upl
ads\Trigonometry_Grade_12.txt> resulttosin.txt
```

Figure 2: Command lines to test for system scalability on localhost

Figure 2 displays the amount of concurrency and the number of requests sent to the WAMP server system. Using the uploads.php\trignometry_Grade_12.txt file, which obtains the coordinates from the MySQL database used in the u-learning project, 100 requests were made at a concurrency level of 5 on the localhost system. A text file named result.txt homepage has the results. The system was only responding to this source in order to generate captured data for the system scalability during the testing phase, as no additional requests of any type were made to the localhost.

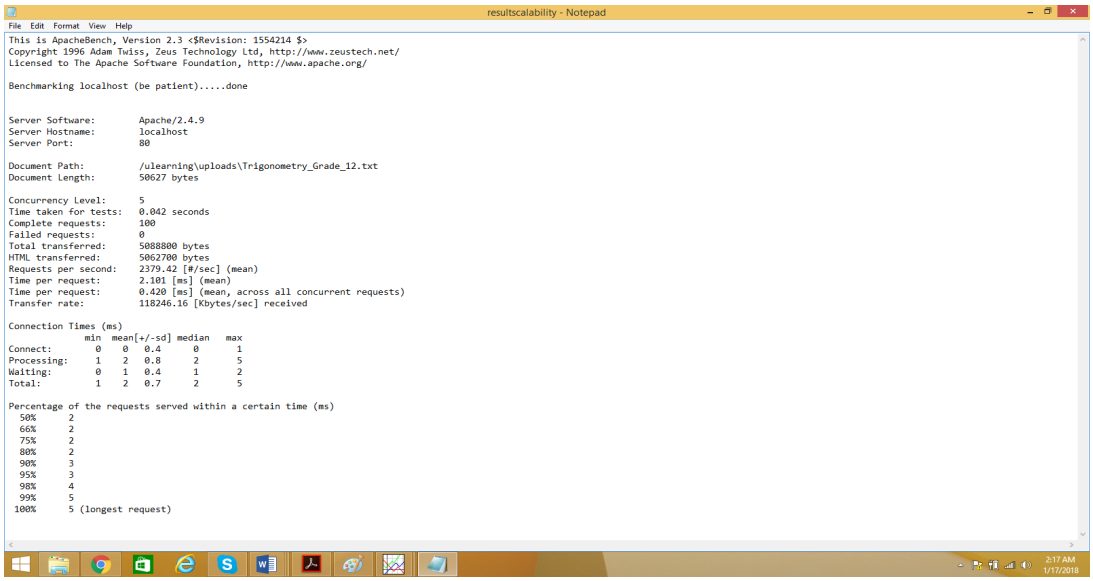

Figure 3: Data captured result for system scalability on localhost system.

Figure 3 shows that the submitted topic is trigonometry and that the document has a length of 50627 bytes. After all of the queries were submitted, the test took 0.042 seconds to complete. Given that 100 requests totaling 50627 bytes were sent, the HTML page has a total size of 5062700 bytes. Because these requests are being issued at a concurrency level of 5, 5088800 bytes are sent in total. The time taken to process all five concurrency level requests

transferred at a rate of 118246.16 Kbytes/sec was 2.101 ms, with an average request taking 0.420 ms. The resulting graph was produced using the gnu plot tool. On the localhost system, a path was selected for the data that was recorded.

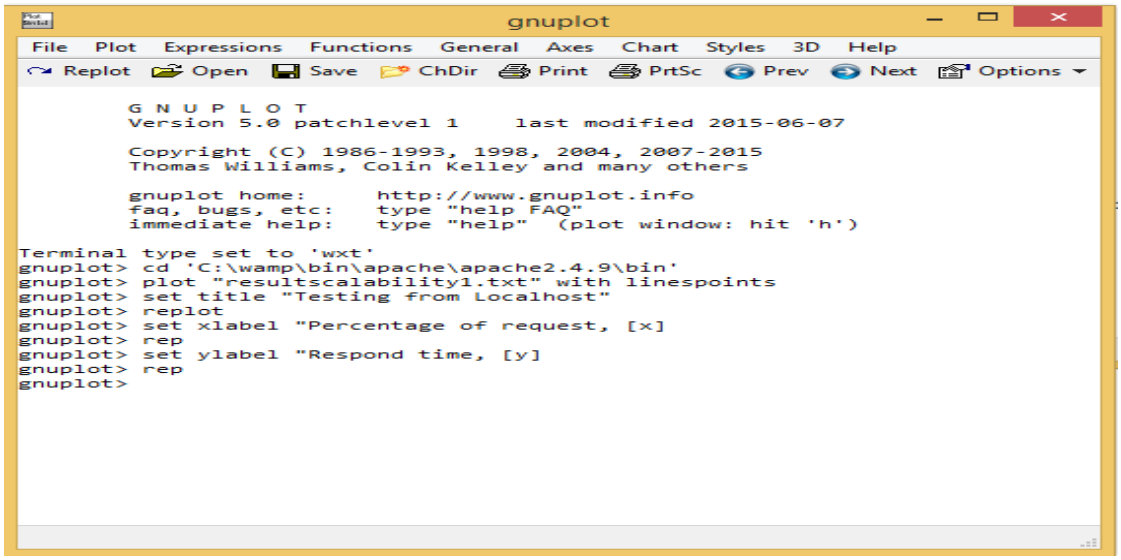

Figure 4: Gnuplot application to generate the scalability result graph for localhost.

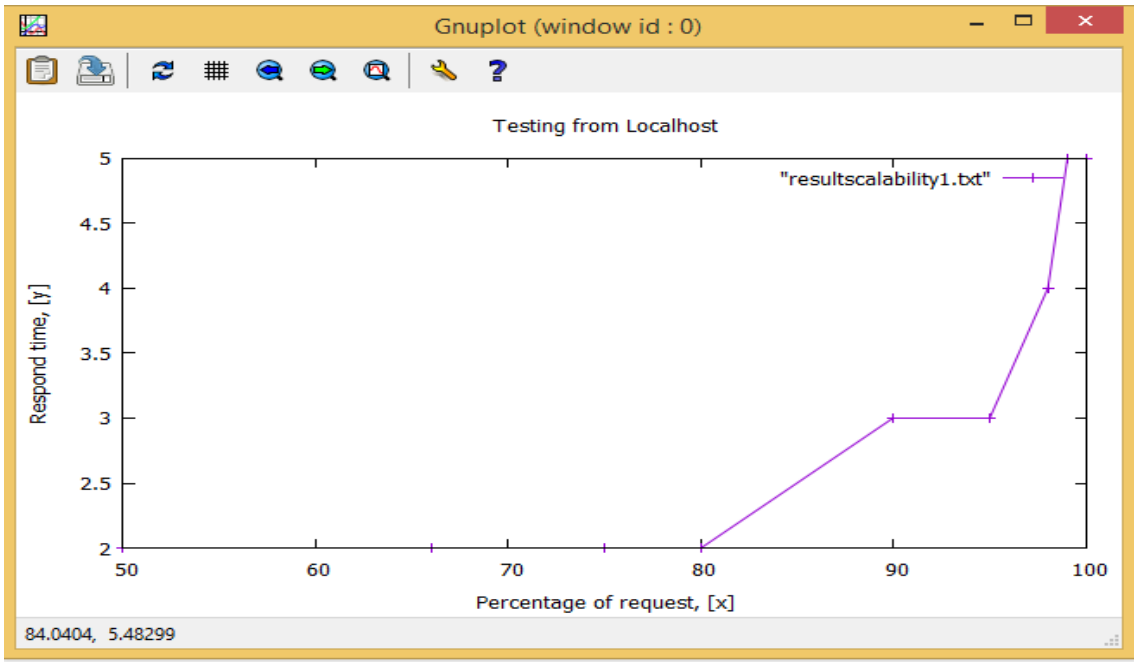

Figure 5: Result graph for system scalability on localhost

Figure 5 shows the proportion of time needed to respond to changes in the x-axis and the response time when changes in the y-axis document length or volume occur. From the local host testing, it was found that there is no discernible disparity in the system's scalability. The result of the system processing the changes in document length and size is stability ranging from 50% to 80% at 2 milliseconds. Moreover, 90 to 95% steady at 3 ms. Just a minor difference of 1 ms separated 95% and 98%. Maintain the same stability for the system's adjustments at 5 ms by going from 99% to 100%. Therefore, considering the analysis outcome on the localhost, we can infer that the system adapts modifications. Wireshark was employed to produce the difference.

Table 1: Result for testing application on scalability

No of Request	System Source (IP)	Time to Request	Time Localhost recives request	Time to respond	Round Trip Time
1	172.20.56.56	15:03:24	15:03:25	15:03:26	0:00:02
2	172.20.56.42	15:03:44	15:03:46	15:03:48	0:00:04
3	172.20.56.59	15:04:04	15:04:11	15:04:11	0:00:07
4	172.20.56.37	15:04:24	15:04:28	15:04:29	0:00:05
5	172.20.56.43	15:04:44	15:04:47	15:04:47	0:00:03
6	172.20.56.73	15:05:04	15:05:10	15:05:10	0:00:06
7	172.20.56.48	15:05:24	15:05:30	15:05:31	0:00:07
8	172.20.56.254	15:05:44	15:05:46	15:05:46	0:00:02
9	172.20.56.34	15:06:04	15:06:05	15:06:05	0:00:01
10	172.20.56.62	15:06:24	15:06:26	15:06:27	0:00:03
11	172.20.56.45	15:06:44	15:06:50	15:06:50	0:00:06
12	172.20.16.82	15:07:04	15:07:13	15:07:13	0:00:08
13	172.20.16.47	15:07:24	15:07:29	15:07:29	0:00:05
14	172.20.16.33	15:07:44	15:07:48	15:07:48	0:00:04
15	172.20.16.36	15:08:04	15:08:12	15:08:12	0:00:08
16	172.20.4.47	15:08:24	15:08:28	15:08:28	0:00:04
17	172.20.16.22	15:08:44	15:08:50	15:08:50	0:00:06
18	172.20.56.88	15:09:04	15:09:11	15:09:11	0:00:07
19	172.20.16.38	15:09:24	15:09:32	15:09:32	0:00:08
20	172.20.56.11	15:09:44	15:09:44	15:09:46	0:00:02

Table 1 shows the results of the tests that were carried out to measure the latency between the client system and the localhost server, as well as the latency between the local host and the server in responding to a request. On a separate machine, this procedure was carried out 20 times at random to test how the application behaved when the server was managing several requests and the network was overloaded with packets, with many requests occurring at once. The system won't achieve an efficient performance level of scalability by conducting this system testing on a small number of systems. For the purpose of testing request and response times as well as time, random sampling was conducted throughout the network on a separate subnet. The request was submitted concurrently on various system sources. The time difference between the client system's request and the server's response time is the average time. The response time less the request time was the round-trip time.

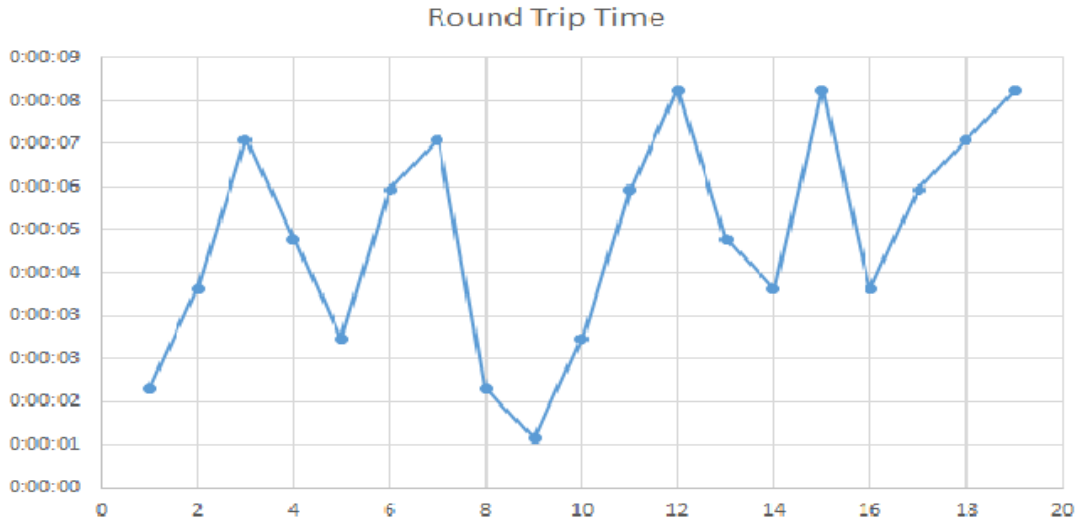

Figure 6: Round trip time graph

Figure 6 shows the results of round trip in table 1. These findings are presented in a visual manner. The network was clogged with numerous packets from different sources attempting to reach the localhost server at the same time, as the graph makes evident. There were three instances where the round-trip time was eight seconds. The nine queries made to the localhost server had the fastest round-trip time, which was one second.

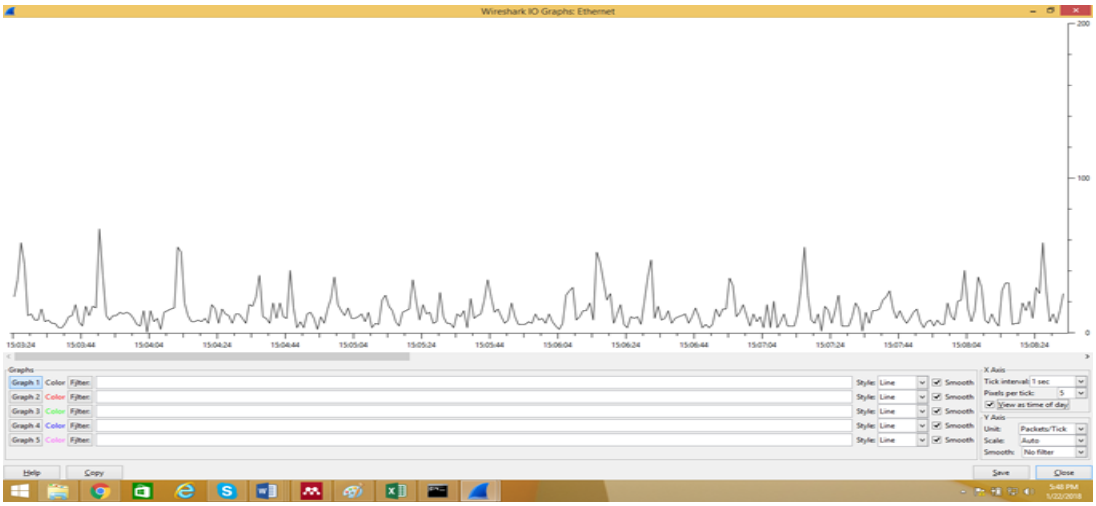

Figure 7: Result of network usage for testing scalability on Wireshark IO

Figure 7 shows the Wireshark IO graph, which displays the total traffic observed in a capture file and is used to assess network utilization during scalability testing. The rate per second in bytes or packets is determined by the test, and it is subject to fluctuations in preferred bits/bytes per second. Tick intervals per second are the default values for the x- and y-axes, respectively, and packets per tick per second. The time of day that was seen on the X-axis corresponded to the request time. Along with the response time, this study also displays the quantity of network traffic that was occurring when a request was made to the system.

As demonstrated by the overall results, which were consistent with the goal of the investigation. The study's objective was to design and evaluate the system scalability's performance level for a web-based e-learning platform. Based on the graph, the system scalability results indicate stability and range from 50–80% at 2 ms, 90–95% at 3 ms, 95–98% at 4 ms, and 99–100% at 5 ms. However, the total travel time, which was (response time–request time). Due to network congestion caused by numerous packet requests from different sources attempting to contact the localhost simultaneously, the longest roundtrip took 8 seconds, while the quickest was only 1 second. Nevertheless, it can be inferred that learners' performance level was good, demonstrating the need to promote the usage of web-based e-learning platforms for knowledge acquisition.

Conclusions and Recommendations

Essentially, by discussing the results in this work, we can conclude that the built system offers an efficient e-learning management system for open distance learning. Therefore, it can also be said that learners' performance levels are good, demonstrating the need for schools to support students' usage of web-based e-learning platforms for knowledge acquisition. Regarding online teaching and learning, the recommendation will enhance technology-enhanced learning.

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Revolutionizing Educ-AI-tion: Shaping the Classrooms of the Future

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Abstract

A new era is taking shape in education with the rapid growth of artificial intelligence (AI). Studies about artificial intelligence (AI) in education are growing, and many believe that teachers and school leaders will have different roles in the future. This study aims to examine how AI has evolved in education and discuss the positive and negative effects of its use. The results highlight the benefits of AI in education, such as enhancing accessibility, saving time and money, providing high-quality education to all, and increasing student engagement and motivation. Conversely, challenges include bias reinforcement, data privacy and security, misinformation, loss of human connection, overreliance, plagiarism, ethical concerns, and job displacement. The study aims to help learners explore the usage of AI in education and understand the necessary ethical regulations for the future.

Keywords: Artificial Intelligence, Education, AI, AIEd, Ethics, Policy, Privacy, Artificial Intelligence in Education, Educational Chatbots.

Introduction

There is a famous quote attributed to Henry Ford, founder of Ford Motor Company: "If I had asked people what they wanted, they would have said faster horses." Now, as we are in a digital century, in all fields including education, we want faster classrooms. With the global penetration of digitalization, new methods are needed for training specialists in various fields, including education. The spread of COVID-19 has demonstrated the relevance of integrating distance education and the latest technologies in education. The objective of this research, titled "Revolutionizing Educ-AI-tion: Shaping the Classrooms of the Future," is to demonstrate the multifaceted impact of AI on education. This research examines the historical origins of AI, its evolution, and its increasing significance in educational institutions. It explores the impact of AI-driven tools and techniques on adapting traditional learning environments to individual preferences. The use of AI in education presents significant potential, although it also poses challenges and ethical dilemmas, particularly in ensuring equitable access and safeguarding data privacy. This research aims to provide insights into the future of AI in education by examining its benefits, challenges, and unexplored domains.

What is Artificial Intelligence?

Artificial intelligence (AI) encompasses techniques that enable computers to imitate human actions and behaviors. In 1956, John McCarthy initiated the Dartmouth Workshop, a meeting for experts developing human-like machines to discuss AI. From 1960 to 1990, AI research focused on modeling human thought processes, followed by the development of expert systems. A paradigm shift occurred in the 2010s when AI began making predictions based on "big data" (Shrivastava, 2023). AI involves tools and systems that exhibit intelligence. Marvin Lee Minsky described AI as "the science of making machines do things that would require intelligence if done by men" (Syropoulos, 2023, p. 20). Alan Turing, a British mathematician, posed the question "Can machines think?" and developed the "Turing test." Russell and Norvig (2021) state that AI systems should communicate, provide information, answer questions, and adapt to new conditions through machine learning. AI comprises machine learning and deep learning, with deep learning recognizing objects, translating languages, understanding words, and generating images (Syropoulos, 2023).

Use of AI in Education

AI has a long history in education, with Sieny Pressey at Ohio University being one of the first to use AI in the classroom in 1920. Pressey's multiple-choice tests improved student assessment and teacher efficiency. Edward Thorndike emphasized immediate feedback in tests in 1927, linking to Pressey's work.

AI's role in education has grown, particularly during the COVID-19 pandemic. OpenAI's ChatGPT, launched in 2022, has accelerated the integration of AI chatbots in education (Ifelebuegu, Kulume, & Cherukut, 2023).

Practices of AI in Education

AI is transforming educational practices, marking the fourth educational revolution (Shrivastava, 2023). AI customizes learning, handles administrative tasks, and provides real-time feedback, enhancing learning outcomes. Key areas of AI in education include:

Automating Administrative Tasks

AI efficiently performs administrative duties, allowing teachers to focus on student engagement. AI can grade multiple-choice tests and is being developed to assess essay-based tests. AI's data-driven insights help teachers make informed decisions, improving learning outcomes (Kamalov et al., 2023).

Intelligent Tutoring Systems (ITS)

ITS combines traditional classroom education with personalized learning. These systems assess student knowledge, track progress, and provide customized guidance, enhancing engagement and performance (Kamalov et al., 2023).

Personalized Learning

AI adapts to students' learning paces and abilities, personalizing education. Personalized Learning Systems (PLS) improve engagement and e-learning outcomes. Research has shown that PLS enhance student engagement and learning outcomes (Kose & Arslan, 2016).

Teacher-Student Collaboration

AI enhances teacher-student collaboration by providing real-time insights into student performance. AI-powered chatbots and tools support learning, improve academic performance, and foster a dynamic learning environment. These tools also identify students who may need additional support and suggest strategies to help them (Ifelebuegu et al., 2023).

Benefits of AI in Education

Enhanced Learning Outcomes

AI personalizes learning through knowledge tracing and collaborative filtering, improving engagement, motivation, retention, and performance. Virtual tutors, voice assistants, and adaptive assessment tools enhance learning (Kamalov et al., 2023).

Cost and Time Efficiency

AI automation saves time and money, allowing teachers to focus on personalized learning and critical thinking. AI-generated lesson plans, lecture slides, and multimedia resources improve teaching efficiency. AI-powered MOOCs and e-textbooks also save educational institutions money, making education more accessible (Kamalov et al., 2023).

Global Access to Quality Education

AI-based tools provide high-quality, personalized education across geographical and socioeconomic barriers, reducing educational inequality and creating inclusive classrooms. AI-powered platforms and chatbots reduce educational inequality and create more inclusive classrooms (Kamalov et al., 2023).

Motivation and Engagement

AI-driven interactive chatbots make learning fun and engaging, increasing student motivation and interest. These tools provide immediate feedback, encouraging students to explore topics at their own pace. Personalized learning through AI applications is more relevant and engaging, thus increasing motivation (Kooli, 2023).

Challenges of AI in Education

Bias Reinforcement

AI trained on biased data may promote prejudices, leading to inequality in educational content and evaluations. The "black box" nature of AI means its information processing is unknown, and biased training data may influence chatbot responses, causing false evaluations and educational inequality (Kooli, 2023).

Overreliance

Excessive reliance on AI may hinder creativity and socialization, essential for learning. Students may overuse AI to answer problems, impairing their critical thinking skills. Teachers may become less engaged if they rely too much on AI for administrative tasks and content creation. AI should be used in moderation to preserve the benefits of human learning and interaction (Mhlanga, 2023).

Misinformation

AI applications like chatbots may spread misinformation if trained on incorrect data. Critical use and source verification are essential to reduce these risks. Students and researchers must verify AI-generated material and compare sources to prevent misinformation (Adetayo, 2023).

Plagiarism

AI tools may unintentionally encourage plagiarism. These tools can recognize and generate new ideas I tools may unintentionally encourage plagiarism. These tools can recognize and generate new ideas, but their ability to write like humans may lead others to use their work without credit. Students may submit AI-generated work as their own, contradicting educational values of originality and honesty. AI systems can detect writing patterns that signify copying, but educators must emphasize academic integrity and proper citation (Ifelebuegu et al., 2023).

Data Privacy

Protecting student data from misuse is crucial. AI technologies manage critical student data, making data protection and security essential. Privacy breaches and data leaks could decrease trust in AI teaching systems. Educational organizations must raise awareness of privacy issues and develop clear standards for AI usage to ensure data security and responsible AI use (Kamalov et al., 2023).

Ethical Concerns

AI in education raises ethical issues, including data protection and transparency. AI-powered classroom robots may limit student interaction with humans, impacting social and mental development. AI training data errors could spread assumptions or biases, causing misinformation. These ethical considerations must be addressed to ensure the safe and moral use of AI in education (Mohammadkarimi, 2023).

Threats to Jobs

AI may replace repetitive tasks, and threatening jobs. AI and technology make banking and manufacturing more efficient but also threaten low-skilled employment, potentially increasing income inequality. ChatGPT shows that AI can aid with everyday tasks and student support, potentially eliminating human jobs. However, AI also creates opportunities for upskilling and new roles, emphasizing the need for proper integration and usage within sectors (Khogali & Mekid, 2023; Chan & Tsi, 2023; Ifelebuegu et al., 2023).

Loss of Human Connection

Machines and chatbots might impact human interactions, essential for empathy and cooperation in education. AI excels in data structure and personalized learning but lacks body language and emotional intelligence. AI might diminish classroom communication and social abilities. AI cannot provide the emotional support and community that teachers offer. To complete education, AI and human participation must be balanced. AI's influence on teacher-student interactions must be considered to maintain educational connections and socio-emotional development (Kamalov et al., 2023; Abbas et al., 2023; Ifelebuegu et al., 2023).

Literature Review

Studies show varying perspectives on AI in education. Lozano et al. (2023) surveyed primary education students, revealing limited initial knowledge about AI. Idroes et al. (2023) found that Romanian undergraduates viewed AI as beneficial yet concerning for job security. Gocen and Aydemir (2021) noted that while AI offers advantages, it also presents challenges, particularly in maintaining educational quality

and ethics. Their qualitative study with 19 participants from four target groups examined the pros and cons of AI in education and society. Teachers acknowledged the advantages of AI over the drawbacks, while academics focused more on the disadvantages. Participants said AI-enabled solutions would help content keep pace with learners, save time and money, allow quick data analysis, and enable proper judgments.

Future Work

Future research should focus on the ethical use of AI in education, developing frameworks, data protection laws, and digital literacy training. Responsible AI use in the classroom involves regulations and standards addressing algorithmic bias and student data ethics. Edtech companies should prioritize transparency and provide detailed instructions to ensure stakeholder security and privacy with AI solutions. AI and VR can provide engaging coursework, and exploring the social implications of AI in education, including parental perspectives on AI-driven career planning, is essential. Digital AI ethics should be organized in all fields to adapt to new challenges.

Conclusion

To effectively use AI in education, teachers must be trained to use the technology correctly, addressing ethical and privacy concerns. The goal of AIEd is not to replace teachers but to enhance productivity and learning outcomes. Who should be in charge of AI in schools? Teachers, students, computer scientists, or technology companies? AIEd's goal is to assist schools, not to promote AI. Teachers can focus on their students' learning when they don't have much workload, leading to better learning results. The future of AI in education is unknown, but students and teachers should remain central to its development.

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AI Competence through AI Literacy: A Guiding Framework for Higher Education

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Abstract

One of the fundamental missions of higher education should be to teach students how to work with artificial intelligence (AI) in their future professional roles. An important concept in guiding efforts to prepare higher education students for an AI-driven world is AI literacy. However, the definition of AI literacy is not fixed and continues to evolve, with little empirical research on the topic. Therefore, it is important to offer a working definition of AI literacy that can be integrated widely into various areas of higher education curricula. Based on the literature, this paper defines AI literacy as an advanced level of competence including the ability to understand AI, use it effectively for given tasks, evaluate and create AI, and exhibit ethical behavior in the use of AI. It presents four dimensions of AI literacy and initial descriptions of those to facilitate the integration of the framework into higher education courses from diverse fields. While such a framework can guide the design of courses focusing on AI literacy and its adaptation will support the establishment of standards for AI use in higher education, discussions about the scope and dimensions of AI literacy in the higher education context should continue.

Keywords: Artificial intelligence (AI) in education; AI literacy; Higher education

Introduction

We live in the age of artificial intelligence (AI). As societies increasingly rely on AI, individuals must acquire the skills to effectively navigate an AI-driven future. International organizations such as the OECD call on governments to take on the responsibility of equipping individuals with the skills necessary to effectively use and interact with AI systems (OECD.AI, Principle 2.4, 2019). Evidence shows that people working alongside an AI-powered system outperform the AI system (or humans) operating alone (Fugener et al., 2022). Although there is a tendency to ban the use of AI in education, graduates will inevitably encounter AI in their careers. Thus, one of the primary missions of higher education should be to teach students how to work with AI in their future professional roles (Cardon et al., 2023). So far, AI has been predominantly considered a technical subject in higher education, primarily confined to the STEM fields, such as computer science and engineering (Southworth et al., 2023). However, AI's growing significance in business and society mandates its more widespread incorporation into higher education curricula. While AI literacy is an emerging term, it has the potential to guide educational efforts to prepare students for AI-driven professional landscapes. Therefore, it is important to establish a working definition and a guiding framework for AI literacy that can enable its integration into various subjects in higher education.

What is AI?

In its most general sense, AI is the "science and engineering of making intelligent machines, especially intelligent computer programs" (McCarthy, 2007, p. 2). Yet, the definition of intelligence, especially human intelligence, remains open to debate among AI scholars. AI refers to both *intelligent* machine ability (Allen, 2020) and the broader discipline of creating and studying such intelligent systems. It encompasses various research fields such as neural networks, machine and/or deep learning, data mining, and computer vision (Getchell et al., 2022). For some, it is also a marketing term invented to make certain types of automation seem more sophisticated than they are, therefore, making research in the field easier to fund (Bender, 2023).

There is a distinction between traditional rule-based AI and machine learning approaches. Traditional AI models rely on explicit rules within the code or predefined patterns. Broadly known as machine learning, the second approach to AI involves computers learning structures and patterns from data without being explicitly programmed for these tasks. As this approach gets more sophisticated using neural networks and deep learning architectures, it is becoming closer to mirroring how the human brain operates and learns. While research on AI has been conducted since the 1950s (Thon et al., 2021), significant progress has been made more recently through the second approach. AI technology reached a level of performance so advanced that in 2023 the CEO of a Chinese video game company, NetDragon, was replaced by an AI bot (Kay, 2023).

Generative AI (GenAI), a subfield of deep learning, for instance, can generate new content in various formats, such as text, visuals, or videos, without explicit coding for each task. The latest GenAI models are capable of interacting with humans through text, audio, and video. An example of a GenAI model is the Chat Generative Pre-Trained Transformer, or ChatGPT, first released to the public by OpenAI in November 2022. ChatGPT is a "large language model," originally designed for natural language processing and understanding, trained on very large datasets. Models such as ChatGPT can be adapted for specific tasks with a procedure called fine-tuning using much smaller training data (once a base model is trained). More recently, the term "foundation model" has been suggested as these systems are becoming multimodal, accepting text as well as other media as inputs (Bommasani et al., 2021).

GenAI systems exhibit impressive performance in various tasks such as text summarization, translation, answering questions in multiple languages, and generating "original" text or media (Cotton, 2023). They are based on advanced deep-learning architectures and complex probabilistic models (Wu et al., 2023). In other words, they neither understand the meaning of the information they generate nor can they verify it. Thus, the quality, quantity, and representational capability of the data used to train an AI model play a vital role in its performance (Allen, 2020; Konishi, 2016). However, the large amount of data required to train these systems may contain personal or sensitive information, and this data can be collected, stored, and processed without user consent. As a result, accuracy, potential biases, data privacy, and security issues are significant challenges encountered in the use of AI (Getchell et al., 2022). Due to the lack of accurate sources, researchers often emphasize the necessity of approaching the reliability and accuracy of materials generated by AI with skepticism (Hurlburt, 2023).

AI Literacy

McBride (2015) defines literacy as the ability to read and write (Ng et al., 2021). Today, the definition of literacy has expanded to include new forms in an ever-changing and complex world. The notion of AI literacy is a relatively new term mainly emerging from the disciplines of computer science, information science, and business and management. Arguably the term was first coined by Konishi in 2016. While Konishi did not provide a clear definition, she advised us to let go of the tasks AI can perform for us while investing our energy in the things AI cannot perform.

This paper argues that AI literacy is a potentially important concept in guiding our efforts to prepare our students for an AI-driven world. However, the term does not have a fixed meaning. It is even better to describe it as a moving target given the fast-changing nature of advances in AI. Also, little empirical research exists on the topic (Laupichler, 2022). Thus, there is a need to offer a working definition of AI literacy for educational purposes. This can be achieved by investigating the types of competencies that will be required in the future in which AI alters the way that humans interact, work, and live with one another and with machines (Long & Magerko, 2020).

In an earlier publication on the topic by Kandlhofer et al. (2016) AI literacy was recognized as highly important for future careers in science and engineering. The authors stated that AI literacy enabled "people to understand the techniques and concepts behind AI products and services instead of just learning how to use certain technologies or current applications" (p. 2). They suggested a set of AI-related computer science topics, described the content, and offered instructional strategies for different grade levels from kindergarten to high school to develop AI literacy. Thus, one can consider their AI literacy definition as topic-focused rather than competency-based.

For Long and Magerko (2020) AI literacy is "a set of competencies that enables individuals to critically evaluate AI technologies; communicate and collaborate effectively with AI; and use AI as a tool online, at home, and in the workplace" (p. 598). They viewed digital literacy as a prerequisite for AI literacy and scientific and data literacy as informing AI literacy. However, for them, computational literacy, that is knowing how to write a code, is not a requirement for AI literacy. They proposed a set of competencies, such as recognizing AI, understanding intelligence, identifying AI's strengths and weaknesses, and imagining future AI applications, which would entail AI literacy. They further offered design considerations when teaching AI literacy. In this regard, the AI literacy concept proposed by Long and Magerko points to a competency-based approach that does not technically require an understanding of computer science topics as a prerequisite and focuses on using AI, which every student from any field can develop.

Similarly, Ng et al. (2021) define AI literacy as "having the essential abilities that people need to live, learn, and work in our digital world through AI-driven technologies," (p. 2) based on an extensive literature review. They examined 46 studies published from 2016 to 2021 focusing on how the researchers define AI literacy. To provide a better understanding, they categorized the AI literacy definitions appearing in the literature under Bloom's taxonomy of the cognitive domain. They recognized that in most of the studies, AI literacy was related to knowing and understanding, using AI applications in everyday life, and applying its underlying concepts and structure in different contexts. Fewer studies focused on higher-level outcomes of Bloom's taxonomy relating to analyzing,

evaluating, and creating levels. They also found that most research they reviewed pertained to primary and secondary students with only a few studies focused on higher education levels.

Southworth et al. (2023) were also inspired by Bloom's taxonomy to define AI literacy. Drawing from Long and Magerko (2020) and Laupichler et al. (2022) they defined AI literacy as "the ability to understand, use, evaluate, and ethically navigate AI" (p. 5). They suggested five areas for AI literacy: enabling AI, knowing and understanding AI, using and applying AI, evaluating and creating AI, and AI ethics. This model laid the foundation of an AI across-curriculum initiative at the University of Florida, enabling instructors to focus on different AI literacy areas in their courses.

Cardon et al. (2023) define AI literacy as a "collective wisdom" that can be developed with instruction. In the context of business communication, they put forward four sets of capabilities: application, authenticity, accountability, and agency. Application has to do with understanding AI tools and how well they can support a specific task at hand. This will require knowing about various generative AI tools and their capabilities and understanding their strengths and weaknesses. Authenticity is related to a concern with "genuine communication and prioritizing the human element." This entails personalizing information in the context of business communication. It may require tailoring the text with a self-voice to ensure it addresses the needs of the audience. Thus, students need to pay close attention to evaluating the content of the text. Accountability entails accepting responsibility for the accuracy and appropriateness of AI-generated information and employing generative AI fairly and equitably. Agency refers to professionals keeping control over their decisions that will require constant human input and control. This model emphasized tailoring AI-generated content, ethical use, and retaining human decision-making authority.

The examination of the literature illustrates that the notion of AI literacy was initially regarded as a technical subject, closely related to computer science topics. Later on, it evolved from being a technical skill to the ability to effectively use and evaluate AI for current tasks. Furthermore, elements such as ethics and agency in the use of AI have also become increasingly important. Bloom's taxonomy has been utilized by researchers to characterize different aspects of AI literacy to make the concept more understandable. Thus, the notion of AI literacy has evolved from being a technical subject to a skill that can be developed by anyone (Figure 1).

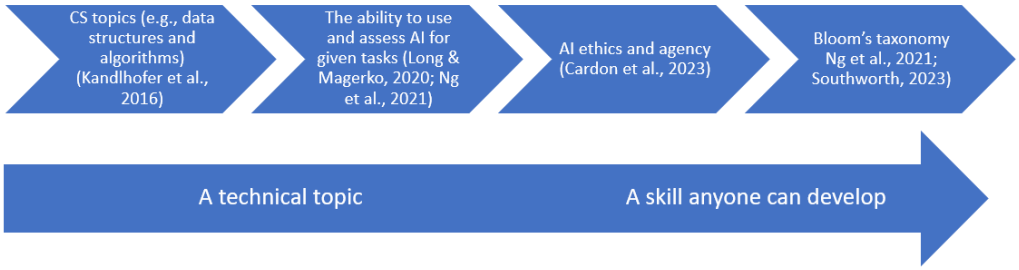

Figure 1. Evolution of the meaning of AI literacy

A Framework for AI Literacy

Based on the existing literature, AI literacy is defined as an advanced level of competence encompassing the abilities to understand AI, use it effectively for given tasks, evaluate and create AI, and exhibit ethical behavior in the use of AI. And AI literacy is characterized in terms of four dimensions: (a) knowing and understanding AI, (b) using and applying AI, (c) evaluating and creating AI, and (d) AI ethics (Ng et al., 2021; Southworth et al., 2023).

Table 1. AI literacy dimensions

Knowing and Understanding AI ·Knowledge of fundamental concepts related to AI and existing AI systems. Understanding the foundations of AI and how it operates. Knowledge about the data used to train AI systems and the limitations of this data.
Using and Applying AI ·Effectively and ethically using AI tools and platforms to solve problems or complete tasks.

Evaluating and Creating AI ·Evaluating existing AI systems from technical and ethical perspectives; designing and building ethical and fair AI systems or creating original AI usage strategies.
AI Ethics ·Understanding the social, moral, and ethical consequences of using AI, making informed decisions about AI use in different contexts, and demonstrating ethical behavior.

Although the four general AI literacy categories appear in the literature (Table 1), their scopes and descriptions are not always clearly defined. Furthermore, there is a lack of information on how to incorporate these categories into course design. Initial explanations for these dimensions are provided below. Although it has been specified as a separate category, AI ethics has been integrated into all categories.

Knowing and Understanding AI

This dimension, covering the categories of knowledge and understanding in Bloom's taxonomy, fundamentally corresponds to knowing basic concepts related to AI and existing AI systems. This level may include knowledge about concepts such as data, code, algorithms, models, machine learning, deep learning, artificial neural networks, natural language processing, and contemporary AI systems, but is not limited to them. Additionally, understanding the principles of how AI operates is addressed at this level. Related to AI ethics, educators may aim to develop knowledge and understanding of the data used to train AI systems, how these data are obtained, and their limitations.

Using and Applying AI

This category encompasses the skills of effectively and ethically using AI tools and platforms to solve problems or complete tasks. AI tools can perform various tasks such as text generation, summarization, code writing, solving mathematical equations, and generating ideas. This dimension focuses on being able to identify appropriate AI tools for given tasks and using them to complete tasks, considering ethical requirements. Siemens et al. (2002) state that human cognition and AI should be considered as complementary, not alternative, ways of thinking. In this regard, discrete cognitive activities can be identified for machines and humans. Educators should evaluate the achievements of using and applying AI in the context of their courses with this perspective and determine optimal human-machine collaboration in course activities or in assessing learning. For example, Oregon State University (n.d.) suggests classifying course achievements based on Bloom's taxonomy in the age of generative AI, considering the capabilities of AI and human skills.

Evaluating and Creating AI

This dimension relates to evaluating existing AI systems in terms of effectiveness and ethics. Additionally, it also involves designing, developing, or creating new strategies for AI to be used most efficiently for given tasks. In other words, this level may correspond to developing programming skills for creating AI systems in technical courses, as well as developing new strategies for using AI efficiently for tasks in social sciences and humanities departments. Different from the skills of using AI, at this level, students can be expected to create or develop original strategies for AI use. Creating novel AI usage strategies can involve skills such as generating effective prompts to elicit the desired output from AI tools, and developing methods for effectively using different AI tools simultaneously.

AI Ethics

AI ethics should be internalized and transformed into behavior beyond knowledge and understanding. Therefore, although it is integrated into all other categories, AI ethics is treated as a separate category in the framework. In this category, students are expected to understand the social, moral, and ethical consequences of using AI, make informed decisions about the use of AI in different contexts, and, as a result, expected to demonstrate ethical behavior in creating or using AI systems.

Implementing the AI Literacy Framework

The AI literacy framework can be implemented at the university or program level. To ensure that all aspects of the framework are covered, available courses that focus on the AI literacy dimensions should be identified first. This will help determine which types of new courses need to be designed to address all four dimensions. This implementation approach used in some large universities in the USA is called the “course AI identification

approach" (Southworth, 2023). However, this approach requires a large-scale effort at the university or program level.

A more practical approach would be to integrate the framework directly into single courses in higher education. The framework takes advantage of Bloom's taxonomy of learning outcomes. The descriptions of the four categories can function as a guide to design course outcomes. For this purpose, determining both general and specific AI literacy outcomes under the four dimensions using a two-step method based on Bloom's taxonomy for determining learning outcomes will be useful (Gronlund, 2004). Gronlund's approach is an alternative to the behavioral approach and allows educators to avoid writing down all observable and measurable learning outcomes. It is sufficient to create a subset that could be an indicator of general learning outcomes (in this case the four categories of the AI literacy framework). In this way, specific learning outcomes that can more effectively guide the planning of course content can be determined. Educators can expand or differentiate specific learning outcomes considering the dimensions of AI literacy and the scope of a particular course.

Curriculum content covering these four areas can be adopted into courses from various fields in higher education. While the first and third categories (knowing and understanding AI; evaluating and creating AI) may be more emphasized in a technical field, the third category (using and applying AI) may gain more significance in humanities and social sciences courses. However, even with different distributions and weights, it is important to include all four dimensions.

Conclusions

It is essential to emphasize that while the presented framework could be an important starting point, the descriptions of the AI literacy dimensions may not comprehensively address AI literacy in all aspects. AI should be viewed as a dynamically evolving field, developing rapidly. The primary purpose of this paper is not to present a fixed and immutable framework for AI literacy but rather to provide a starting point for research in this area and encourage dialogue about the scope of the concept. The suggested descriptions for AI literacy dimensions could be useful for developing AI literacy questionnaires, which could be applied at a large scale. The four areas can guide the development of items, which then can be refined through qualitative and quantitative data analyses.

The framework could guide the design of courses that target AI competence in higher education. Instructors can evaluate their available courses in terms of the dimensions and identify any gaps regarding the framework. There are benefits to implementing such a framework in higher education. Firstly, basing the AI literacy framework on a widely known learning outcomes framework, such as Bloom's taxonomy, will facilitate the adaptation of the framework, given that educators may already be structuring their courses based on Bloom's taxonomy. The adaptation of such a framework will further support the establishment of standards for the use of AI in courses. As explained above, it is important to address all dimensions of the framework, even though the weight and scope may vary across different subjects. Addressing AI ethics as an integral part of all the categories, in particular, will play a critical role in determining guidelines for the responsible use of AI in course activities and assignments.

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Micro-Credentials and Recognition of Prior Learning: Offering Flexible and Relevant Learning Opportunities for ODL Learners

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Abstract

Open and Distance Learning (ODL) is an approach that offers accessibility and flexibility to learners in various contexts. Recently, there has been a focus on incorporating micro credentials and recognition of prior learning (RPL) to enhance the adaptability and practicality of learning experiences in ODL systems. This systematic review explores the relationship between micro credentials and RPL in ODL settings, emphasizing how they provide flexible and relevant learning opportunities for ODL learners. The study aims to investigate various aspects, including examining possible issues related to integration of micro credentials into ODL programs and alongside RPL, identifying the benefits and challenges for ODL learners, analyzing strategies for recognition and accreditation of micro credentials. A comprehensive investigation was conducted in scholarly databases, including Scopus and Google Scholar, from 2014 to 2024, analyzing peer-reviewed publications on micro credentials and RPL in ODL. This study specifically examines the incorporation of micro credentials and RPL in ODL programs, providing insights into effective integration strategies employed by universities. Overall, this systematic research explores the scope and potential of micro credentials and RPL in distance learning settings. In conclusion, micro-credentials and RPL are vital in online and distance learning. They enable learners to showcase acquired skills from various experiences. Implementing quality assurance, innovative teaching methods, and technology-enhanced environments enhances education, fostering lifelong learning and improving outcomes. By embracing these processes and technological advancements, we can create a more inclusive, adaptable, and efficient online and distance learning ecosystem.

Keywords: Open and Distance Learning, micro-credentials, recognition of prior learning

Introduction

Online learning has emerged as the primary medium for educational delivery during the COVID-19 pandemic, thus underscoring the necessity to understand the factors related to online learning outcomes (Yu, 2021; Yan et al., 2021). For newer users, micro-credentials were identified as valuable in facilitating emergency remote teaching contexts. A value of these credentials is as a way to begin to operationalize teaching techniques and make us sort of have these educational identities and so forth (Kumar et al., 2022).

Within the realm of open and online learning, micro-credentials have garnered a substantial amount of interest providing learners with short competency-based units of learning that are in line with the requirements of the industry (Wheelahan & Moodie, 2021). Evidence-based micro-credentials could help with personalized learning, clear visibility of learners' credentials, and increased inclusive practices in assessment and credentialing (Reed, 2023). In addition, micro-credentials are appealing to professionals, policymakers, and stakeholders because they offer learners variations on accredited learning pathways that, when combined, adequately recognize and convey what they have achieved throughout their life (Gibson et. al., 2016).

According to Selvaratnam & Sankey (2021), research into micro-credentials (including digital badges) is still a nascent area of investigation, and concerns creating, communicating and maintaining an overarching vision for a useful learning system. Global efforts are under way now, to define what micro-credentials are, how to ensure they represent a quality learning experience, and what can be expected from learners, employers, education providers, and edtech companies in this exchange (Lang, 2023).

On the other hand, recognition of prior learning (RPL) recognizes the learning that takes place outside formal education and that all learning experiences should be acknowledged (Snyman & Berg, 2017). Additionally, Zawacki-Richter et al. (2020) emphasizes that the framework of open education incorporates several different components, including open and remote learning, open educational practices, massive open online courses (MOOCs), and RPL. ODL focuses on the on-going learning of new skills and knowledge over the span of an individual's life. This is reflected in RPL mechanisms that recognize and value learning from a range of different experiences. This, in turn, helps to nurture lifelong learning pathways for students (Snyman & Berg, 2017; DeVries, 2019).

Considering this fast-developing field and increasing interest from educators, it is important to conduct a systematic review to (1) provide an overview of where the field stands and (2) identify some key questions and challenges. This research aims to conduct a review with the purpose of exploring the existing literature on the subject to gain an adequate insight. The objective of this review is to examine and answer two fundamental research questions:

- RQ1. How have publications on micro-credentials and prior learning in higher education evolved over time?
- RQ2. How is the research focus distributed within the field of study?

Methodology

Systematic literature review approach was utilized in the study. The systematic review process consisted of several key steps. Firstly, a comprehensive screening of relevant studies that addressed application-related problems was conducted. Secondly, the quality of these studies based on predetermined inclusion and exclusion criteria was evaluated. Thirdly, which studies would be included in our review were determined. Lastly the findings from the selected studies were analyzed to extract themes in order to draw meaningful conclusions (Kowalczyk & Truluck, 2013). PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) quality standards were implemented during the search process for this systematic review. The search method used in each database included using the topic phrases 'micro-credentials' and 'previous learning' in combination. Based on the guidelines provided by the recommended reporting elements for systematic reviews and meta-analyses (PRISMA; Moher et al., 2010), published journal articles on micro-credentials and recognition of prior learning in ODL were systematically reviewed.

Data Sources and Collection

The study utilized Scopus and Google Scholar scholarly databases. These databases were chosen to ensure a comprehensive search of relevant literature. The timeframe for the search spanned from 2014 to 2024, to capture the most recent and up-to-date research in the field. The data collection process involved carefully reading and analyzing the selected articles. Key information such as types of micro-credentials, integration strategies, benefits, challenges, recognition practices, and accreditation practices were extracted and recorded.

Search Strategy

To gather relevant articles, the search strategy included the use of specific keywords “micro-credentials”, “microcredentials”, “micro-cred*” “microcred*” and “prior learning". The asterisk sign used as wildcard character indicating that any letter combination will be accepted. The reason for doing so is to include the expressions with or without dash (-) and plural or singular versions (like “credential” and “credentials”). Finally Boolean operators (AND, OR, NOT) were used to refine the search and ensure the inclusion of relevant articles. Table 1 shows the initial search strings.

Table 1. Initial Search String.

	Topic	**Search Terms**
-	Micro-credentials	micro-credentials OR microcredentials OR micro-cred* OR microcred*
Boolean Operator		AND
-	Prior Learning	Prior Learning

Inclusion and Exclusion Criteria

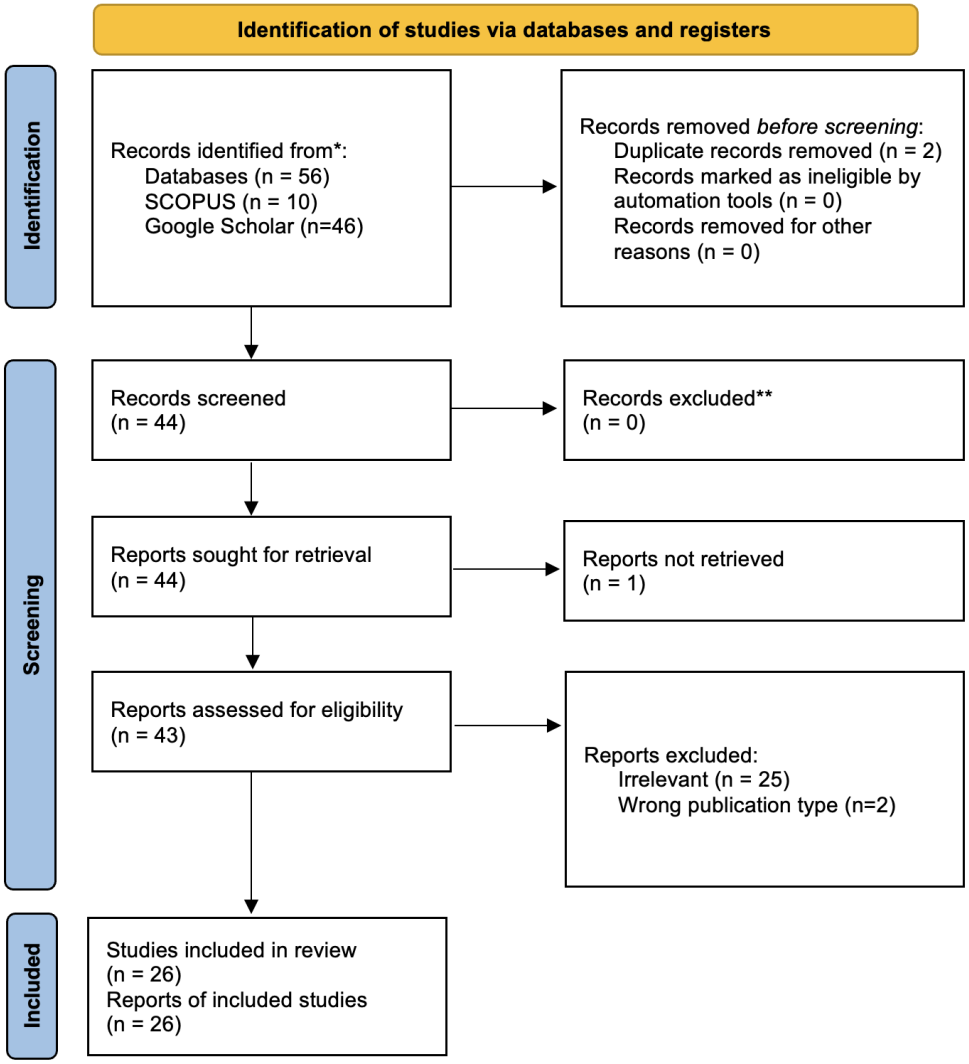
Peer-reviewed full text articles which were published between 2014 and 2024 included in the search design focusing on micro-credentials and recognition of prior learning in ODL settings. Non-English articles and irrelevant to the research topic were excluded.

Data Analysis

The collected data were analyzed using a thematic analysis approach. The key themes identified in the literature, such as integration strategies, benefits and challenges were organized and synthesized. Patterns, trends, and relationships within the data were identified to draw meaningful conclusions.

Following the first screening process, there were 56 publications that still needed to be screened in their entirety (see to Figure 1). Nevertheless, two of them proved inaccessible, both via the library databases and attempts to reach out to the authors. Consequently, a total of 54 publications were obtained, evaluated, and categorized. After excluding 28 papers, 26 articles were left for analysis.

Figure 1. Diagram for the Article Selection for Systematic Literature Review



The 26 remaining publications were first analyzed for their overall characteristics, including the year of publication and main topic. Based on this first analysis, the research questions were used to identify and classify relevant texts using a selective reduction approach. Subsequently, the researcher used the categories to develop themes that are linked to the study topics.

Results

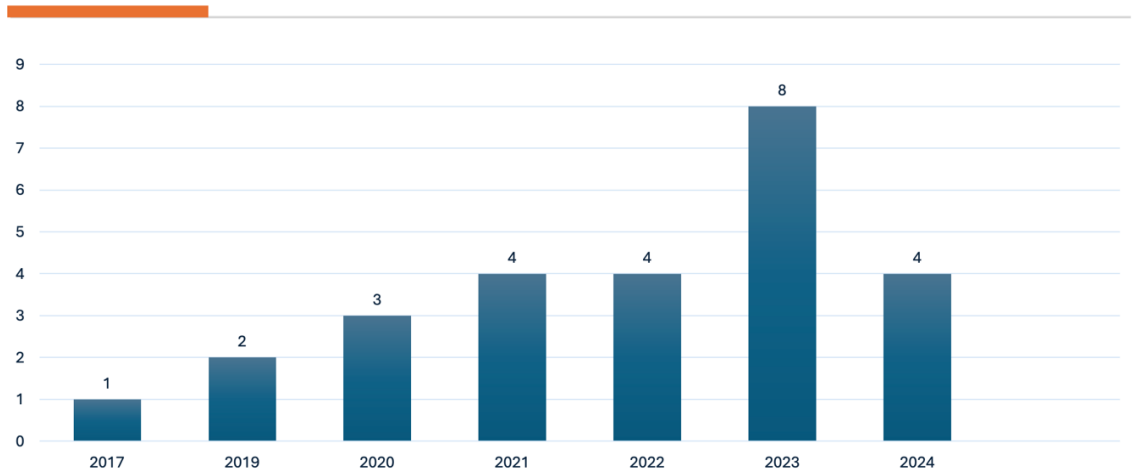
The findings of this study provide an analysis of the evolution and distribution of research on micro-credentials and prior learning in higher education. Addressing both research questions, the temporal progression of publications, highlighting significant trends, peaks, and shifts in scholarly interest over time is charted.

RQ1. How have publications on micro-credentials and prior learning in higher education evolved over time?

The articles were classified based on their year of publication. Figure 2 illustrates a rise in publications during the epidemic era. The analysis analyzed 26 specifically chosen papers that were published from 2017 to 2024. The demand for micro-credentials and recognition of prior learning (RPL) had a substantial increase between 2017 and 2023. The Covid-19 epidemic created social and economic restraints, which compelled workers to seek

alternate means of requalifying to maintain competitiveness in the job market. It is evident that the majority of the publications released following the epidemic have prioritized the exploration of micro-credentials and RPL as solutions to the difficulties brought about by the pandemic.

Figure 2. The Distribution of Publications on Micro-credentials and Prior Learning in Higher Education Over Time



RQ2. How is the research focus distributed within the field of study?

The study indicated that the bulk of research in this field tends to focus on many crucial features. First, there is a sizeable research-based literature on the challenges faced by universities in their integration of micro-credentials and RPL processes. These studies are very valuable for revealing the challenges and obstacles that need to be tackled to ensure the proper adoption and utilization of micro-credentials in educational contexts.

Much of the literature written on this topic also serves to pinpoint what steps must be taken and what skills of the learners enable the students/learners to be eligible for micro-credentialization and RPL adoption. Understanding these success factors will enable educators and policy makers to develop strategies to enhance the deployment and use of micro-credentials within education.

Lastly, a considerable part of the research looks at the contribution of micro-credentials and RPL to processes in the social, economic, and higher education sectors. They examine the broader considerations and impacts of including micro-credentials and RPL in the field of education. Driven by a research agenda focused around how micro-credentials and RPL can support workforce development, economic productivity and social inclusion. Researchers are interested in uncovering the multiple uses and benefits that micro-credentials and RPL could contribute in a wide array of contexts.

Conclusions

In an earlier review, Brown et al. (2021) states that the inconsistency in terminology and credit size, as well as the existence of several models for obtaining a micro-credential, such as self-directed modes and acknowledgment of past learning, renders the field's navigation perplexing and disorienting. This review's results indicate that higher education institutions intending to implement micro-credentialing and acknowledge past learning should be cognizant of the key players and their role within a broader ecosystem. In line with the research conducted by Brown et al. (2021), which identified students, educational institutions, governments, and employers as the four main stakeholders in the micro-credentials ecosystem, this study's findings indicate that higher education institutions can be seen as the central players in the micro-credentials and recognition of prior learning ecosystem.

Even though the introduction of micro-credentials and RPL in higher education serves as an enabler of many activities, there are a number of obstacles that make their path longer. People have concerns, primarily about accusations of privatizing education and muddying the waters when it comes to differentiating between public and private higher education provision (Desmarchelier & Cary, 2022). This critique is crucial as a reminder to consider

the consequences of restructuring educational offers to fashion programs to fit micro-credentials, so as not to exacerbate existing education disparities.

The implications of embedding micro-credentials, and RPL, require a systemic framework that covers the socio-economic and lifelong learning aspects of these aspects in addition to the technical and pedagogical ones. With the increasing domination of the market and commercial imperatives in the higher education landscape due to the critical juncture brought about by the pronounced impacts of marketisation, digital platforms, and commercial drivers, universities are forced to mediate between market requirements and educational standards and fairness (Williamson, 2020). The convergence of economic interests and educational ideals underscores the intricate processes that shape the recognition and execution of micro-credentials in higher education environments.

Furthermore, research has delved into the components of micro-credentialization and what factors contribute to its effective implementation (Maina et al., 2022). It is essential to identify these elements to create more favorable conditions for the acceptance of micro-credentials and ensure their recognition. The integrated effect of success factors and enablers on the incorporation of micro-credentials could help educational institutions better integrate micro-credentials into their existing configurations to realize their benefits for learners. Likewise, researchers have examined the capacity of micro-credentials to facilitate several processes in the social, economic, and higher education domains (McGreal et al., 2022). Policymakers and educators may use the many functions of micro-credentials and recognition of prior learning in various industries to achieve beneficial results at both societal and institutional levels.

The discussions in the review underscore the complexities and challenges of micro-credentials and RPL in higher education Variation in nomenclature, credit size, and routing to certification compounds current confusion in the area known as well as the ways the field often fails to grasp who the primary players determining outcomes are and what they do in the superstructure. Higher Education Institutions are a critical part of the micro-credentials and RPL ecosystem, as well as students, educational institutions, governments and employers.

The criticisms that the process of deconstructing existing courses to mould micro-credentials may lead to the privatization of education and create a gray area in higher education, blurring the lines between public and commercial provisions grow legitimate. It is also very important to seriously study the impact of changes in curriculum to avoid the deepening of educational accessibility gaps by adding micro-credentials.

In addition, the selection of micro-credentials and recognition of prior learning must be seen in its broader socio-economic context, rather than as merely a question of technology and education. Given the increasing rise of digital platforms and matching commercial models in higher education, this balance between demand and supply is essential to prioritize educational quality and equity. The alignment of economic interests and educational ideals highlights the complex processes that influence the acknowledgment and implementation of micro-credentials in higher education settings.

In addition, other studies have pointed out key elements and enablers of success for the widespread adoption of micro-credentialization. Through their determination and implementation, institutions can generate circumstances where micro-credentials stand a better chance of being recognized. Moreover, the potential of micro-credentials and acknowledgment of past learning to facilitate diverse functions in social, economic, and higher education sectors has been investigated. These benefits may allow for micro-credentials and prior learning recognition to be implemented by policymakers, educators at broad levels, and departments to deliver results that are well received by society and institutions.

In conclusion, the findings of this study highlight the importance of successfully handling the complex nature of micro-credentials and RPL in higher education. Educational institutions informed by studies of the consequences and addressing the objections as well as leveraging the potential benefits can implement these improvements to benefit a more holistic and effective learning environment.

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Optimization of University Academic Performance Through Asynchronous Wooclap. Case Study

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Abstract

In the Degree in Fundamentals of Architecture at the Universitat Politècnica de València (UPV) in Spain, there has been a recurring issue of a high percentage of failures in the theoretical part of the Structural Calculation subject taught in the third year. This problem has persisted over the years despite different promotions of students. To address this issue, an active methodology will be applied to two of the six groups of students in the subject during the current 2023/2024 academic year. The goal is to improve student results. Subsequently, the results obtained in the evaluations of these experimental groups will be compared to those of the remaining students who have followed the traditional methodology. This article presents the results obtained after incorporating an interactive response tool into the chosen group's teaching and learning system. The study used the Wooclap platform in an asynchronous distance learning context, at the students' pace. This tool allows questions to be asked to the students, who can respond whenever and wherever they want. This promotes their autonomy and deepening of the topics. The possibilities of deferred feedback and flexibility in participation are also addressed, which can enrich the educational experience. The research results indicate that using this tool has a positive impact on students' academic performance. Therefore, it is recommended to implement it not only for other students in the same subject, but also for students in other subjects of the degree program.

Keywords: Wooclap, self-learning, test, skills, feedbach

Introduction

The current generation of university students has undergone a significant change compared to recent educational history. Generation Z, born between the mid-1990s and the mid-2010s, have been heavily influenced by rapid technological advancement, digital connectivity, and immediacy. They are digital natives, quick to adapt to new platforms and devices. However, this increased dependence on technology may sometimes lead to a deficiency in critical thinking skills. Additionally, they are multitaskers, capable of performing multiple tasks at once, such as listening to music, checking social media, and studying, which can influence their learning style. Unlike Millennials, they have a noticeably shorter attention span and a greater demand for immediacy. The new university student body prefers interactive and participatory learning, enjoying dynamic educational environments that offer instant feedback. This change in the profile of university students influences the way they approach learning and poses new challenges for teaching and educational methods. Understanding these particularities is crucial for designing effective pedagogical strategies that align with the needs and preferences of Generation Z students.

On the other hand, the integration of technology and gamification in the university environment has emerged as an innovative and effective strategy to enhance the teaching-learning process. This pedagogical approach combines the use of technological tools with playful elements to actively involve students in their own educational process. This combination promotes participation, commitment, motivation, and the development of key skills among students. In fact, the active involvement of students in the educational process has been recognized as a fundamental factor for improving deep and meaningful learning of subjects, promoting substantial understanding, and facilitating long-term retention and effective transfer of knowledge. The involvement of students contributes to the assimilation of complex concepts, the development of critical skills, and the internalization of content in a meaningful context.

In the current context, it is essential to rethink educational strategies and take advantage of the available technological tools to offer training that meets the demands of the 21st century. With the new technology available, teachers can create interactive learning environments that incorporate the Student Response Systems (SRS) approach and can be used in face-to-face, virtual or hybrid teaching. One of the innovative and cutting-edge tools in this sense is Wooclap. This platform allows real-time interaction through surveys, open questions, quizzes, and polls. Teachers can evaluate student comprehension and adapt teaching according to the received responses, which can be anonymous or not. It also incorporates gamification of learning since it can be used in competition mode, providing a podium with winners, capturing the interest and attention of students. Another advantage of Wooclap

is its ability to generate detailed analysis of student performance, which provides the teacher with valuable information about areas where students may need additional support. Therefore, this tool is an effective means to increase student participation, evaluate their academic progress, and create more dynamic and student-centered learning experiences.

The aim of this study is to enhance the motivation and participation level of the students enrolled in the subject of Structures 1, taught in the third year of the Degree in Fundamentals of Architecture at the Universitat Politècnica de València (UPV). For this purpose, the tool Wooclap was used during the second semester of the 2023/2024 academic year in two experimental groups out of the total of six groups of students who are taking the before mentioned subject.

Methodology

The compulsory subject of calculation of structures in which the following research has been developed is relevant to the Degree since in its 9 ECTS credits it lays the foundations for the study of the behaviour of isostatic structures both at the level of stress and deformation. It analyzes the basic dimensioning of structural elements by criteria of resistance, deformation and stability. The syllabus corresponding to the calculation of normal stresses within the Strength of Materials has been chosen to enhance student interest in these concepts, improving their understanding by receiving immediate feedback and optimizing the learning process. The knowledge acquired in this subject will allow them to size and assess beams and columns based on resistance criteria using Navier's Law. The learning outcomes are:

- Understanding the behaviour of types of bending in isotropic, continuous and homogeneous materials.
- The sizing of linear structural elements subjected to normal stress in the elastic regime.
- The representation of the normal stress diagram of simple and compound sections.
- The correct application of the concept of elastic Resistant Module of the section.
- The calculation of the maximum load that can be supported by a bar subjected to normal stress based on resistance criteria.

To achieve the proposed objective, three Wooclap questionnaires have been implemented within this subject during the 2023/2024 academic year. These activities have been generated in asynchronous mode and have been linked to the online platform of the Universitat Politècnica de València, called PoliformaT. Students enrolled in groups A2 and C have had access to these activities by completing each of them within the deadline established by the teacher. The teacher acts as a guide in the students' learning process, marking the times for carrying out the different proposed tasks. This tool has allowed students to know the correct answers at the end of each questionnaire. Additionally, it offers the teacher information on the students' level of understanding of the subject taught, allowing them to clarify and reinforce the concepts in the next group session.

The three tasks that have been designed in online questionnaire mode work on the following aspects of the subject:

Wooclap 1: general concept of stress

The first questionnaire focuses on reviewing the fundamental hypothesis and principles on which we base the concepts related to the stress state of a point as well as remembering the stress-strain diagram of steel and concrete. Students usually memorize these basic concepts but have difficulty dreawing conclusions and applying them to questions different from those already worked on previously. This questionnaire attempts to promote deep understanding and not simply understanding by repetition.

Wooclap 2: types of bending

This second task focuses on working on understanding the different types of bending that occur in the section and calculating the maximum stress. The difficulty that students have is to identify the main axes of inertia and calculate the position of the neutral axis for the different cases of stresses that act on the section. Finally, they must identify the most unfavorable points of the section, which will be those that present a maximum stress value.

Wooclap 3: optimal profile position

In this last questionnaire we work on the optimal position of the section when it is made up of composite profiles. In ths way, the student will be able to have judgment and properly orient the beams and pillars in the design of their structures, acquiring criteria to apply them in their professional projects. The knowledge worked on this lesson has transversality with other subjects taught in the degree, such as the Projects subject, in which students can correctly design the structures of the buildings they create. In this Wooclap the competition mode was used to try to motivate more the students.

Once the deadline for students to answer each questionnaire has closed, the teacher comments on the results of each question in the next session, justifying the validity or not of each response alternative. The teacher focuses on the answers that the students have mostly failed, reinforcing the explanation in those aspects.

Student satisfaction level with Wooclap

To take care of all aspects of this research, the teacher conducts a survey of the students to evaluate the use of Wooclap. The survey is carried out at the end of the lesson, just before taking the corresponding evaluation test. This survey combines open-response questions with questions based on a Likert scale, as can be seen in Figure 1.

1. Express your opinion about the lesson with Wooclap activities included:

(1= Strongly disagree, 2= Disagree, 3= Neutral, 4= Agree, 5= Strongly agree)					
	1	2	3	4	5
1.1 I have paid more attention to the explanation to better answer the questionnaire later					
1.2 I have been more motivated during the sessions					
1.3 They help me to increase my participation in the sessions					
1.4 They help me to increase my interest in the subject					
1.5 They make the theory sessions easier to follow					
1.6 They provoke debate situations with classmates and the teacher					
1.7 They help me to better understand the concepts discussed					
1.8 They help me to think more deeply about the theoretical concepts discussed					
1.9 Competition mode motivates me more to answer the questions					
1.10 The number of questions has been correct					
1.11 I would like this tool to be incorporated into other lessons					
1.12 It has been easy to use this tool in asynchronous mode					

2. What did you like most about Wooclap?
3. What did you like least about Wooclap?
4. How would you improve the use of Wooclap in the lesson?

Figure 1. Survey to evaluate the degree of student satisfaction with the use of Wooclap.

Results

The three questionnaires carried out are analyzed below, both from the point of view of student participation and the results obtained in each question.

Results of the three Wooclap

The three tasks have been carried out with a separation of three weeks between them. Wooclap 1 was held on February 12 2024, the second one on March 4 and the third one on March 25. The students were able to answer each questionnaire for a whole day.

Firstly, Table 1 shows the level of student participation in these activities. Next, Figures 2 and 3 represent the result of correct answers obtained in the two experimental groups in each question for the three tasks.

Table 1. Group A2 and C participation.

Wooclap	Online students		Students that log in to Wooclap		Students that answer the questionnarie	
	Group A2	Group C	Group A2	Group C	Group A2	Group C
1	48	50	48	45	46	42
2	57	50	50	50	50	46
3	58	53	49	47	48	46

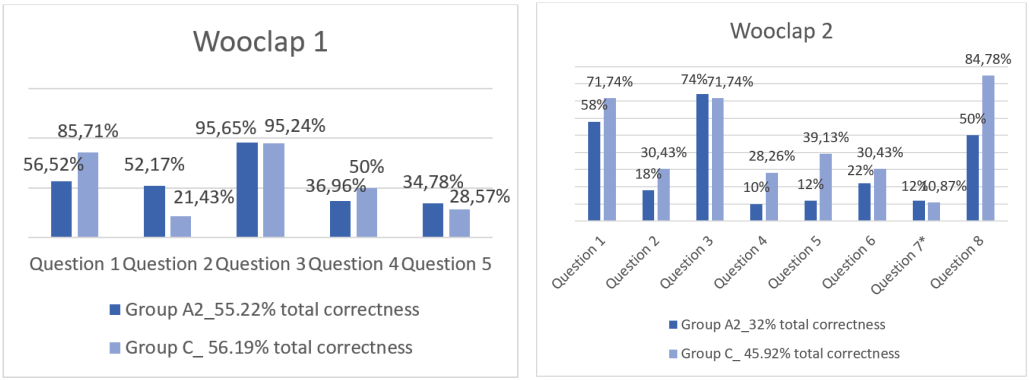

Figure 2. Results of correct answers in Wooclap 1 and 2 in the two experimental groups.

In Wooclap 2, question 7 was multiple response, 52.72% got one or both valid solutions right in group C while in group A2 it was 69%. Given that question 4 of Wooclap 2 had a very low percentage of correct answers in both groups, in Wooclap 3 it was repeated in question 1 in a very similar way to observe if the knowledge about how to locate the neutral axis in the section based on the current requests, it was consolidated after the pertinent explanation of the teacher in the previous questionnaire. Figure 3 shows how the results improved slightly in group C and considerably in group A2 in that question.

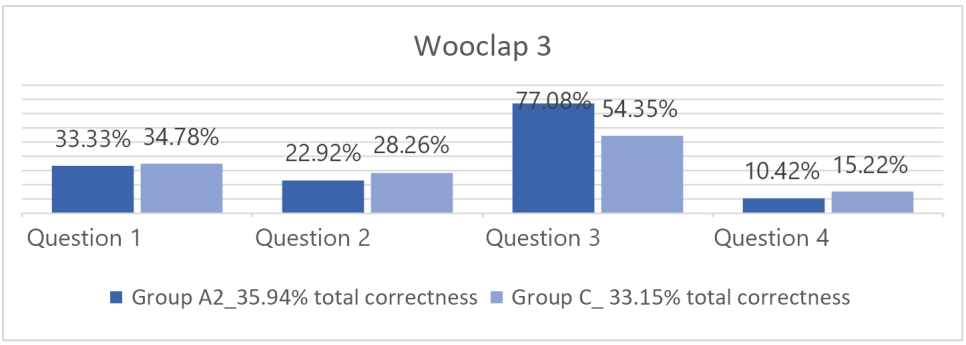

Figure 3. Results of correct answers in Wooclap 3 in the two experimental groups.

Results of the survey of the degree of satisfaction of the tool

The implementation of this new tool has been very well received by the 92 students who responded to the survey, 42 students from group C and 50 students from group A2.

The results depicted in Figure 4 are extracted from both groups based on a Likert scale of 12 questions.

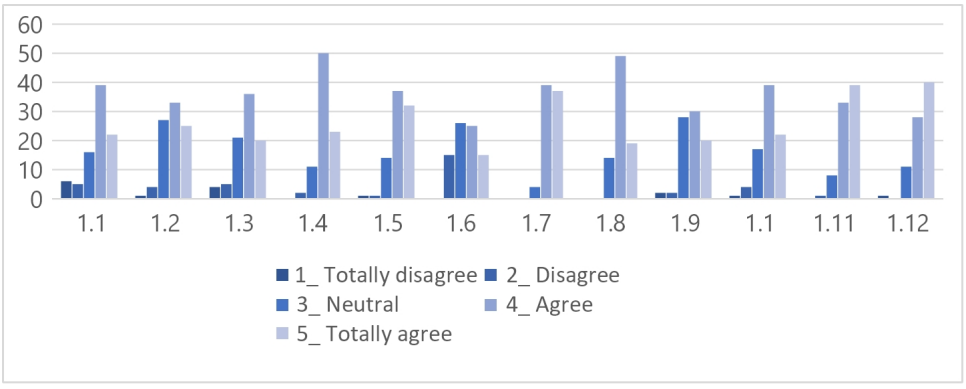

Figure 4. Results of the survey in both experimental groups A2 and C.

The graph shows how the opinions “agree” and “totally agree” clearly predominate compared to the rest, with the results in the two groups being very similar in all questions. Therefore, the survey shows excellent results in terms of the degree of student satisfaction regarding the use of this tool. Figure 5 summarizes the average values obtained in each question. The average values are close to 4 (on a scale of up to 5) in all questions.

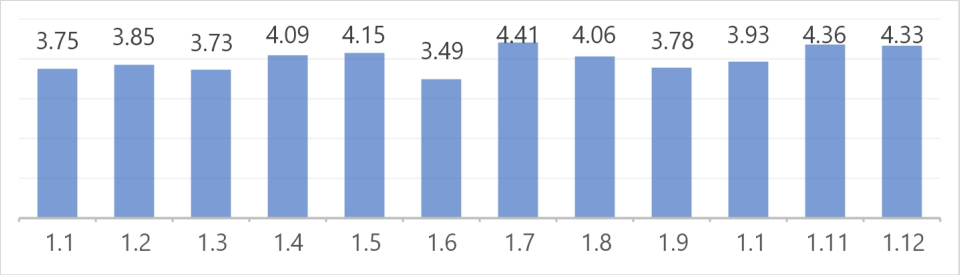

Figure 5. Average values in the 12 questions based on a Likert scale.

The answer to question 7 ("They help me to understand the concepts better") is overwhelmingly positive since 76 of the 90 students surveyed marked a value of 4 or 5, which represents 85% of the number of students. Likewise, the answer to question 11 ("I would like this tool to be incorporated into other lessons") is also very positive since 72 of the 81 who responded marked a value of 4 or 5, representing 89% of the student body. These data corroborate the students' interest in the implementation of Wooclap in lessons.

Regarding the open-response questions of the questionnaire, the students reflected that what they liked most about Wooclap is that it is very interactive, ease of participation, and the fact of learning in a different way the theoretical part of the subject. However, they also expressed some concerns, such as feeling rushed to think and answer, too much time for each question, inability to change answers before time runs out and the inability to go back.

Finally, they presented ideas on how to improve the use of the tool, showing interest in dedicating more time to discussing the answers in groups and adding more questionnaires throughout the topic taught.

Results of the B0a evaluation test of the experimental groups

The evaluation test carried out consisted of a theoretical question and a practical problem. The theoretical part had an impact on the final exam grade of 30%. Figure 6 shows the data obtained in the two experimental groups.

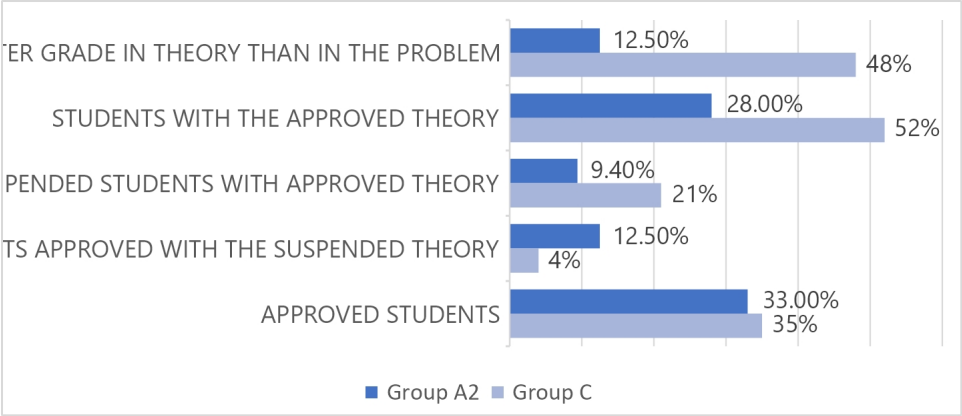

Figure 6. Data obtained in the evaluation test of the two experimental groups.

The results obtained in the 3 Wooclap are analyzed in theoretical questions similar to those posed in the evaluation test, observing that 33% of the students have improved their answer in the exam.

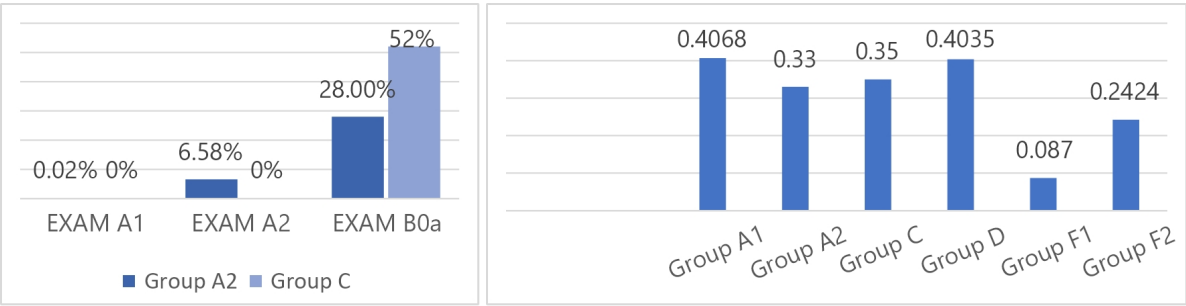

Figure 7. Percentage of students with the theory approved in the course exams (left) and Percentage of passes of the complete last exam B0a (right).

It is interesting to compare the results that these two experimental groups have obtained in the theoretical part of this last exam with the marks in the theoretical part that the same students obtained in the previous exams. The satisfactory evolution is clearly seen in the Figure 7 (left).

Finally, the Figure 7 (right) shows the percentage of passes of the complete last exam B0a in the six groups that make up the total of the subject. It is observed how the two experimental groups A2 and C present a passing percentage slighly lower than that of groups A1 and D, and clearly higher than that of groups F1 and F2.

Conclusions

Implementing gamification through the use of Wooclap increases student motivation and improves their performance. Results show that 85% of students say that it helps them better to understand the concepts, while 89% want the use of this application to be implemented in other lessons.

The incorporation of this methodology in the Normal Stress lesson of the subject Structures 1 in the Degree of Fundamentals of Architecture has facilitated the understanding of theoretical concepts, showing a progressive improvement in the responses of the students of the experimental groups (A2 and C). The positive evolution of the results of the theoretical part that the same students obtained in the last B0a exam compared to those they obtained in the previous A1 and A2 exams in which Wooclap was not used.

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SQLatch: Enhancing SQL Learning through Interactive Block-Based Programming

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Abstract

Databases have been proven to be a topic of significant importance in the Computer Science domain, with their usage spreading from simple data storage in an application, to maintaining and supporting critical infrastructures and services. Learning this subject, however, is challenging due to the abstract nature of database concepts and Structured Query Language (SQL) logic, which significantly diverges from conventional programming paradigms, creating obstacles for learners. Traditional text-based learning approaches often fail to engage students effectively, leading to a steep learning curve and diminished interest. Research indicates that visual learning environments can significantly lower these barriers, making abstract concepts more tangible and interactive. In this context, a block-based tool, similar to Scratch, emerges as a promising solution for SQL learning.

This study introduces SQLatch, a web-based application combining a block-based interface where students can interact with SQL learning activities and content, and build their own SQL queries. Drawing on the familiarity of students with visual coding platforms like Scratch, SQLatch offers a similar user experience tailored for introductory SQL learning, offering a novel approach to bridging the educational gap in database instruction. The paper provides a theoretical background on the domain, presents related work in the field, and elaborates on the architecture and functionalities of the proposed tool. Further, it explores the application of SQLatch in educational contexts and presents preliminary findings from piloting the tool among students, concluding with reflections on its effectiveness and potential improvements.

Keywords: Programming Learning, SQL, Databases, Block-Based Programming, Educational Technology.

Introduction

Studying Computer Science comes with an inevitable intercourse with database science and SQL programming. Data storing, analysis, and manipulation are important for establishing the foundation of a wide range of applications in our everyday life. Those processes are achievable through the organization of available data in databases and SQL language integration in software code. However, learning SQL using the traditional methods of learning courses has been proven to be a challenge as both students and teachers are expressing their concerns on this subject (Soflano et al., 2015; Renaud & Judy, 2004). Long and exhausting theory lectures and usage of poorly written learning material turn database learning into an overwhelming and unappealing subject, giving students the feeling of being thrown into a deep-end.

One possible solution to this arising issue seems to be the integration of gaming into the learning process. Gaming can offer numerous benefits in the learning process (Tahir et al., 2020; Morales-Trujillo & García-Mireles, 2020; Santos & Beja, 2019), engaging learners in immersive experiences that promote active participation and skill development while also contributing to the development of students' critical thinking and problem-solving skills. Furthermore, the interactive nature of games allows for personalized learning experiences, where learners can explore topics at their own pace and receive immediate feedback on their performance. By integrating gaming into the learning process, educators can create dynamic and inclusive environments, adjustable to diverse learning styles and preferences, ultimately leading to more effective and enjoyable educational outcomes, keeping students from losing interest and motivation.

Following this principle, SQLatch was implemented as a web platform that offers a gamified SQL learning experience to its users. SQLatch follows the popular drag-and-drop block-based design for query construction as a high percentage of students are already familiar with this kind of structure. Additionally, SQLatch displays important theory content of SQL commands and also provides learning scenarios and exercises so that students can better absorb and consolidate their newly acquired information and knowledge.

Related Work

Despite the limited existence of literature on innovative ways of teaching SQL, similar attempts have been made on the creation of educational tools and methods, aimed at helping students better understand database theory and SQL commands. Surprisingly, each study depicts a different aspect of technology usage and educational perspective. A web-based tool for SQL teaching and learning (Soler et al., 2006) was created on ACME, an e-learning platform for undergraduate technicians and engineers. This tool provides students with practical SQL problems and scenarios while also keeping track of statistics and providing feedback. Through this tool, students' weak points can be discovered so that personalized attention and feedback can be provided to them. SQLearn is another browser adaptive SQL environment that personalizes the provided content. In particular, SQLearn consists of two parts, the browser extension and the online testing platform. Students' interaction with the online platform is being tracked and the browser extension suggests personalized online resources suitable for a given concept for each individual student. In the form of online assistants, a chatbot (Balderas et al., 2022) and an SQL query generator (Parikh et al., 2022) have been developed and integrated into e-learning platforms. The chatbot-based platform presents students with exercises and scenarios classified into three levels of difficulty. The student is able to interact with the chatbot, proposing solutions or asking for hints and the platform provides feedback on the given answers. On the other hand, Auto-Query, was mainly designed to retrieve data for users with little to no previous SQL knowledge. Auto-Query converts natural language questions into SQL queries using a deep neural network with a high accuracy percentage.

Following the gamification educational approach, Tahir et al. (2020) implemented SQL-Tutor, an intelligent tutoring system that teaches SQL and incorporates game elements. In particular, goals, assessments and challenges were implemented in SQL-Tutor and students earned badges upon completion. Similarly, a free online game called SQL Island was utilized in an SQL assignment by Xinogalos & Satratzemi (2022) to motivate active student participation during the Covid-19 lockdown. Soflano et al. (2015) investigated the effects of adaptive game-based learning by developing a 3D role playing game about SQL. In this study participants were randomly placed into groups, each using a modified version of the game: A non-adaptive mode that treats all students the same and takes no account of the student's learning style, an out-of-game adaptive mode, where the characteristics of a student are identified by a learning style questionnaire and accordingly applied to the gameplay and finally an in-game adaptive mode where the student's characteristics are identified during the gameplay. Morales-Trujillo et al. (2020) in their study used QueryCompetition, a gamified web system that allows students to practice SQL while solving challenges and competing with each other, to investigate the effects of gamified elements in education. Schildgen & Rosin (2022) developed an SQL-Injection Learning game to help students understand how hackers operate. This game provides students with hints with which, using their SQL knowledge as well, they can breach the security of the game's websites, exploit vulnerabilities and retrieve data. There are also other innovative ways of teaching SQL. Santos & Beja (2019) proposes a peer learning model among students where students with a high level of expertise were given the mentor role through gamified course activities while the study of Renaud & Van Biljon (2004) indicates the effectiveness of two different SQL teaching strategies, exposing students to the concepts of SQL from the beginning of their first year into the university until the end of their third year or introducing students to SQL only at their third year level.

Several researchers have adopted gamification strategies to enhance programming instruction. Kazanidis et al. (2018) detail the use of an augmented reality (AR) mobile app that incorporates gamification to promote collaborative learning among undergraduates. This app engages students in group activities, bolstering their cooperative and problem-solving skills. Jiang & Li (2021) explore the effectiveness of Scratch, a block-based coding platform, in developing computational thinking for primary school students lacking programming backgrounds. Their research underscores Scratch's utility as an introductory programming tool. Furthermore, Alp & Bulunuz (2023) investigate the combined effects of Scratch and web-assisted cooperative learning on enhancing critical thinking in fifth graders, with a particular focus on creating educational content about biodiversity.

The Case of SQLatch

SQLatch is an innovative web application designed to facilitate the learning of SQL commands and database theory through a gamified approach. Building on established pedagogical strategies, SQLatch incorporates a block-based interface that mirrors the user-friendly designs of popular educational tools, opts for a better user experience and ease of use, as a high percentage of students and teachers are already familiar with this type of interface. The application guides users through interactive exercises and engaging scenarios to teach the fundamentals of SQL and enables them to construct their own databases and experiment with query functionalities. It provides immediate feedback on user actions, reinforcing learning and encouraging iterative improvement.

Design and Implementation

Design

The primary design objective during the development of SQLatch was to ensure its user-friendliness, making it accessible to individuals with minimal or no prior programming experience. This accessibility is achieved through a simple, intuitive interface consisting of two main components: a puzzle-like sandbox and a Theory/Interactive Scenarios tab.

The sandbox allows users to construct SQL queries by connecting blocks, mimicking the process of building queries from fundamental components. This approach simplifies the complexity of SQL syntax and logic, enabling users to create both simple and complex queries through a visual, hands-on method. The Theory/Interactive Scenarios tab complements this by providing foundational SQL concepts and interactive learning scenarios. Users can apply the concepts they learn directly in the sandbox, offering immediate, practical experience.

The integration of these two components results in a gamified learning experience. The interactive scenarios within the Theory/Interactive Scenarios tab require users to engage actively with the sandbox to complete tasks, thus merging theoretical learning with practical application.

Technologies Used

To ensure that SQLatch is both modern and performant, the application is built using Next.js, leveraging the capabilities of React and TypeScript frameworks. (Fig.1). The core block-based functionality of SQLatch is powered by a customized implementation of Google's Blockly Library. Originally designed for general-purpose programming, Blockly was specifically tailored to support SQL query logic, allowing users to visually assemble SQL statements.

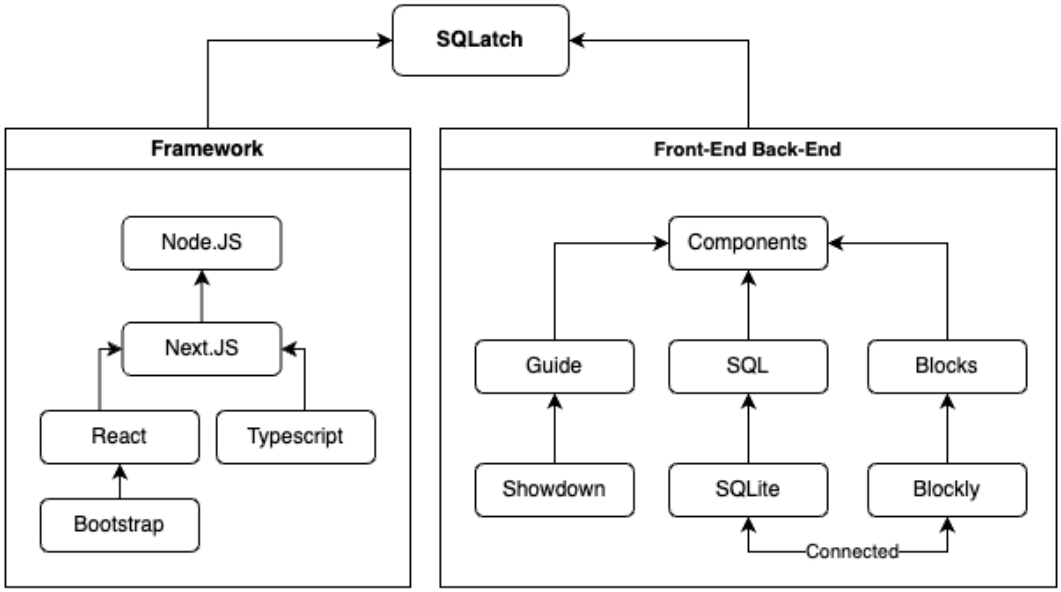

Figure 1. Technology Stack Diagram.

To execute the queries generated by Blockly, SQLite was integrated as the database management system. SQLite, is an open-source and lightweight database that operates directly within the browser, significantly reducing the resources and complexity that hosting a traditional SQL server would entail. This strategic choice enhances the application's efficiency and accessibility.

Finally, SQLatch is deployed using an NGINX server, which optimizes performance by enabling fast load times. This efficiency is primarily due to NGINX's ability to compress media files, significantly reducing the data size and consequently saving bandwidth for both the server and the client.

The Web Application Interface

The application interface consists of three main components as illustrated in Fig. 2. On the left-hand side, the Toolbox contains a selection of available blocks. Next to this is the Sandbox, where users can construct SQL queries by dragging, dropping, and connecting blocks from the Toolbox. On the right-hand side, the Learning Material and Scenarios panel provides access to essential SQL theory, interactive exercises, and engaged scenarios. This panel can be conveniently minimized by clicking the blue arrow button on its side, allowing for a focused workspace. At the top-center of the interface are two critical buttons. The green button executes the constructed query within the canvas, providing immediate feedback on its functionality. The blue button generates a schema of the created database, offering a visual representation of its structure.

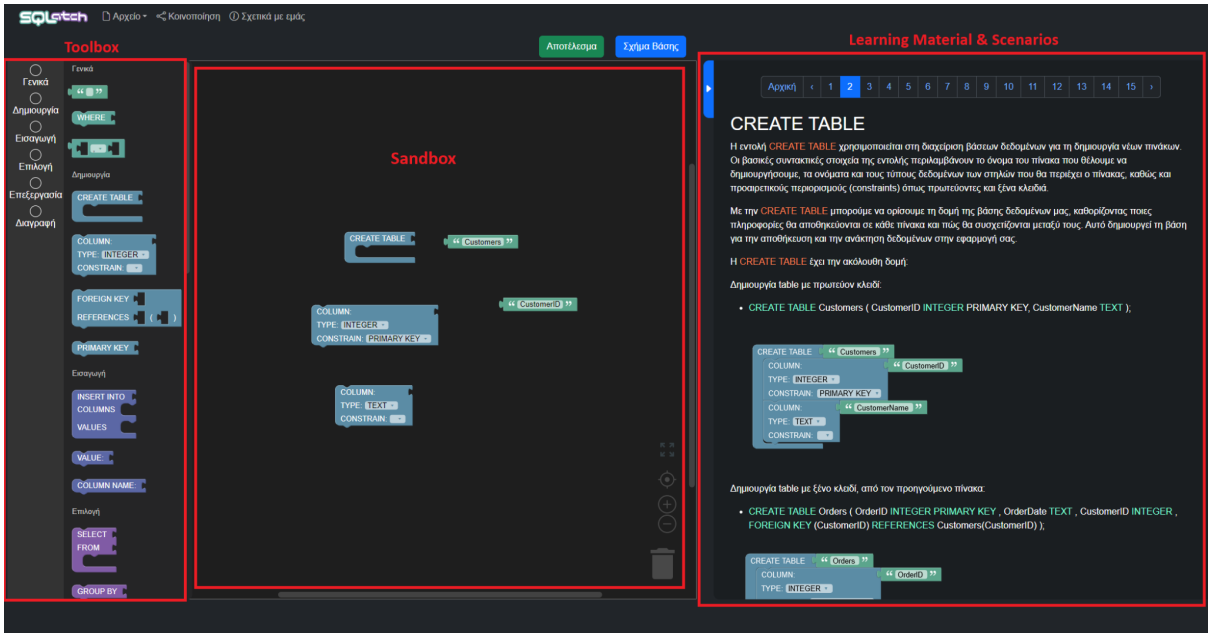

Figure 2. The User Interface of SQLatch.

SQLatch Features

SQL Theory & Exercises

The SQL Theory & Exercises are presented on the right-side panel. This panel includes fundamental SQL theory accompanied by practical examples. After the users recreate the example inside the sandbox, they receive a pop-up message that either rewards them upon successful completion or encourages them to try again if errors are detected. Following several lessons, users are presented with exercises that require them to solve questions based on the material they have learned so far. If a user is stuck on a question, they can click the "Show Correct Answer" button to reveal the solution.

Learning Scenarios

Likewise, the Learning Scenarios are a part of the right-side panel and function in a manner similar to the Exercises. However, instead of presenting a list of questions, the Learning Scenarios offer an interactive story accompanied by animations, divided into smaller segments. Each segment introduces a storyline that presents a problem to be solved using SQL blocks. These problems are designed to progressively increase in difficulty, requiring the student to apply and combine the knowledge gained from the Theory section to solve increasingly complex challenges. After each part of the scenario is completed successfully the user can proceed in the next part. Additionally, there is a “Show Correct Answer” button that the student can press if they need assistance.

SQLatch Sandbox

The Sandbox is located on the left-side panel and provides students with various blocks grouped into different categories based on their functionality. These blocks can be dragged onto the canvas and connected to form SQL queries. Connections can only be made if the blocks are "compatible," thus preventing the user from creating syntax errors.

Schema Visualization

SQLatch provides a clear and comprehensive view of the database structure through its schema visualization feature. Near the green "Execute" button in the upper center of the screen, there is a blue "Display Schema" button. When clicked, SQLatch displays a visual schema of the database that the user has created. This visual representation includes the names of tables, columns, data types, and primary/foreign keys. Additionally, it shows the foreign key relationships between tables through connective lines, providing a clear and comprehensive view of the database structure (Fig. 3).

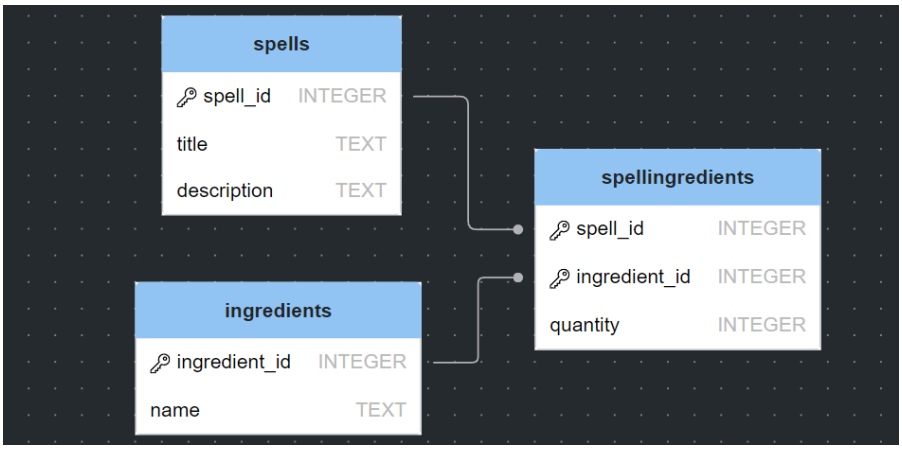

Figure 3. Example of Schema Visualization.

Project sharing & save-load functionality

By using the navigation bar located at the top of the screen, users can decide to save/load their work as a JSON file, as well as generate a link that upon visiting, loads the sandbox canvas that the user shared.

Preliminary Results

During this project's presentation inside the university, the platform was demonstrated to 33 students of the Computer Science Department of Democritus University of Thrace. Out of these, 17 students actively engaged with the platform, testing and exploring its various features. They were requested to visit SQLatch, interact with it for a few minutes, and explore all the major parts of the platform. Subsequently, the students were asked to share their feedback, specifically highlighting features they liked or disliked and commenting on its overall usability and ease of use.

The feedback from the participants was overwhelmingly positive. The user-friendly interface was much appreciated alongside the easy-to-follow interactive scenarios and exercises. Many of them recognized the platform as a valuable tool for learning SQL and expressed its potential utility in educational settings. Positive feedback was given regarding several features of the platform, including the sandbox environment, the seamless block export/import functionality, and the well-structured lessons. However, a notable concern raised by the students was the lack of translation options and the absence of mobile support.

Conclusions

This paper presented SQLatch, a game-based platform designed for teaching and learning SQL through an interactive, play-and-error approach. SQLatch aims to prevent syntax errors and facilitate the acquisition of practical SQL knowledge by engaging users in constructing queries through a visual, block-based interface.

The initial reception of SQLatch among university students demonstrates promise for the potential of the application as a valuable tool in SQL teaching and learning. However, it is important to note that the participants number was limited, and SQLatch has not yet been fully implemented in a formal educational setting. Moving forward, further research and testing are essential to refine SQLatch and adjust its features to appeal to the needs of users. By addressing these considerations and continuing to iterate based on user feedback, SQLatch has the potential to become a valuable asset in SQL education. Moving forward, further research and extensive testing are essential to refine SQLatch and tailor its features to better meet user needs. By continuously iterating based on user feedback and addressing identified limitations, SQLatch has the potential to become an invaluable asset in SQL education.

Acknowledgments

We would like to thank the Undergraduate Computer Science students at Democritus University of Thrace, Greece, particularly Mr. Vasileios Christofas and Mr. Dimitrios Manos for dedicating their time and knowledge as members of the SQLatch development team. Additionally, we express our gratitude to Mr. Christos Kerigkas from Democritus University of Thrace, Greece, for aiding in the design of the learning material.

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Wikipedia in University Program: Meta-analysing the Typology of Courses in the Lusophone Page

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Abstract

Due to the potential to foster the so-called digital capital, when pedagogically integrated in the curriculum, the Wikimedia Ecosystem allows to promote a broad set of skills, which we assume, in the scope of the WEIWER® International Academic Network, under the umbrella concept of Wikiliteracy. The Wikipedia in University Program is a part of that ecosystem to which we have been dedicating research, namely the projects that have been developed within that program. Hence, we considered to be important to meta-analyse the Portuguese page of the Wikipedia Program at the University specifically between the years 2011 to 2018. The study thus designed was inspired by the following central question: What do the courses of the Wikipedia University Program that are registered on the Wikipedia Lusophone platform tell us? In this text, we take a part of that research, aiming particularly to answer to the specific question: What formats/typologies are used to provide courses in those contexts? Methodologically, in the exploratory study, of a descriptive, meta-analytical and mixed nature, the MAECC®, Meta-model for Analysis and Exploration of Scientific Knowledge®, was adopted. Considering only the data from the Methodologies (macro) and Format/Typology (meso) categories, we can conclude that, of the 92 meta-analysed courses/projects, only 61 had the active link at the date of the data collection. Of these, only 58 included information applicable to our research purpose. Therefore, 4 formats/typologies were identified: "Edit-a-Thon (5); "Dashboard" (1); Project page (19); Project page segmented into pages – "Main", "Discussion", "Resources", "Help" (33). The typology of courses that emerges from the meta-analysis that we undertook in the online encyclopedia's Lusophone page allows us to further illustrate, in a direct reference to the Wikimedia Foundation motto, that "Wikipedia belongs to education".

Keywords: Wikipedia at University Program, Lusophone Community, Open Higher Education, Knowledge Mapping and Systematization, MAECC®.

Introduction

Throughout its existence, Wikipedia has assumed an educational role as it can be considered an Open Educational Resource (OER) and therefore, when integrated either curricularly and/or pedagogically, it can be considered an Open Educational Practice (OEP). It is undeniable that it has become a phenomenon that transcends Wikipedia articles, allowing to identify a set of data and processes in its construction (Kopf, 2022; Pentzold et al., 2017). It is important to note that Wikipedia is the product of the collaboration of a community of wikipedians around the world, therefore, the "Discussion" and "See history" spaces, among others, enable to collect a set of data, namely, in the last example: "Search edit history" and "Editing statistics". Corroborating this position, Pentzold et al. (2017, p. 1) state that "The online encyclopedia Wikipedia is both a cultural reference to store, refer to, and organize digitized and digital information, as well as a key contemporary digital heritage endeavor in itself".

In this text, we specifically focus aspects inherent to the role it assumes in education, given that we aim at meta-analyzing a set of interventions carried out in different Brazilian and Portuguese higher education institutions, reported on the Lusophone Wikipedia page of the Wikipedia University Program (WUP), which is part of the Wikipedia Education Program (WEP). Our meta-analysis was carried out as part of the research agenda of the WEIWER® International Academic Network, based at LE@D, the Laboratory of Distance Education and Elearning of the Open University Portugal.

The text is organized into three parts: firstly, we summarize our theoretical contextualization, namely the relationship between Wikipedia and OER and OEP within the WEIWER® network, framed by the wikiliteracy, with a view to promoting the empowerment of the students (i.e., their digital capital); secondly, we present our methodological analysis system, the MAECC®; thirdly, we describe and discuss our data.

Theoretical Framework

As previously mentioned, the WEIWER® International Academic Network is integrated in LE@D, a research and development unit based in a Portuguese public higher education institution; WEIWER® has been promoting research taking Wikipedia as the object of study, namely studies on Wikipedia curricular integration, at different levels of education, thus resulting in master's dissertations, doctoral theses, post-doctoral reports, and scientific papers. The WEIWER® Network was created with the motto "Let's Share, Learn & Discover?!" (Cardoso, Gamez, Pestana & Pinto, 2020), with the objectives of: disseminating OEP where Wikipedia plays a relevant role; disseminate research results in the field of training and open education with Wikipedia, to build new research; stimulate critical reflection on the curricular integration of Wikipedia, particularly in the context of continuous training for teachers and trainers; disseminate other projects of the Wikimedia Foundation ecosystem; foster collaboration in the field of OEP, specifically in the context of Wikipedia (Cardoso, Pestana & Pinto, 2020). Hence, the issues of the openness are evident, namely the issues associated with legal, technical and social openness, assuming, in this case, dimensions related to the cultural and pedagogical components (Pestana, 2018).

It is important to note that Wikipedia as an object of study and as a pedagogical strategy has become increasingly present at different levels of education in the world, particularly because the Wikimedia Foundation identifies partnerships with various educational institutions as a priority, as summarized in the motto "Wikipedia belongs to Education". We have been advocating those mottos, for example, by providing workshops aimed at primary, secondary and higher education teachers, librarians, and students too (Cardoso, Mota, Cruz & Pestana, 2023).

Regarding the relationship between the projects of the Wikimedia Ecosystem (in particular, Wikipedia) and the digital capital, we are inspired by Addeo et al. (2023, p. 2), for whom the digital capital refers to "a set of internalized abilities and aptitudes […] as well as externalized resources […] that can be historically accumulated and transferred from one arena to another", which "contributes to life opportunities enhancement by creating a bridge between online and offline realms". From the perspective of DuBose (2023), the personal empowerment of working with students in "Wikipedia-based research projects" allows to achieve and develop the "Digital Capital". According to the author, the participation of students in these projects enables the acquisition of a broad set of skills, which form, within the work carried out by WEIWER®, the wikiliteracy. The author also states that "[g]iven the uneven distribution of the digital capital required to represent one's community on Wikipedia, teaching community-based assignments using Wikipedia creates rich opportunities to extend an institution's digital capital to the community and promote student learning" (p. 55).

Moving to the literacies involved in the wikiliteracy, as we understand it, at WEIWER®, it can be mobilized in the OEP promoted by our academic network. Thus, the wikiliteracy is directly allotted to the Digital Literacy, in line with Reddy, Sharma & Chaudhary (2020) and Reddy, Chaudhary, Sharma & Hussein (2023), i.e., this literacy integrates the: Information Literacy; Computer Literacy; Media Literacy; Communication Literacy; Visual Literacy; Technological Literacy. To this set of literacies, we associate the Critical Literacy, which, in line with English (2023) and McKenzie (2023), allows to promote a critical stance, response or action in relation to a problem (Cardoso & Pestana, 2023). The critical literacy, despite being associated with most of the literacies previously identified (e.g. Information Literacy and Media Literacy), assumes a dominant and transversal position in the digital literacy, namely in the context of the wikiliteracy, a literacy associated with the Wikimedia ecosystem. In this context, according to McKenzie (2023, p. 3), "Wikipedia is arguably one of the best tools for teaching critical literacy as a result of its hegemonic position in the information landscape […] coupled with students' casual familiarity".

After identifying the framework that supports the curricular and/or pedagogical integration of Wikipedia, in the following section, we present the methodological framework that supports the meta-analysis we ran of the WUP page in Portuguese.

Methodology

The research carried out intended to answer the following main question: What do the WUP courses registered on the Lusophone Wikipedia platform tell us? Thus, five specific questions were considered, and, in this text, we specifically address one: What formats/typologies are used to provide those courses? From this question, the five corresponding objective is to identify formats/types of course provision.

Considering now the design, our research was developed in a mixed approach, combining quantitative and qualitative methods. Moreover, according to Pinto, Cardoso & Pestana (2019, p. 30), the systematization of knowledge, embodied in mixed or multimodal meta-analysis, allows document analysis from a qualitative and quantitative perspective to be reconciled with content analysis, "privileging the theories proposed by Van Der Maren (1996), categorized according to the following levels: description, understanding, explanation and formalization of knowledge, which promote the appropriation of critical and reflective knowledge on the topics in

question". It is important to clarify our understanding of meta-analysis, drawing on the perspective of Gene Glass, who introduced the term for the first time in 1976. Thus, for Glass (1976, p. 3), "[m]eta-analysis refers to the analysis of analyses. I use it to refer to the statistical analysis of a large collection of analysis results from individual studies for the purpose of integrating the findings".

From the meta-analysis, we considered for our study, in line with Cardoso (2007), the following procedural steps: (i) the selection and inclusion of all existing courses on the WUP platform; (ii) the definition of inclusion and exclusion criteria for defining the corpus of (meta) analysis; (iii) the development of coding categories, to cover most of the courses identified; (iv) the analysis and graphical representation of results and their distribution; (v) the combination of quantitative and qualitative reviews.

According to Cardoso (2007), phase 1 (Collection) was based on document analysis and culminated in the identification of documents to integrate the corpus. For this purpose, the inclusion and exclusion criteria of the documents to be (meta) analyzed and the respective research descriptors were defined and applied (e.g. the period between 2011 and 2018). The Treatment and Organization (phases 2 and 3) refer to consecutive reading stages, through which information was progressively emerging from each document of the corpus, induced by content analysis, in a constant dialogue with the data. In the analysis instrument developed, the analytical units were recorded, according to the defined categorical matrix. It is important to mention that we had MAECC® as support and, therefore, we incorporated its five macro dimensions (Characterization, References, Methodologies, Contributions, Implications). The identifying terms form the cores of meaning that emanate from the analysis, summarizing the thematic sets that characterize Portuguese-speaking research in the WUP domain, in the period of time considered. These are clusterings, of which the content, was coded and systematized according to the topic typologies that emerged from the meta-analysis; it was further stored in a relational database, a very important tool, as it allows, for example, to compare data chronologically and/or thematically (by source and date of the courses in which they appear and/or by topic), highlighting convergences or divergences, indicative of reciprocal or antagonistic meaning. The database created in Excel electronically supports the knowledge analysis meta-model. Finally, phase 4 (Diffusion) concludes the methodological sequence of this study.

Context

The WUP is part of the WEP, as mentioned, and the Portuguese-speaking WUP page brings together all the courses developed under this program in Portuguese. The "*Boas-vindas!*" page, as the name suggests, serves to welcome those potentially interested in the program and is also aimed at those directly involved in the program – teachers, students and wikipedians. In addition to the welcome page, the program includes the "*Cursos*" (courses), "*Embaixadores de campus*" (campus ambassadors), "*Embaixadores* online" (online ambassadors), "*Recursos*" (resources) and "*Ajuda*" (help) tabs. In this text, we only consider the data included in the courses' tab, because we focus a part of a broader study.

Thus, in the "Courses" tab, represented below, the courses taught in this program in Portuguese are aggregated and presented. At the time of defining the corpus to be meta-analysed, the last record was the course "Extension: Reformulation and construction of Wikipedia entries in the area of Theory of History"; but, as it dates from the first half of 2019, it was not included in the corpus.

Figure 1. Print Screen of the "Courses" tab on the WUP page in Portuguese (https://bit.ly/31jyHVv).

The "Courses" tab on the Portuguese-speaking WUP page between 2011 and 2018 totals 92 courses, our corpus (for a thorough account of both these documents/courses and their coding – in addition to the name of the course, we identify the associated higher education institution –, cf. Pestana & Cardoso, 2020, pp. 363-364).

Once the corpus was defined, and based on both our research questions and objectives, the analysis instrument was developed, drawing from Cardoso (2007). And once the meta-analytical grid was stabilized, its final version included five macro categories, segmented into (meso) subcategories, and, in the case of the References and Methodologies categories, further segmented in micro subcategories (Pestana & Cardoso, 2020, pp. 365). So, regarding the macro category "Methodologies", it includes 2 meso categories "Actors" and "Format/typology of course provision". The meso category "Actors" integrates, in turn, the micro subcategories "Teachers", "Students", "Ambassadors"; the meso category "Format/typology of course provision" conciliated the existing closed and the open categories, thus corresponding to a mixed coding.

Results

For this text, and from our broader research, we selected the following specific question: What formats/typologies are used to provide courses? In the context of the 92 courses displayed on the main page of the WUP "Courses" tab, it was only possible to access to the pages of 61 courses. Regarding the access to the level of information, only in four courses it was considered "Not applicable".

Of the 58 courses with "Applicable" information, under the meso dimension "Format/Typology of course provision" (relating to the "Methodologies" macro dimension), it is possible to verify that the participating teachers and ambassadors adopted different strategies to implement the courses. Based on the evidence collected, it was possible to further systematize them in four typologies, coded with the letters "A" to "D". Specifically, 5 courses were made available as an Edit-a-Thon (typology "A"), 1 course was made available using the Dashboard (typology "B"), 19 courses were made available through a page project (typology "C"), and 33 courses were made available on a project page segmented into a "Main" page, a "Discussion" page, a "Resources" page and a "Help" page (typology "D"), hence, in this case, provide more information.

The Edit-a-thon (typology "A") corresponds to "Volunteers assembling to edit a crowd-sourced encyclopedia together, for hours" (Snyder, 2018, p. 119). According to this author, the concept emerged in 2011 and is commonly implemented in higher education institutions and libraries; these initiatives have enjoyed enormous support over time. She also highlights her experience, in several public libraries in the United States, "with Wikipedia [that] are distinct and include editing, adding citations, information literacy, and partnership-building. What binds them together is their embrace of Wikipedia – and its dynamic community of editors – because of the content opportunities, technical features, and collaborative community it offers" (2018, p. 215). The themes can be diverse, depending on the objectives that are intended. In the case of the work carried out by Cowles, Sheppard, Waltman & Kimball (2020, p. 268), intended to "'Leveraging librarians' research skills to make Wikipedia a better, more evidence-based resource, this event and all following edit-a-thons focused on adding citations and content to health pages using trusted health information resources" from both the Network of the National Library of Medicine (NNLM) and similar organizations. To this end, "a cross-regional Wikipedia Working Group", coming from different organizations in partnership with the "WikiProject Medicine" community, gathered to identify needs; "the team chose to focus the first edit-a-thon on improving content related to rare diseases".

Di Lauro (2020) emphasizes the relevance of "Edit-a-Thons" to bridge female representation on Wikipedia, given that they "have become international vehicles for reconciling gaps in gender and cultural representation as educational institutions, libraries and museums work in collaboration with the online encyclopedia to increase the number of articles about notable women, and those related to women's histories and interests". Secondly, he identifies an important deceased wikipedian and academic, who played a relevant role and is considered by the community as an example to be considered – Adrianne Wadewitz "bridges the traditional world of scholarship with the newer phenomenon of open online collaboration, and consideration of her Wikipedia career and associated initiatives illustrates the global potential and impact of digital platforms" (p. 1003).

As for the Dashboard (Typology "B"), it refers to a specific way of presenting the course, within the infrastructures of the Capacity & Learning Program, which in turn is part of the WUP. The "Programs & Events Dashboard", according to the analysis carried out on its page, is the tool that integrates projects since 2015 (5 projects in this year); according to Wikimedia Meta-Wiki, it "is a tool which assists the management of wiki programs and events […] Tracking functions for organizers to measure and report the outcome of a program", thus, it is transversal to the Wikimedia Foundation ecosystem in the field of education. It is important to highlight that in 2016 this tool integrated 24 projects, 83 projects in 2017, 120 projects in 2018 and 117 projects until September 2019, therefore demonstrating adherence to this tool.

Before moving to the conclusions, we summarize below the mapping of the corpus and its meta-analysis, as inspired by Cardoso (2007), and earlier discussed.

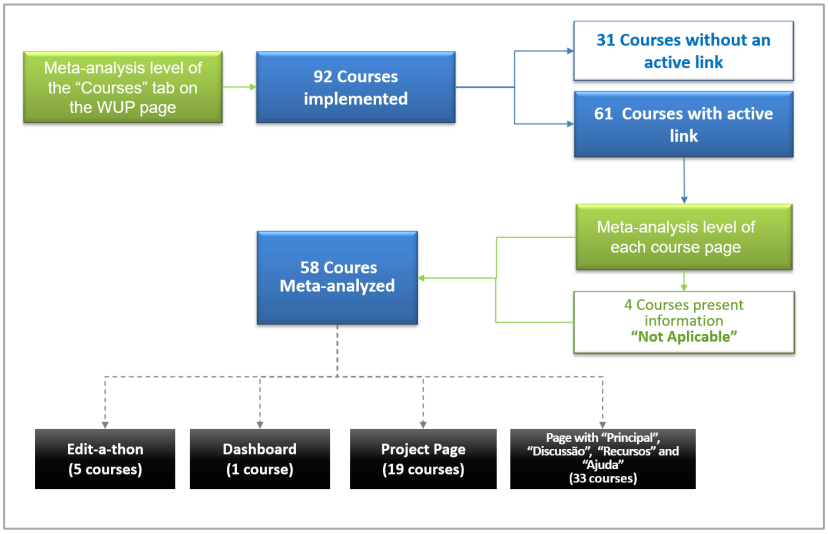

Figure 2. Summary of the various levels of corpus analysis.

Conclusions

From our broader research, we selected, for this text, the specific question: What formats/typologies are used to provide the WUP courses on the Lusophone Wikipedia page? Of the 92 courses comprising our corpus of (meta) analysis, only 61 have an active access link. However, we meta-analysed 58, those with information, thus identifying four typologies of courses: "A" – "Edit-a-Thon" (5); "B" – "Dashboard" (1); "C" – "project page" (19); "D" '"Project page with the 'Main', 'Discussion', 'Resources', 'Help' pages" (33).

As a limitation, we recognize that the data collection was carried out in two stages: the first associated with the analysis and processing of data collected from the page in the WUP "Courses" tab; the second stage was the result of analyzing and processing the page of each course per se, which was, in some cases, impossible given that the link to the respective course page was inactive. As a result of these two phases, on the one hand it was possible to list a vast set of evidence, on the other, we were faced, in some cases, with little information.

So, in future studies, it is important to identify the reasons that underlie the fact that a project like Wikipedia, clearly associated to openness, has such a large volume of courses closed for consultation. Hence, we suggest interviewing the participants in each of those closed courses. For future research, we also suggest continuing the meta-analysis of the courses on the Lusophone Wikipedia between the 2019-2023 period. And it would be important too to meta-analyse the courses on the "Dashboard", as many universities have migrated to this space. Because the typology of courses that emerges from the meta-analysis that we undertook in the online encyclopedia's Lusophone page allows us to reinforce, in a direct reference to the Wikimedia Foundation motto, that "Wikipedia belongs to education".

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Promoting Student Participation in University Teaching of Strength of Materials

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Abstract

In this study, a proposal is presented to encourage the active participation of university students at the Universitat Politècnica de València, specifically in the teaching of Strength of Materials. Traditionally this subject has been taught following the modality of master classes, given the high number of students enrolled in each group. Due to the high percentage of success that has been demonstrated with the incorporation of active learning methodologies, the viability of the implementation of peer learning strategies is analyzed, specifically from the cooperative learning approach applying the Aronson puzzle technique. For this purpose, the didactic unit of dimensioning against normal stress is designed following this philosophy. These sessions could be taught both in person and online with the help of Teams and the creation of different rooms on this platform for work groups. Next, the sessions prepared are presented to the students and the work methodology is explained to them. Finally, an anonymous questionnaire is carried out to the students so that they give their opinion on the advantages and disadvantages of the technique, thus evaluating their degree of satisfaction in order to encourage their participation in class, each assuming the role of expert. The results of the survey obtained show how the students would increase their motivation and involvement in the subject with the aim of achieving deep learning in it. In conclusion, this methodology manages to promote not only participation and interest in the subject but also the relationship between the teacher and the student and that of the student with the rest of their classmates, thus developing social integration skills that can influence improving academic performance.

Keywords: Cooperative learning, Aronson puzzle, peer learning, teaching innovation, Strength of Materials

Introduction

The technological revolution of the 21st century has posed different challenges in today's society. It is inevitable to question the traditional education system and with it, the teaching-learning process in both basic and higher education.

Currently we are working with a student-centered training model, where the role of the teacher changes and becomes a guide. This approach seeks to promote the student's construction of knowledge autonomously with the support of the teacher. Recent research has recognized the effectiveness of implementing active methodologies in the classroom. These studies have shown a significant improvement in students' academic performance when pedagogical techniques that encourage active participation, autonomy, and cooperative learning are applied.

One of the widely used techniques to encourage the active participation of students is the “Aronson Puzzle”, which is based on group dynamics. This technique requires the division of a topic or content into several parts, each of which is assigned to a group of students, these are expert groups. In the first stage, each student becomes an expert in his or her part of the topic thanks to independent learning and discussions between groups of experts. Subsequently, the groups are reorganized so that each one has a member who is an expert in a different part of the topic, these are puzzle groups. Later, puzzle groups meet in which each expert will explain to his classmates the subject that had been assigned to him. In this way, collaboration between students is encouraged, as each ones depends on the specialized knowledge of the others to fully understand the topic. Finally, the knowledge acquired by the students is evaluated.

Evidence supports the notion that a student's ability to explain content to a peer serves as a reliable indicator of his or her understanding of the topic. Numerous studies have shown that peer teaching, in which one student explains concepts or processes to another student, not only consolidates knowledge in the student teaching, but also benefits the receiving student by providing an alternative perspective and reinforcing his or her understanding. This process of mutual explanation fosters a deeper and more lasting understanding of the content, which in turn contributes significantly to the academic performance and comprehensive development of students. The "Aronson Puzzle" promotes the active participation of students, the development of social and cognitive skills, as well as the promotion of shared responsibility in the learning process.

The context in which this teaching experience is intended to be applied is in the subject of Strength of Materials at the Universitat Politècnica de València (UPV), in Spain. Historically, this subject has been taught following the modality of master classes due to the high number of students enrolled in each group.

Methodology

During the 2023-2024 academic year, within the framework of the Structures 1 subject belonging to the third year of the Degree in Fundamentals in Architecture at the UPV, innovative teaching methodologies have been introduced in two experimental groups of a total of seven groups in teaching Strength of Materials. These methodologies include formative evaluation through peer correction (co-assessment and self-assessment), as well as the use of questionnaires with Wooclap to address the theoretical part of the content. After the conclusion of the teaching module "Dimensioning against normal stresses" and with the students familiar with all the corresponding material, the teacher proposes a new approach based on the Aronson Puzzle for the next course, requesting their opinion on the matter.

The teacher prepares a document that includes an informative video of this technique, lasting less than seven minutes, a breakdown of the content that each group of experts will prepare and a detailed schedule of the twelve sessions corresponding to this teaching unit. These sessions could be taught both in person and online with the help of Teams and the creation of different rooms on this platform for work groups.

The working groups will be made up of five members, so that the matter to be worked on is divided into five parts.

The groups of experts will prepare the content corresponding to normal stress caused by:

- Group 1: axial only (N), pure compression or tension
- Group 2: z-axis bending moment (Mz) only, symmetrical pure bending
- Group 3: y-axis bending moment (My) only, symmetrical pure bending
- Group 4: y-axis and z-axis bending moment (My+Mz), deflected bending
- Group 5: axial and bending moments of y and z axes (N+My+Mz), compound bending

The one and a half hour long sessions that are part of this unit are detailed below:

- Session 0: prior individual work outside the classroom. Each student studies a specific case. They read the corresponding documentation prepared by the teacher with an explanatory video lasting less than 10 minutes, perform a simple exercise and answer a final questionnaire. They must prepare a document with the doubts that arise.

- Session 1: classroom session or synchronous meeting of the expert groups. The experts debate among themselves, resolving the doubts they have reached. The teacher goes through the different groups, guiding them in the explanations they make to each other. They must design a common plan to transmit the information about their case to the rest of the students. Each student will be an expert on the case they have to study.

- Sessions 2 to 6: five classroom sessions or synchronous meetings of the puzzle groups. Each expert explains his case to the rest of his classmates in the puzzle group. They do a common exercise. The last 30 minutes of each session are shared with the teacher, correcting the exercise carried out in class on the blackboard, clarifying any doubts that arise.

- Sessions 7 to 12: six classroom sessions or synchronous meetings. Sessions taught by the teacher following the traditional way that includes the calculation of reinforcements (composite sections) and the foundation.

- Session 13: The evaluation of the learning achieved is carried out.

Figure 1 shows a practical application of group formation and the implementation of this technique in the classroom.

In this unit, in addition to working with the Aronson Puzzle technique, other methodologies that have previously been successfully implemented would be included, such as formative evaluation with peer correction and tests using Wooclap with a subsequent discussion of the solutions with the teacher and the rest of the students.

After sharing all this information with the students, they are provided with a link to an asynchronous Wooclap so that they can anonymously complete a survey of ten questions on a Likert scale, shown in Figure 2, which evaluates their degree of satisfaction in this way of promoting their participation in class, each assuming the role of expert.

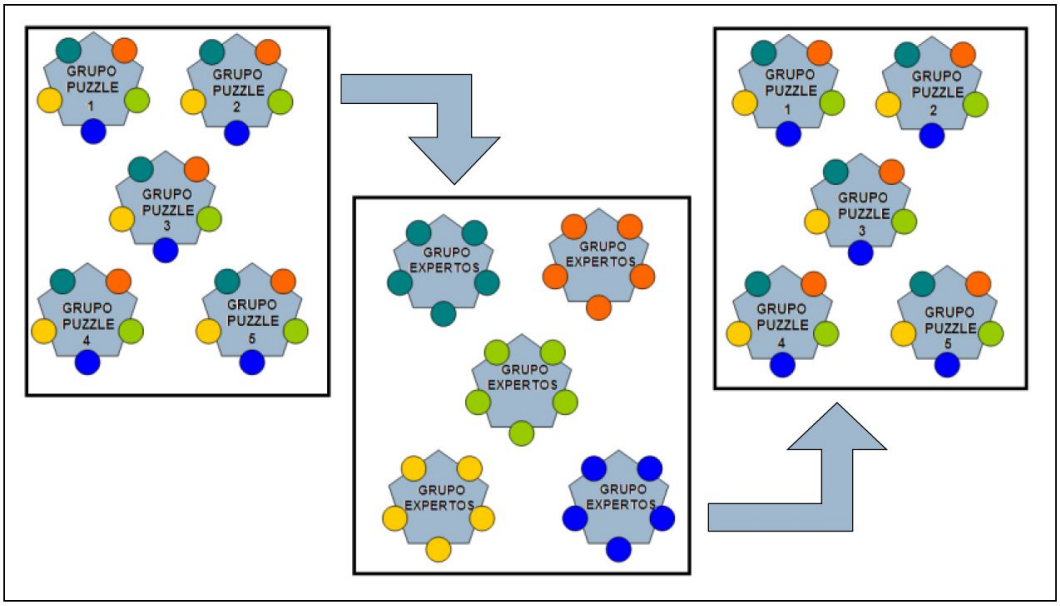

Figure 1. Graphic representation of the implementation of the Aronson Puzzle by E. Guijarro et al (2014)

Working the Sizing unit against normal stresses with the Aronson Puzzle technique can be positive because…					
(1= Strongly disagree, 2= Disagree, 3= Neutral, 4= Agree, 5= Strongly agree)					
	1	2	3	4	5
…I like working in a group					
…I will like it more than taught in a traditional way					
…my colleagues can help me better understand the contents					
…I can interact more with my colleagues					
…by having to explain part of the topic I will understand the contents better					
…I will receive more help to resolve my doubts and I will be able to understand it better					
… I prefer to be able to do things and explain them to each other than to always sit listening to the teacher					
…sitting in groups I will have a better time					
…we will do different activities and it won't be boring					
It will not be positive to include this technique					

Figure 2. Student opinion survey on implementation of the Aronson Puzzle technique.

Results

The survey in asynchronous mode was answered by 62 students in April 2024.

The detailed results are shown in Figure 3. The graph shows how the opinions “Disagree” and “Strongly disagree” are a minority of answers in all questions except the last one in which the statement said that “It will not be positive to include this technique.”

Likewise, Figure 4 summarizes the average value obtained in each statement. These values are above 3 (on a scale of up to 5) in all questions except two of them. The students gave a 4.23 to the statement “by having to explain part of the topic I will understand the contents better” and a 2.72 to the statement “It will not be positive to include this technique.”

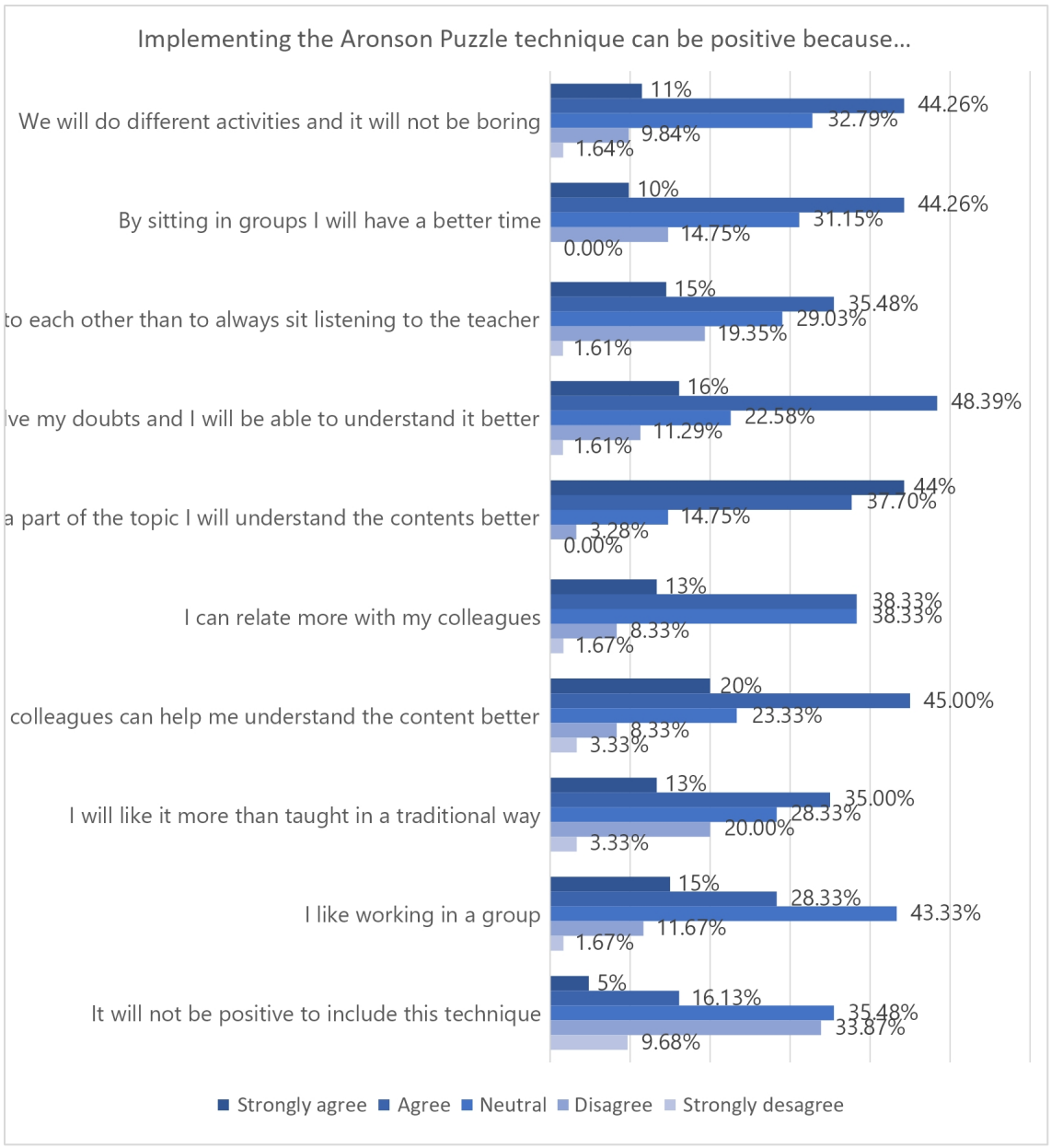

Figure 3. Percentage of survey responses on Likert scale.

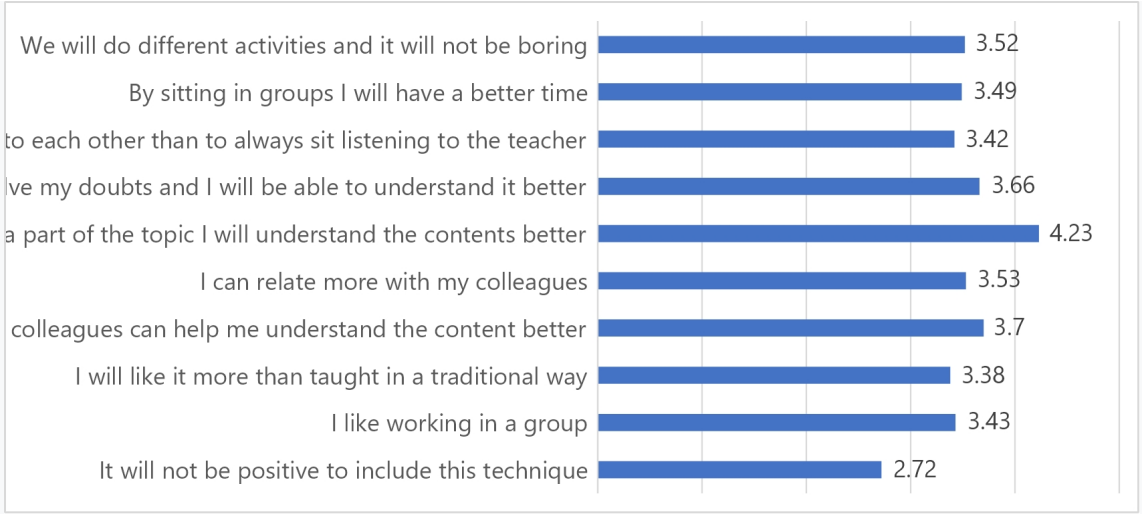

Figura 4. Average values in the ten questions based on a Likert scale.

Conclusions

The high participation in the survey indicates that the students value these initiatives very positively, thus reinforcing their learning process.

Furthermore, this methodology can allow both the teacher and the students to redefine their role within the teaching-learning process. The student takes on a more active role in his or her construction of knowledge while the teacher acts as a guide.

In conclusion, Aronson's Puzzle methodology demonstrates its ability to encourage both active participation and interest in the subject, as well as to strengthen relationships between the teacher and the student, as well as between the students themselves, promoting the development of learning skills. social integration that could positively affect academic performance. It will therefore be very interesting to implement this technique next year and analyze the results.

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The Fundamental Approaches and Applications of Regression Analyses in Educational Research

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Abstract

This study holds significant value as it offers a comprehensive overview of fundamental approaches and contemporary issues within regression analysis through a meticulous literature review. By synthesizing existing literature, the research aims to delineate the stages of regression analysis, providing researchers with a structured understanding of the subject matter. The overarching objective is to identify key concepts within the literature and furnish a robust guide for practitioners navigating regression analysis. Methodologically, the research undertakes a systematic exploration of articles pertaining to regression analysis, ensuring that selected works are indexed in reputable journals. Through this rigorous process, the study thoroughly scrutinizes the foundational methodologies, approaches, and findings prevalent in regression analysis literature. The findings of the study consolidate fundamental approaches and prevalent issues in regression analysis, amalgamating dispersed knowledge from existing literature. Notably, this synthesis serves to equip researchers with a comprehensive understanding of the subject, aiding them in navigating complexities and nuances within regression analysis. However, the study is not devoid of limitations. Primarily, it is confined to a specific timeframe and relies solely on particular datasets, potentially limiting the breadth and applicability of its conclusions. Looking ahead, recommendations for future research underscore the necessity of conducting more expansive studies on regression analysis, leveraging contemporary datasets to enhance relevance and applicability. Emphasizing the importance of staying abreast of evolving methodologies and datasets is paramount for advancing the field of regression analysis effectively.

Keywords: analysis, educational research, regression, reliability.

Introduction

Statistical modeling serves as a crucial tool for researchers to comprehend relationships within complex datasets and predict future events (Jin et al., 2021). Within this context, regression analysis plays a critical role in statistical modeling, providing valuable guidance to researchers in data analysis processes. Regression analysis is a statistical technique that describes and models the relationship between a dependent variable and one or more independent variables (Jfri et al., 2021). This technique enables the examination and understanding of relationships between variables in complex datasets. In the process of statistical modeling, regression analysis enhances scientific research by enabling researchers to identify patterns in data, understand causal relationships, and forecast future scenarios (Maulud & Abdulazeez, 2020). Consequently, the significance of regression analysis lies in explaining complex relationships in datasets and enhancing predictability.

Regression analysis stands out among advanced analytical methods due to its ability to assess the impact of one variable on others, make predictions, and statistically evaluate results through hypothesis testing, thus enjoying broad applicability in the scientific community. Developments in regression analysis literature can offer researchers new perspectives, methodological innovations, and potential solutions in this field. Examining these developments can update existing knowledge on regression analysis and enhance advanced analytical skills. Therefore, the main purpose of this study is to provide fundamental approaches to regression analysis while addressing current issues in detail, thereby offering researchers a more effective and up-to-date knowledge base.

The primary objective of the research is to systematically review the regression analysis literature to identify fundamental approaches and current issues in this field and guide researchers accordingly. Through this guide, researchers working on regression analysis can be provided with a methodological framework, as well as the potential to contribute to the existing literature by addressing knowledge gaps. The methodological approach of the study is a literature review. This choice aims to comprehensively identify fundamental concepts and current issues in the regression analysis literature. Regression analysis articles will be selected from prestigious journals indexed on the Social Sciences Index and accessed through databases such as Taylor and Francis Online, SCOPUS, Science Direct, Springer, Elsevier, and Web of Science to ensure obtaining qualified and reliable sources from the field's literature.

The expected findings aim to expand the existing knowledge base by highlighting fundamental approaches and current issues in regression analysis literature. These findings aim to fill gaps in the literature on regression analysis, providing researchers with a more comprehensive and up-to-date perspective. However, among the limitations of the study are the effects of focusing on a limited time frame and specific datasets. This situation could restrict the generalizability of the study. Recommendations for future research include increasing comprehensive and up-to-date research on regression analysis, utilizing different datasets, and considering methodological diversity. These recommendations can provide important guidance for expanding knowledge in the field of regression analysis and developing methods.

Literature Review

Regression analysis is a powerful tool in the field of statistical modeling, occupying a significant place for understanding relationships between variables, making predictions, and evaluating results (Sarstedt & Mooi, 2019). The main aim of this research is to guide researchers who seek to understand the fundamental principles and steps of regression analysis.

The principles of regression analysis encompass fundamental steps such as how dependent and independent variables are related, estimating regression coefficients, and assessing the adequacy of the model (Yan et al., 2023). These basic principles form the overall structure of regression analysis, and this review focuses on these fundamental topics. Additionally, variable selection in regression analysis is considered a critical decision (Ternès et al., 2016). This review aims to address the challenges encountered in the variable selection stage in detail and examine proposed solutions to guide researchers on making effective decisions at this stage. Variable selection is crucial for the reliability and generalizability of the results obtained in analysis.

Regression analysis is a method that examines a group of independent factors' impacts on a dependent variable. Essentially, it aims to model the correlation between factors by creating a system that describes this relationship and attempts to forecast the dependent variable's value once delivered the values of the independent variables. Simple linear regression, utilizes merely one independent variable, while multiple regression can build more complex models by incorporating multiple independent variables (Hidalgo & Goodman, 2013).

Linear regression focuses on modeling the relationship between variables as a straight line (James et al., 2023), whereas polynomial regression can use polynomial degrees to express more complex relationships (Heiberger & Neuwirth, 2009). Logistic regression is administered once the dependent variable is binary, expressing results in probabilities (Nick & Campbell, 2007). Poisson regression is suitable for cases where the dependent variable represents the number of events occurring in a period or area (Hayat & Higgins, 2014). Ridge regression, a type of multiple regression, provides regularization to prevent overfitting (McDonald, 2009). Lasso regression selects some regression coefficients to zero during variable selection, while Elastic Net regression combines lasso and ridge regressions, using both regularization methods simultaneously (Alhamzawi & Ali, 2018). All these types of regression analysis are widely used across various fields, especially in disciplines such as statistics, economics, engineering, and biology, for data analysis and prediction purposes.

Regression analysis is a commonly used statistical analysis technique in educational research. This methodology allows educational researchers to understand and evaluate relationships between dependent and independent variables (Tuncer & Yılmaz, 2017). Typically, in educational applications, the dependent variable represents the outcomes focused on in the research (e.g., student achievement), while the independent variables represent the factors used to achieve these outcomes (e.g., learning methods or teacher performance) (Hussain et al., 2021). The primary advantages of regression analysis are as follows:

- Capability to compute meaningful associations between either one or multiple independent variables and the dependent variable.
- Capacity to gauge the comparative impact of various independent variables on the dependent variable.
- Proficiency in forecasting outcomes.

Through this methodology, educational researchers can, for example, effectively allocate educational resources by understanding the strong relationship between a specific learning method and student achievement. Knowing the relative strength of effects is also valuable for educators, as understanding factors that affect student achievement can shape teaching strategies more effectively. Additionally, regression analysis enables comparison of the effects of variables showing scale differences (Gomes & Jelihovschi, 2020). Therefore, regression analysis can be utilized as a powerful tool in education for creating effective strategies and managing resources.

In general, upon reviewing the literature, regression analysis emerges as an important tool in statistical modeling for understanding relationships between variables, making predictions, and evaluating results. The decision of variable selection in regression analysis is critical for the reliability and generalizability of the analysis. In this context, various methods of regression analysis, such as linear regression, polynomial regression, logistic regression, Poisson regression, ridge regression, and lasso regression, have been identified.

Methodology

Table 1. Literature review process (Tranfield et al., 2003; Xiao & Watson, 2019).

Process I.	**Planning of the Scan**
Step 1	Determining the need for scanning
Step 2	Creating the scanning protocol
Process II.	**Implementation of the Scan**
Step 3	Literature review
Step 4	Internal and external purpose review
Step 5	Evaluation of quality
Step 6	Extraction of data
Step 7	Synthesis of data
Process III.	**Reporting and Presentation for Use**
Step 8	Reporting
Step 9	Presenting evidence for application

SLT (Systematic Literature Review), is a method of collecting, critically evaluating, synthesizing, and presenting findings from multiple research studies on a research question or relevant topic (Pati & Lorusso, 2018). Table 1 illustrates the general structure of this process (Tranfield et al., 2003; Xiao & Watson, 2019).

The beginning of this study starts with identifying the need for a scan aimed at identifying gaps and issues in the field of regression analysis. Initially, gaps in the literature on regression analysis were identified to determine the focus of the scanning process. In the second stage, criteria suitable for the identified scanning needs were established. These criteria provide a guide for reviewing and evaluating the literature on regression analysis. During the scanning phase, literature review involved scanning published articles related to regression analysis based on the identified criteria. During this stage, articles selected from journals were primarily examined, and fundamental approaches and current issues in regression analysis were analyzed in depth. This stage also aimed to access the most recent information in the literature and understand the latest developments in regression analysis.

During the inclusion and exclusion review stage, a review was conducted based on the established criteria to determine whether selected articles would be included in the literature review. In this stage, articles that did not include fundamental approaches or current issues in regression analysis or did not meet the defined criteria were excluded.

In the quality assessment stage, the quality of selected articles was evaluated, and an assessment was made based on criteria such as sample sizes and the accuracy of statistical analyses. This assessment constituted an important step in increasing the reliability and validity of the obtained information.

In the data extraction stage, data related to fundamental approaches and current issues in regression analysis were extracted. Findings were summarized and classified according to the established criteria. During this stage, an in-depth analysis of the obtained data was conducted to determine main topic headings. In the data synthesis stage, the obtained data were synthesized to provide a comprehensive overview of fundamental approaches and current issues in the literature on regression analysis. The main goal of this stage was to comprehensively evaluate and grasp the findings. In the reporting stage, the obtained findings were organized into a report and detailed to include fundamental approaches and current issues in the field of regression analysis. It is expected that this report will enable researchers to access current information on regression analysis and guide their future work in this field.

Results

Regression Analysis Assumptions

Regression analysis is a statistical research method used as an analysis technique, typically employed to understand relationships between variables and to make predictions. According to Sarstedt & Mooi (2019), this analysis encompasses specific steps, including verifying the suitability of the data for analysis, constructing, testing, and utilizing the model. Initially, the regression analysis checks data requirements to ensure the suitability of the data for analysis, ensuring that the data are properly collected, complete, and appropriate for regression analysis. The second step involves determining and predicting the regression model. This stage entails identifying which independent variables will be included in the model, followed by predicting the model. The third step involves testing the assumptions of regression analysis. This step is necessary to guarantee the model's dependability and correctness. The fourth step is interpreting the regression results. At this stage, the results obtained by the model are evaluated, and the significance of these results is interpreted. The extent to which variables are effective and the overall performance of the model are evaluated at this stage. The next step is confirming the regression results. This is done to test the accuracy and reliability of the model. Confirming how successful the model was on previous data sets can increase the reliability of future predictions. Finally, the regression model is used. The model is used to make predictions or to understand the data. Additionally, it has been emphasized that considering various data requirements before starting regression analysis is important. These requirements include sample size, variable diversity, the scale type of the dependent variable, and multicollinearity (Sarstedt & Mooi, 2019).

Data Preconditions

Sample Size

The first prerequisite is the necessity for an "acceptable" sample size. "Acceptable" ($N > 25$) (Jenkins & Quintana-Ascencio, 2020) signifies a sample size that ensures a high statistical power for the analysis, thereby increasing the likelihood of if at all feasible, obtaining noteworthy outcomes. The second prerequisite involves calculating the G power value. Typically, the power needs to be set at 0.80. A power level of 0.80 implies that there is an 80% chance of detecting a significant effect (Bulus & Dong, 2021).

Alternatively, the impact of individual parameters on the sample size can be measured using a rule-based method. Green (1991); Wilson Van Voorhis & Morgan (2007) argue that a sample magnitude of $104 + k$ is required, where k represents the number of independent variables. Thus, when there are ten independent variables, $104 + 10 = 114$ observations are necessary. They observe that the ideal time to use this rule is that there are fewer than 10, and definitely fewer than 15, independent variables. VanVoorhis and Morgan (2007) further add that having at least 30 observations per variable (i.e., 30k) allows for better detection of smaller effects (expected R-squared value of 0.10 or less). Thus, it is stated that the number of observations in the research group should not be less than 30 in this case.

Variable Diversity

In a regression model analysis, if variables do not exhibit any continuity, the relationship between these variables cannot be predicted (Sarstedt & Mooi, 2019). If there is no continuity in the dependent variable (i.e., if it has a constant value), it means we already know the value of the dependent variable, and therefore, regression is not needed. Similarly, if an independent variable lacks continuity, it is argued that this variable does not explain any changes in the dependent variable.

Type of Dependent Variables Scale

The dependent variable has to be on an interval or ratio scale as the third need for data. For example, other regression types should be employed if the data are not on an interval or ratio scale (Hellevik, 2009). Binary logistic regression should be used if the dependent variable is binary and can only have two values: zero and one. Multiple logistic regression should be employed if the dependent variable is nominal and has more than two values (Kwak & Clayton-Matthews, 2002). For example, this regression type should be used to explain why consumers like product A over B or C.

Collinearity

The final requirement for the dataset is that it should exhibit minimal to no multicollinearity, a data issue where two independent variables display high correlation (Salmerón-Gómez et al., 2020). Perfect multicollinearity arises when two or more independent variables contain identical information, resulting in a correlation coefficient of 1 or -1 (Morgül, Tumbaz & İpek, 2021). This happens when an independent variable is included twice or when two variables are combined linearly (for example, when sales are expressed in thousands of units and units as a multiple

of each other). Regression analysis is unable to estimate one of the coefficients in these situations. Less severe kinds of multicollinearity are more widespread in practice, though. For instance, if a regression model aims to examine factors affecting students' exam scores but includes the same student grade for both math and science courses, perfect multicollinearity can result. Here, both coefficients in the model represent identical information, rendering predictions ineffective. Hence, considering multicollinearity is crucial when constructing regression models and conducting analysis.

Detecting multicollinearity is relatively straightforward and can be accomplished by computing the variance inflation factor (VIF), which reflects each independent variable's impact on the standard error of the regression coefficient (Folli et al., 2020). Specifically, the square root of VIF indicates the increase in standard error when there is no correlation with other independent variables. Typically, a VIF exceeding 10 suggests multicollinearity issues (Hair et al., 2020). Some studies suggest that VIFs even higher than 10 may be acceptable, especially with large sample sizes and high R-squared values (0.90 or more) (O'brien, 2007). Conversely, with sample sizes below 200 and low R-squared values (0.25 or less), multicollinearity becomes more problematic (Mason & Perreault, 1991). In such instances, VIF values ideally should be lower, around 5 or less.

Although several methods exist to address multicollinearity, each has its own drawbacks. For perfect multicollinearity, removing one of the perfectly overlapping variables is a solution. For weaker forms of multicollinearity, three approaches can be used to mitigate it (O'brien, 2007):

1. Using principal component or factor analysis on multicollinear data to produce uncorrelated components that contain the majority of the information from the original variables.

2. Changing the regression model's specification by removing variables with strong correlations. A correlation matrix of all independent variables added to the regression model should be produced, with an initial focus on the variables that have the strongest correlations to help decide which variables to exclude.

3. Choosing not to take any action. In many cases, eliminating multicollinear variables may not substantially reduce VIF values and could potentially mis-specify the regression model. Thus, accepting multicollinearity, except in extreme cases, might be a better option, albeit with caution in interpreting regression coefficients due to potential misleading values and significance levels.

Guessing the Model

The process of forecasting a regression model is known as model estimation. Ordinary Least Squares (OLS) is the most often used approach for estimating regression models. According to Kilmer and Rodríguez (2017), OLS entails fitting a regression line to the data and minimizing the sum of squared distances to this line. Since squared values are always positive, squaring the distances guarantees that negative distances—that is, those below the regression line—do not cancel out positive distances, or those above the regression line. Additionally, squaring the distances gives less weight to data along the regression line and more weight to observations distant from the line (Sarstedt & Mooi, 2019). Finding the greatest fit between a regression line and a collection of observations may be done effectively, if somewhat arbitrarily, by applying the squared distances method (Anderson & Schumacker, 2003).

Even though OLS is a trustworthy estimator, there are some situations when other approaches could work better. When one of the regression assumptions is broken, these conditions occur. For example, Weighted Least Squares (WLS) may be used to deal with regression errors that show heteroscedasticity, which is a sign of non-constant variance between variables (Willett & Singer, 1988). Specialized methods such as two-stage least squares (2SLS) may be necessary when the estimated mean error of the regression model is not zero (Chan et al., 2012).

Regresyon Analysis Assumptions

A regression analysis may yield invalid results if its assumptions are not met. To obtain valid results, four assumptions of regression analysis are necessary (Mooi et al., 2018):

- One can express the regression model in a linear fashion.
- The regression model's anticipated mean error is zero.
- The homoscedasticity of mistakes means that their variance is constant.
- There is no autocorrelation and errors are independent.

An additional assumption, if satisfied, provides insights into the distribution of regression parameters, allowing for direct interpretations of their meanings. When this assumption is met, standard errors (and t-values) can be relied upon to determine the significance of regression parameters. However, we cannot rely on standard errors (and t-values) to understand the significance of regression parameters if the regression analysis does not match this criterion, even though the regression model is still valid. It is required that errors follow an approximate normal distribution (Li et al., 2012).

Linearity Assumption and Ramsey's RESET Test

A regression analysis may yield invalid results if its assumptions are not met. Therefore, four assumptions are necessary for obtaining valid results in regression analysis (Schmidt & Finan, 2018):

1. There has to be a linear expression for the regression model.
2. The regression model's anticipated mean error ought to be zero.
3. There should be homoscedasticity, or a consistent variance of mistakes.
4. There should be no autocorrelation in the errors.
5. An approximate normal distribution is required for errors.

Meeting the fifth assumption can provide information about the distribution of regression parameters and enables direct conclusions regarding their significance. If the assumptions are not met, the regression model may still be correct, but the significance of regression parameters cannot be determined accurately relying on standard errors (and t-values) (Sarstedt & Mooi, 2019).

The first assumption, i.e., the linearity assumption, states that the regression model can be expressed as `y = α + βx + e` (Schmidt & Finan, 2018). Therefore, non-linear relationships like `β1x^2` are not acceptable. However, logarithmic expressions such as `log(x1) ` can still determine the regression model linearly. If regression parameters (ßs) can be written for a linear model, this assumption is considered to be met. To determine if there is a linear relationship between the independent variable {x} and the dependent variable {y}, one can utilize a scatter plot.

A particular test of linearity called Ramsey's RESET test may use squares of independent variables (like {x1^2}) and their third powers (like {x1^3}) (Leung & Yu, 2001). It is possible to recognize some forms of non-linearity, but it is not possible to pinpoint which variable or factors have a non-linear connection with the dependent variable. Although it checks for linearity, this test is occasionally mislabeled as a test for missing variables (Sarstedt & Mooi, 2019). The second presumption is that the regression model's anticipated (predicted, not observed!) mean error is zero. A skewed line is produced if the total of the errors is not expected to be zero (Yuan & Chan, 2011). This assumption, that the expected value of the error is not zero, implies the presence of additional information not used in the regression model. In the third assumption, heteroscedasticity is when the variance of errors is not constant (Kaufman, 2013). In the case of heteroscedasticity, although regression models may produce the correct ßs, the associated standard errors are likely to be very large and may lead some ßs to be deemed insignificant even though they are significant. Heteroscedasticity usually arises due to omitted variables in scales (Stock & Watson, 2008). According to Gowen et al. (2011), the fourth assumption is that the regression model's mistakes are independent, meaning that error terms don't show any link between two data.

The Durbin-Watson (D-W) test can be used to detect if autocorrelation is present (Durbin and Watson, 1951). The D-W test evaluates the null hypothesis, which states that there is no autocorrelation, against the upper and lower limits for positive and negative autocorrelation, respectively. An alternate hypothesis that there is some degree of either positive or negative autocorrelation is supported if the null hypothesis—that there is no autocorrelation—is rejected. In total, four scenarios are possible: There are four possible outcomes for this test: (1) positive correlation between mistakes, (2) positive and negative error correlations, (3) no systematic error pattern, or (4) inconclusive D-W values falling between lower and higher critical levels. The interaction between the lower (dL) and upper (dU) critical values determines the Durbin-Watson test statistic (d).

One useful method for detecting autocorrelation is the Durbin-Watson test. In the case of 30 observations and the independent variable of a particular model, for instance, the upper critical value (dU) is 1.489 and the lower critical value (dL) is 1.352. When the Durbin-Watson test finds autocorrelation, models that take this into consideration—like panel and time series models—should be applied. Nevertheless, this book does not go into great detail about these techniques; for more reading, see Hill et al. (2011).

Presumption of Autocorrelation Absence

The fourth assumption in a regression model is that the error terms are independent (Qian et al., 2023); in other words, the error terms should not exhibit correlation for any two observations. For example, consider wanting to explain student achievements with a specific educational program and using the achievements from the previous

period. If achievements increased in the previous period, there is a high probability of increase in the current period as well. This situation is called autocorrelation, meaning that regression errors are positively (or negatively) correlated over time. The presence of autocorrelation is an important consideration for obtaining reliable results in regression analysis.

To ascertain whether autocorrelation is present, apply the Durbin-Watson (D-W) test (Okafor et al., 2021). By comparing the null hypothesis—that there is no autocorrelation—to the upper and lower boundaries for negative autocorrelation and the upper and lower bounds for positive autocorrelation, this test determines whether or not autocorrelation exists. Support for an alternative hypothesis indicating the existence of either positive or negative autocorrelation can be established if the null hypothesis is rejected. Four possible possibilities are to be found:

1. Positive autocorrelation, or positive correlation, may exist between errors.
2. If positive errors tend to be succeeded by negative errors, and negative errors tend to be followed by positive errors, it indicates the presence of negative autocorrelation.
3. If there is no systematic pattern among errors, there is no autocorrelation.
4. If D-W values fall between the upper and lower critical values, the test is inconclusive.

The interaction between the Durbin-Watson test statistic (d) and the lower (dL) and upper (dU) critical values results in the existence of autocorrelation. Models that take autocorrelation into consideration, including panel and time series models, ought to be applied if it is found (Sarstedt & Mooi, 2019).

(Optional) Normal Distribution of Error Terms

The nearly normal distribution of the error terms is the sixth and optional condition in the regression model. T-values might be off if this isn't the case (de Menezes et al., 2021). Nevertheless, the regression model can still yield accurate estimates of the coefficients even if the errors are not regularly distributed (Sarstedt & Mooi, 2019). We thus consider this assumption to be optional.

Graphs and formal testing are the two major methods used to verify that error terms have a normal distribution. The Shapiro-Wilk test (Wang & Luo, 2022) is one formal test for normalcy that has to be run on data that has mistakes noted in it. A formal test can give definitive criteria and show non-normality. Formal test findings, however, don't reveal anything about the cause of non-normality. If mistakes are not normally distributed, one way to determine why would be to examine a plot of the normal distribution. These histograms can be used to identify the cause of non-normality and are simple to comprehend.

Interpreting Regression Results

At this stage, two fundamental components are addressed to evaluate the performance of the regression model. Firstly, in the "Overall Model Fit" section, various statistics and metrics are examined to assess how well the developed regression model fits the dataset. This evaluation will allow us to understand the overall effectiveness, predictive capability, and degree of fit with the dataset of the model. Secondly, in the "Effects of Individual Variables" section, the effects of each independent variable within the regression model on the dependent variable are examined. At this stage, the coefficients of each independent variable and their statistical significance are evaluated to understand the role of each variable in the model. Both sections provide important perspectives to assess the overall effectiveness of the regression analysis and understand the contribution of each variable. This dual-layered evaluation enables us to comprehensively examine the robustness of the model and the impact of each variable on the model.

Total Model Fit

Interpreting the F-test, which evaluates the model's significance and shows if any of the independent variables have an impact on the dependent variable, is the first step in determining the model's overall adequacy (Au et al., 2020). A one-way ANOVA's test statistic, the F-value, determines if all of the regression coefficients are equal to zero (Sureiman & Mangera, 2020). Thus, the following is the null hypothesis that is being examined:

- H0: $\beta1=\beta2=\beta3=\ldots=0$

If all regression coefficients are indeed zero, it indicates that the independent variables exert no influence on the dependent variable, signifying a lack of relationship (zero correlation) between them. Should we fail to reject the null hypothesis, adjustments to the regression model may be necessary, or alternatively, it might be concluded that the regression model lacks significance. A p-value below 0.05 in the F-test suggests model significance; however,

this doesn't automatically imply significance of individual regression coefficients when examined independently. Nonetheless, a significant F-value increases the likelihood of one or more regression coefficients being significant. It's important to note that model significance doesn't necessarily reflect a close fit but solely indicates statistical significance.

R-squared can be used to assess model fit if the F-test is significant. The degree to which the model explains the observed variance in the dependent variable with respect to the mean is shown by R-squared, sometimes referred to as the coefficient of determination (Maulud & Abdulazeez, 2020). Explanatory power is measured using adjusted R-squared, which accounts for model complexity. To evaluate models with various independent variables, additional fit metrics have also been given, such as the Bayesian Information Criterion (BIC) and the Akaike Information Criterion (AIC) (Dziak et al., 2020). These criteria are relative measures showing the difference in information. Furthermore, the use of scatter plots and regression analysis for interpreting R-squared has been explained, emphasizing that R-squared explains the percentage of variance and adjusted R-squared controls for model complexity. AIC and BIC compare models by applying a penalty based on the number of independent variables and sample size. In summary, when selecting regression models, it's important to use criteria such as adjusted R-squared, AIC, and BIC. These criteria can help in selecting the most appropriate model by evaluating explanatory power, model complexity, and information difference.

Effects of Individual Variables

This section explains the procedures used to use regression analysis to evaluate the impact of independent variables on the dependent variable. The p-values for each independent variable's regression coefficient are looked at first. The significance of the independent variable's impact on the dependent variable is ascertained using these numbers. The null and alternative hypotheses are then assessed using a hypothesis test. The null hypothesis is disproved and the impact of the independent variable is deemed significant if the p-values are low.

Effect size is as important as statistical significance. A significant coefficient may not be practically significant in terms of effect size. Therefore, considering both statistical significance and effect size, managerial implications are considered. Standardized β (Beta) coefficients are used to compare the effects of independent variables with different measurement units. These coefficients express the effects in terms of the standard deviation of the independent variable, allowing for comparisons between measurement units.

Finally, moderation analysis can be used to understand situations where the effect between individual observations is not constant. This analysis examines how the effect of another variable influences the effect of the independent variable. These steps summarize the basic steps followed to evaluate the effects of individual variables in the process of regression analysis.

Confirming Regression Results

The stability of the regression model must be evaluated following the validation of the regression analysis's assumptions and the interpretation of the findings. For the sake of this discussion, outcomes are considered stable if they exhibit consistency over an extended period of time, under a variety of settings, and with minimal reliance on the details of the model. The stability of a regression model may be assessed using a variety of techniques.

Random Splitting Method for Data Set

The dataset can be divided randomly into two subsets, with approximately 70% of the data used for estimating the regression model (known as the estimation subset) and the remaining 30% reserved for comparison (known as the validation subset) (Picard & Berk, 1990). If both subsets yield similar outcomes, it suggests model stability. However, exact replication of results across all regression models during validation is not necessary. It is essential, though, that individual parameter signs remain consistent, and significant variables remain unchanged, despite potential minor fluctuations in significance levels (e.g., $p = 0.045$, $p = 0.051$) (Harrington, 2018). The selection of the 70% and 30% split is a conventional practice, lacking a specific rationale (Sarstedt & Mooi, 2019).

(Cross-Validation)

The validity of findings can be assessed by cross-validating them with a separate dataset, allowing for an examination of the consistency between these findings and the original results. Consistency between findings

indicates the stability and appropriateness of our regression model's specification. However, it's important to note that cross-validation necessitates the availability of a second dataset (Song et al., 2021).

Adding Alternative Variables Method

Various alternative variables can be added to the model, and if the original effects change can be examined (Pomerantsev & Rodionova, 2021). For example, if the impact of education data on student achievements is being investigated, various additional variables can be added to the regression model. To do this, a basic model can be established to explain student achievement, including variables such as students' study hours and previous grade averages. However, to improve the model and control the continuity of the effects, alternative variables need to be added. First, the alternative variables to be added are determined. For example, the number of extra classes attended by students and their socioeconomic status are considered. These variables are added to the basic model, and a new model is created. Analysis is then conducted using the new model, and it is examined whether the basic findings persist despite the addition of new variables. Focus is placed on whether the effects of the previous variables remain stable. As a result, it can be observed whether the effects of the previous variables persist consistently despite the addition of new variables. In this case, it can be demonstrated whether the regression model is stable and whether the added alternative variables negatively affect the basic findings of the model.

Utilization of Regression Results

The steps to effectively utilize the results of regression analysis are summarized in the table below.

Table 2. Literature review process (Tranfield et al., 2003; Xiao & Watson, 2019).

Theory	**Practice**
Check the data requirements for regression analysis.	
Adequate Sample Size	Conducting a power analysis using G*Power involves the following steps: 1. Navigate to the "Analyze" menu, then select "Regression," followed by "Linear," and finally "Statistics." Ensure that "Descriptives" is checked. 2. In the output, locate the value of "N" under "Descriptive Statistics." 3. Alternatively, look at the ANOVA table after doing a regression analysis and determine the value between "df" and "Total." Subtracting 1 from this figure yields the overall sample size. To determine the required sample size: - Control the sample size to 104 + k, where k is the number of independent variables, if the predicted effects are modest (with R-squared at 0.10 or less). - Alternatively, if the expected effects are weak, ensure a minimum of 30 · k observations for each independent variable.
Are variations observed in the dependent and independent variables?	To calculate the standard deviations of the variables for verification, follow these steps: 1. Navigate to the "Analyze" menu, then select "Regression," followed by "Linear," and finally "Statistics." Ensure that "Descriptive" is checked. 2. In the output, examine the "Std. Deviation" under "Descriptive Statistics." Ensure that the standard deviation values are greater than zero.
The dependent variable is interval or ratio scaled.	Enter the required measurement value from the program's data entry.
Check for high correlation among independent variables in regression analysis.	To perform this verification, navigate to the "Analyze" menu, then select "Regression," followed by "Linear," and finally "Statistics." In the output, review the Collinearity Diagnostics section. Ensure that all Variance Inflation Factors (VIFs) listed under Collinearity Statistics are less than 10.

Check VIF.	
Specify the regression model and make a prediction.	
Specify the model	1. Choose different variables. 2. Aim to construct a robust model. 3. Take into account the variables essential for providing recommendations. 4. Assess whether the number of independent variables correlates with the sample size. 5. Create dummy variables first for ordinal variables. Go to ► Transform ► Create Dummy Variables to do this. Insert the first portion of the dummy in the "Root Names (One per Selected Variable)" section of the "Main Effect Dummy Variables" box after moving the ordinal variable to the "Create Dummy Variables for" box. Value labels are automatically assigned to each category by SPSS. Value labels can be set to "Use values" if they are not defined. It should be noted that SPSS creates dummy variables automatically for every category, therefore defining the base category is essential.
To predict the regression model	To forecast the regression model, navigate to ► Analyze ► Regression ► Linear. Specify the dependent variable in the "Dependent" field and include the predictors in the "Independent(s)" section. Finally, click OK to proceed with the analysis.
Test regression analysis assumptions.	
Can a regression model be determined linearly?	Can you write the regression model as: $y = +\alpha\ \beta 1x1 + \beta 22x + e$ Think of it as such.
Are the independent and dependent variables in a linear relationship?	To examine the linearity of the relationship, use a scatterplot matrix displaying the dependent variable against each independent variable. Access this by navigating to ► Graphs ► Chart Builder. Choose Scatter/Dot and drag Simple Scatter to the Chart preview window. Place the dependent variable on the Y-axis and each independent variable on the X-axis. Repeat this for all independent variables. The regression model must first be performed in order to perform Ramsey's RESET test. Go to ► Linear ► Regression ► Analysis. Indicate the variables that are dependent under "Dependent" and independent under "Block 1 of 1." Click Save after that. Choose "Unstandardized" under "Predicted Values," then click Continue and OK to continue. Proceed to ► Transform ► Compute Variable after that. To compute the quadratic prediction values, enter **2 after entering the non-standardized prediction variable "PRE_1," in the mathematical expression, then enter "PRED_2" in the "Target Variable" box. Proceed using the same procedure to forecast values for exponent 3, denoted as "PRED_3."
Is the expected mean error of the regression model zero?	Make a choice based on theoretical foundations.
Is error variance constant (homoscedasticity)?	Navigating to ► Analysis ► Regression ► Linear will launch the regression model. Enter the dependent variable in the "Independent(s)" column and make sure all predictors are included. Click Save after that. Click "Save," then choose "Residuals" under "Nonstandardized." After selecting Continue, select OK.

	Navigate to ► Charts ► Chart Builder and create a scatterplot of the dependent variable versus the residuals. Drag Simple Scatter to the Graphics preview window after selecting Scatter/Dot. Arrange the residuals that were stored on the X-axis and the dependent variable on the Y-axis. Check to see if the error variance exhibits a discernible rise or fall, signifying heteroscedasticity (a funnel shape). Use of the bootstrap approach should be considered if heteroscedasticity is present. Utilize Bootstrap and Linear and Regression under Analysis and Regression. Turn on "Perform Bootstrapping" and make sure there are 1,000 instances.
Are there no autocorrelations among the errors?	Sort the data according to the time variable and use the Durbin-Watson test to see whether there is a time component. Navigating to ► Analysis ► Regression ► Linear will launch the regression model. In the "Independent(s)" section, provide the dependent variable and each predictor. Navigate to Statistics, choose "Durbin-Watson" under "Residuals," click Proceed, and then click OK. First-order serial correlation may not be amenable to the Durbin-Watson test. Consult the essential values listed in the materials that go with it.
Are the mistakes roughly distributed normally?	For visual inspection: Rerun the regression model and navigate to ► Analysis ► Regression ► Linear. Include the dependent variable and all predictors in "Independent(s)" section. Click Chart and select "Histogram" under "Standardized Residuals Chart." Click Continue, then OK. Check if the histogram's bar lengths resemble the normal curve. For statistical testing: Rerun the regression model and go to ► Analysis ► Regression ► Linear. Include the dependent variable and all predictors in "Independent(s)" section. Click Save. Under "Residuals," select "Nonstandardized." Click Continue, then OK. Conduct the Shapiro-Wilk test by navigating to ► Analysis ► Descriptive Statistics ► Explore. Add the non-standardized residuals to the Dependent list, check the "Tests of normality" box, and click Continue, then OK. Verify if the Sig. value of the Shapiro-Wilk test exceeds 0.05.
Analyze and explain the results of the regression model.	
Evaluate the overall model fit.	Assess the significance of the F-test and the R-squared value.
Evaluate the effects of the independent variables separately.	Examine the (Standardized) β coefficients and their signs. Evaluate the significance of each coefficient by considering the p-value and the Sig. value.

To contrast models	Use the following procedures to calculate the Bayesian Information Criterion (BIC) and Akaike Information Criterion (AIC): When establishing the regression model, click Paste rather than OK. The /STATISTICS subcommand should now include SELECTION (for instance, /STATISTICS COEFF OUTS R ANOVA COLLIN TOL SELECTION). Go to ► Run ► All, select all of the created code, and then click Run. Verify the AIC and BIC values to make sure the simpler model has values at least twice as high as the more complex model, ideally 10 units lower.
Verify the model	
Are the consequences reliable?	Choose 30% of the dataset's instances at random that satisfy the minimal sample size criteria. Navigate to ► Data ► Select Cases to accomplish this. In the "Approximately % of all cases" box, enter 30% after selecting "Random sample of cases." Before clicking OK, make sure that "Filter unselected cases" is selected under Output. Proceed to ► Data ► pick Cases and pick "All cases" to go back to selecting all instances. After that, choose ► Data ► Split File. Select "Organizing output by groups" from the dialog box, drag the filter_$ variable to the "Edit by groups" box, then click OK. Verify that the regression model's outputs for the big and small samples are identical in terms of direction and significance by comparing them.

Sample Regression Analyses

Regression analysis with SCL variables as predictors of LLS choice

	B	*SE*	Beta	*t*	*p*	*F*	R^2	Adj. R^2
Memory	1.125	.354		3.178	.002**	26.4	.439	.422
Motivation	.121	.079	.117	1.538	.126			
Persistence	.254	.112	.223	2.261	.025*			
Self-efficacy	.314	.099	.314	3.191	.002**			
Cooperation	.145	.068	.145	2.145	.033*			
Competition	-.208	.058	-.233	-3.574	.000**			
Cognitive	1.205	.279		4.318	.000**	24.86	.424	.407
Motivation	.358	.062	.444	5.776	.000**			
Persistence	-.034	.089	-.039	-.388	.698			
Self-efficacy	.238	.078	.306	3.068	.003**			
Cooperation	.038	.053	.049	.720	.472			
Competition	.034	.046	.048	.732	.465			
Compensation	1.150	.315		3.650	.000**	21.36	.387	.369
Motivation	.364	.070	.413	5.207	.000**			
Persistence	-.264	.100	-.271	-2.633	.009**			
Self-efficacy	.421	.088	.494	4.805	.000**			
Cooperation	-.009	.060	-.011	-.155	.877			
Competition	.128	.052	.169	2.476	.014*			
Metacognitive	.637	.262		2.437	.016*	41.07	.549	.535
Motivation	.301	.058	.353	5.189	.000**			
Persistence	.267	.083	.284	3.215	.002**			
Self-efficacy	.127	.073	.154	1.740	.084			
Cooperation	.103	.050	.124	2.053	.042*			
Competition	.008	.043	.010	.176	.860			
Affective	1.030	.342		3.014	.003**	15.98	.321	.301
Motivation	-.006	.076	-.006	-.074	.941			
Persistence	.258	.109	.257	2.378	.019*			
Self-efficacy	.180	.095	.205	1.890	.060			
Cooperation	.191	.065	.217	2.927	.004**			
Competition	.043	.056	.056	.774	.440			
Social	.143	.351		.408	.684	25.29	.428	.411
Motivation	.347	.078	.342	4.467	.000**			
Persistence	.157	.111	.140	1.410	.160			
Self-efficacy	.163	.098	.166	1.668	.097			
Cooperation	.128	.067	.131	1.914	.057			
Competition	.108	.058	.123	1.868	.063			

Note: $^{*}p < .05$, $^{**}p < .01$

Figure 1. Multiple linear regression analysis table (Almusharraf & Bailey, 2021)

Above is the table with the results of multiple linear regression analysis. The interpretation of the cognitive category variable of the table is as follows:

"A significant regression equation was found for the cognitive category (F(5, 169) = 24.86, p < .001) and the corrected R2 value was calculated as .407. Participants' use of predicted cognitive strategies is expressed as 1.205 (constant) + .358 (motivation) + .238 (self-efficacy).

Participants' level of use of cognitive strategies increased by .358 points for every 1-point increase in motivation, and .238 points increased for every 1-point increase in self-efficacy." Looking at the above interpretation, firstly, it was stated that the regression analysis performed in the cognitive category was significant. The F-test results were presented together with (F(5, 169) = 24.86, p < .001) and the corrected R2 value (.407) to indicate that the model had significant explanatory power. Next, the regression equation is given, which expresses the participants' predicted cognitive strategy use: 1.205 (constant) + .358 (motivation) + .238 (self-efficacy). This equation told us how the independent variables (motivation and self-efficacy) affected participants' use of cognitive strategies. Finally, focusing on the coefficients of the equation, the following conclusions were drawn: For every 1-point increase in motivation, there was a 0.358-point increase in the use of cognitive strategies, and for every 1-point increase in self-efficacy, there was an increase of 0.238 points. In these expressions, the effects of the independent variables on the dependent variable are specified in quantity.

Conclusions

The results of this study were obtained through a systematic literature review on the basic concepts and current problems in the field of regression analysis. An overview of the findings has the potential to present researchers with the current knowledge on regression analysis and important developments in the literature. First of all, the

systematic literature review and analysis of the reviewed articles covered a broad perspective on regression analysis and revealed various approaches in this field. The diversity of basic concepts and methods provides researchers with flexibility in their regression analysis applications, while at the same time demonstrating the need for standardization of this diversity. The overall evaluation of the findings is that the basic concepts related to regression analysis are explained and these concepts have the potential to provide a comprehensive guide to researchers. The explanation of basic concepts stands out as an important resource, especially for researchers who are new to this field. The findings of the study focus on the basic concepts of regression analysis, emphasizing its potential to provide researchers with a resource that can provide a solid foundation in this field. Explaining the basic concepts is especially important for researchers who are new to regression analysis. However, at this point, it should be emphasized that the developments and new methods in the literature should be constantly updated. The literature review and the analysis of the reviewed articles show that the basic approaches and methods related to regression analysis are covered in a wide range. This diversity in the literature provides researchers with the flexibility to gain and apply different perspectives on regression analysis. However, this variation may also indicate a lack of a specific standard, indicating the need for more comprehensive guidance and standardization in future regression studies.

The constraints of focusing on a limited time frame may offer incentives for future researchers to pursue more wide-ranging, long-term studies. Furthermore, the limitations imposed by relying on specific data sets highlight the importance of studies on larger and more diverse data sets. In addition, it emphasizes the necessity of following current developments in the literature on regression analysis, integrating new methods and closing the gaps in this field. Researchers should be urged to focus on and apply advanced methods of regression analysis.

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Ensuring Intensive Computerization of Higher Education Students in the Context of Blended Learning Technologies Development

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Abstract

This article delves into the use of intensive information technologies within higher pedagogical education. It explores the latest trends in modern technologies and their impact on the training of future teachers, particularly in the context of blended learning. The author highlights strategies for intensive informatization that aim to enhance the quality of the educational process and develop students' key competencies. The article delves into the practical methods and tools of digital support that optimize blended learning. It examines the implementation of virtual tools, electronic resources, and innovative pedagogical methods in the context of intensive informatization. Moreover, the article analyzes potential challenges that may arise during the informatization of higher pedagogical education and provides solutions to overcome them.The conclusions of the article help to systematize the accomplishments in the field of intensive informatization and outline the prospects for further technological development in higher pedagogical education.

The purpose of the article: this article aims to study and analyze the possibilities of implementing digital educational services and resources in blended learning.

Main objectives:

1) Consideration of current models of informatization: Analysis of existing models of informatization of higher teacher education to determine their effective use in the context of blended learning.

2) Development of integrated pedagogical strategies: Identification and development of pedagogical strategies that will successfully combine traditional methods with modern technologies in the educational process.

3) Creating a blended learning infrastructure: Consideration of the creation of an effective infrastructure that will support the integration of digital resources and technologies into the learning process.

4) Evaluating the effectiveness of informatization: Identification of criteria and methods for evaluating the effectiveness of informatization of higher teacher education, in particular in the context of blended learning.

Expected results:

As a result, is expected that the article could be used for providing specific recommendations and conclusions that will help higher education institutions and professors and staff to successfully implement informatization to optimize blended learning. Also, the conclusions of the article can be used to increase the efficiency of the educational process and preparation of graduates for the challenges of modern society.

Blended learning, as a strategy for the optimal combination of traditional and digital methods, requires integrating various digital resources and interactive platforms into the pedagogical process. This becomes a key component to achieve synergy between traditional learning and modem technologies, maximizing the convenience and effectiveness of learning.

Digital resources to expand the learning space:

Digital resources, such as video lectures, e-textbooks, interactive exercises, and virtual labs, enable students to access materials at their own time and pace. This is especially important in a blended learning environment, where independent work with the material becomes a significant component.

Interactive platforms to enhance the learning process:

The use of interactive platforms such as virtual forums, online conferencing, and assignment-sharing systems allows you to engage students in active discussion and collaboration. These tools contribute not only to the expansion of knowledge but also to the development of communication and teamwork skills, which are important aspects of modern education.

Blended Learning as a Strategy for Optimal Integration of Traditional and Digital Methods:

Blended learning, as an educational strategy, involves the thoughtful integration of traditional face-to-face instruction with digital methodologies. This approach seeks to capitalize on the strengths of both conventional teaching methods and modern technologies that impede the learning process, students might be susceptible to non-educational content or multitasking, affecting overall focus and engagement.

Balancing the advantages and addressing the disadvantages of informatization in higher pedagogical education is essential for maximizing the benefits of blended learning while mitigating potential challenges.

Prospects for further development

To date, informatization in higher pedagogical education has already shown significant achievements and made a significant contribution to improving the educational process. The integration of digital technologies and blended learning has opened up new horizons for the effective learning and development of future teachers. In this section, the authors explore possibilities and prospects for the continued advancement of technologies in higher pedagogical education. They shed light on emerging technological trends that could impact the educational process and discuss how these technologies might enhance the quality of education.

Emerging Technological Trends:

Artificial Intelligence (AI) Integration:

The integration of artificial intelligence in educational tools holds the potential to personalize learning experiences, offer real-time feedback, and adapt to individual student needs.

Extended Reality (XR) Applications:

The application of extended reality, including virtual and augmented reality, can create immersive learning environments, providing students with hands-on experiences that transcend traditional classroom boundaries.

Blockchain for Educational Credentials:

The use of blockchain technology for secure and transparent management of educational credentials has great potential for modern education.

In the contemporary landscape of education, the integration of technology has become imperative in fostering dynamic learning environments. A pivotal aspect of this paradigm shift is the creation of a robust blended learning infrastructure that seamlessly integrates digital resources with traditional pedagogical approaches.

A multimodal approach, as advocated by Picciano (2009), emphasizes purposeful blending, leveraging both synchronous and asynchronous elements. This framework acknowledges the diversity of learners' needs and preferences. Integrating learning management systems (LMS), virtual classrooms, and collaborative tools forms the backbone of this infrastructure (Graham, 2006).

The successful integration of digital resources necessitates a strategic approach. Vaughan (2007) highlights the importance of aligning technological tools with learning objectives. This pedagogical alignment ensures that technology complements rather than supersedes traditional teaching methods. Additionally, a phased implementation strategy aids in fostering faculty buy-in and effective utilization of technological tools within the curriculum.

The efficacy of a blended learning infrastructure heavily relies on the availability and accessibility of technological support. Ensuring robust technical support mechanisms, coupled with user-friendly interfaces, enhances the user experience and minimizes barriers to adoption. Scherer, Siddiq, and Tondeur (2019) emphasize the significance of the Technology Acceptance Model (TAM) in gauging educators' willingness to embrace digital technologies, underscoring the importance of usability and perceived usefulness.

An inclusive blended learning infrastructure caters to diverse learner needs. Incorporating adaptive learning technologies enables personalized learning experiences, addressing individual learning paces and preferences. This adaptability fosters engagement and enhances learning outcomes (Mishra & Koehler, 2006).

Creating a robust blended learning infrastructure necessitates a deliberate integration strategy that aligns technological tools with pedagogical objectives, fosters accessibility, and accommodates diverse learning needs. Such an infrastructure serves as the cornerstone for an effective blended learning environment, facilitating meaningful interactions and optimizing learning outcomes.

Conclusions

However, the path to intensive informatization is not without challenges. Ethical considerations, the need for digital inclusion, and the imperative for continuous professional development for educators are critical aspects that demand attention. Addressing these challenges ensures that the benefits of technology in education are realized equitably and responsibly.

In essence, the pursuit of intensive informatization in higher pedagogical education is a dynamic journey marked by innovation, adaptation, and a commitment to enhancing the quality of education. As we navigate this transformative landscape, the vision is one of empowered educators, engaged learners, and a technologically enriched educational ecosystem that prepares individuals for the complexities of the modern world.

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From Open Education to Wikiliteracy: reframing key concepts in the light of the digital capital

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Abstract

It is undeniable the role that the digital dimension plays today in society. Thus, in this text, it is our purpose to revisit key concepts that set that digital dimension, namely in education. To this end, we call upon the theoretical foundations of the work we have been developing within the WEIWER® International Academic Network, dedicated to study e.g. the Wikimedia ecosystem. Moreover, we call upon our design, implementation, and evaluation of the curricular and pedagogical integration of Wikipedia, which has driven us towards new understandings of our different frameworks, including those on the digital dimension. We specifically focus on Open Education, Open Pedagogy, Open Teaching and Open Learning, bringing to light an updated comprehension of the Wikipedagogy. Then, we also focus on the digital capital, in contrast to the digital divide, bringing to light an updated comprehension of the Wikiliteracy. In the end, by reframing those key concepts in the light of the digital capital, particularly inspired by our work, it has led us to contribute to open educational practices. In a word, our path from open education to wikiliteracy has shown us possible ways to contribute to the learners' developing of a broad set of literacies, including digital literacy, which ultimately promotes meaningful learning impacting on learners.

Keywords: Open pedagogy, open teaching, open learning, WEIWER®, wikipedagogy.

Introduction

In the literature we identify the curricular and/or pedagogical integration of the Wikimedia Foundation projects, including Wikipedia, as promoters of a broad set of literacies (Ball, 2019; Cardoso & Pestana, 2023b; Cummings, 2009; Lockett, 2020; Park & Bridges, 2022; Pestana, 2018). It is important to note that the Wikimedia ecosystem is supported by a framework associated to the openness movement, which can take on different dimensions: technical, legal, social, and financial (Pestana, 2018; Tuomi, 2006, 2013). Although our work is limited to the curricular and pedagogical component, therefore, focused on the social dimension, it intertwines with the remaining dimensions of the openness phenomenon. In fact, because we work with students at all levels of education, for example, legal issues are considered, namely by using Creative Commons licenses. The financial dimension is also at stake, since both the materials used for the work and the platform in which it takes place (MediaWiki) are free of charge, i.e., without the need for any payment.

To those dimensions there is the need to add the digital dimension, nowadays a key asset in society. According to Pinto, Cardoso & Pestana (2019, p. 26), "“the triad 'Digital skills - Qualification – Employability' must be a constant throughout life, as technological developments continue to transform our daily lives. But it is also fundamental for building a fairer, more inclusive and sustainable society”, thus emphasizing the role it plays in each individual's Digital Capital. Thus, in this text, it is our purpose to revisit key concepts that set that digital dimension, namely in education. Moreover, we aim at reframing key concepts in the light of the digital capital, namely from Open Education to Wikiliteracy.

Open Education and Wikiliteracy: facets of multidimensional concepts

Open Education presents “an increasing effect on the effectiveness of education and training processes at every education level on an economic and social basis (Demirbilek & Keser, 2023, p. 145). According to Pestana (2018) and Zawacki-Richter et al. (2020), it is a complex and comprehensive phenomenon, often associated with current trends, not always perceived from a multifaceted perspective, as evidenced by the following definition, inspired by Conole & Brown (2019), Cronin & MacLaren (2018) and Cardoso & Pestana (2023a): Open Education integrates individual and/or institutional resources, tools and practices aiming at promoting access, efficiency, success and equity in education around the world. Therefore, and considering two significant concepts, resources and practices, we propose to take a look at both in some detail, which can be supported by their importance in the Wikimedia ecosystem and specifically in the curricular and pedagogical integration of Wikipedia.

Currently, the Open Educational Resources (OER) are understood as "teaching, learning and research materials in any medium, digital or otherwise, that reside in the public domain or have been released under an open license that allows no-cost access, use, adaptation and redistribution by others with no or limited restrictions" (UNESCO, 2012, p. 1). As for the Open Educational Practices (OEP), these are understood as "collaborative practices that include the creation, use, and reuse of OER, as well as pedagogical practices employing participatory technologies and social networks for interaction, peer-learning, knowledge creation, and empowerment of learners" (Cronin, 2017, p. 4). OER and OEP are paramount to Open Education, namely to Open Pedagogy, Open Teaching and Open Learning, as we discuss in the next paragraphs.

DeRosa (2018), in her book chapter, looks back at the concept of Open Pedagogy (OP) by introducing the work of Morgan (1979), who associates OP with three foundational values: autonomy and interdependence; freedom and responsibility; democracy and participation. Although OP can take on other aspects, it is also associated with numerous teaching/learning theories, including the integration of OER, and therefore of OEP, which is particularly relevant. Schultz & Azadbakht (2023) refer to Wiley (2013), who also shares that understanding, considering Open Textbooks (OTB) as promoters of a broad set of literacies, namely, in the context of the information literacy, on the one hand, and, on the other hand, in the context of the critical literacy. Cummings (2023) associates as well OP with OER and OEP through OTB, hence embodying what he calls the Open Teaching (OT).

In the literature review carried out by Chiappe & Lee (2017) regarding OT, it is associated with flexibility and access as factors that allow autonomous work, particularly in an e-learning context. The authors also associate this autonomous work with OER, namely with OTB, thus emerging active learning as a core element. In turn, Olcott (2022) emphasizes the element associated to "teaching" in the teaching/learning binomial, hence considering that "Open teaching is an instructional framework that draws upon open practices, resources and pedagogical strategies designed to promote access, enhance teaching quality and improve more effective learning in educational environments" (p. 160).

In the context of Open Learning (OL), Li (2018, pp. 409-413) reviews the concept over time and associates it with the technologies that support it, namely: "Correspondence learning (before the 1960s)"; "Distance learning through multiple technologies (1960 to 1985)"; "Distance learning with increasing use of computers and networks (1985 to 1995)"; "Online learning through high-bandwidth computer technologies (1995 to 2007)"; "Interactive online learning Web 2.0, mobile and synchronous technologies (2008 to the present)". Therefore, OL "involves an educational philosophy and operational practices that it denotes and/or connotes. Open entry, freedom from barriers and learner-centredness embody educational principles or ideals. Having flexibility in learning and adapting various strategies in teaching and learning are ways to achieve these principles. Technologies provide the means and tools for open learning to take place in its preferred way and be distinguished from conventional learning" (Li, 2018, p. 419).

These are indeed important features, mostly in distance education, as is our case (Cardoso & Pestana, 2021), and that is why we highlight, as the author, the role of open universities in the world as promoters of scenarios in Virtual Learning Environments (VLE) with those characteristics. Green (2018, n.p.) segments the OL phenomenon in three dimensions: the first situated in a contemporary dimension that focuses "on the use of openly licensed content in tandem with open, effective teaching strategies"; the second "on a more general philosophy of openness in all elements of the teaching process including open planning, open products, and open post hoc reflection"; the third the perspective given between the 60s and 70s of the last century, associated with "open education […] and open classrooms) to learner centered teaching approaches that were inspired by theorists such as John Dewey and Jean Piaget".

Open Teaching and Open Learning converge and can be considered as two sides of the Open Education, pertaining to the teacher and to the student, or even as two sides of the "WikiPedagogy" (Olcott, 2022), the former linked to the educational dimension and the latter to the pedagogical dimension, all targeted at the development of the wikiliteracy as we have been advocating. Initially, the wikipedagogy was associated with the pedagogical framework that involves working on a Wiki software (Bower, Woo, Roberts, & Watters, 2006) and was later associated with work with the Wikimedia ecosystem (Baltzersen, 2010; Humer, & Schnetzer, 2022; Sura, 2015); to us, it combines both the openness and the wiki premises, of which we highlight, from the former, the blended (e)learning and the flipped learning approaches, and, from the latter, the peer review and the collaborative work (cf. Figure 1).

Wikiliteracy is a concept created by Ball (2019), which we have been subsidizing with other contributions (e.g. Reddy, Sharma & Chaudhary, 2020; Reddy, Chaudhary, Sharma & Hussein, 2023). Thus, we assume that the wikiliteracy is directly allocated to Digital Literacy, which, in turn, includes the: Information Literacy (knowing how to identify the information you need and being able to obtain it from digital sources of information, which involves researching, analyzing, synthesizing, critically evaluating and fulfilling all copyright and sharing rules); Computer Literacy (knowing how to use computers and digital technologies); Media Literacy (being able to access,

analyze, evaluate and communicate information on various digital platforms); Communication Literacy (being able to communicate individually and in a network, taking advantage of Web 2.0 tools, in which the use of the internet is not only passive, but also active, by content production); Visual Literacy (perceiving and representing information from digital media in pictorial images or graphics); Technological literacy (using digital technology to enhance learning, performance and productivity).

To this set of literacies, we add Critical Literacy which, in line with English (2023) and McKenzie (2023), allows to promote a critical stance, response or action in relation to a problem. Critical Literacy, despite being associated with most of the literacies previously identified (e.g. Information Literacy and Media Literacy), assumes a dominant and transversal position within the Digital Literacy, namely, in the context of the Wikiliteracy, that is, associated with the Wikimedia Ecosystem, as when we integrate it from the point of view of the curriculum and/or of the pedagogy (Cardoso & Pestana, 2022). Hence, according to McKenzie (2023, p. 3), "Wikipedia is arguably one of the best tools for teaching critical literacy as a result of its hegemonic position in the information landscape […] coupled with students' casual familiarity". Moreover, it is also a promoter of the Digital Capital.

Digital Capital: facets of a multidimensional concept

The "Digital Capital" refers to "a set of internalized abilities and aptitudes […] as well as externalized resources […] that can be historically accumulated and transferred from one arena to another […] contributing to life opportunities enhancement by creating a bridge between online and offline realms"; currently it has three levels: 1st "Access" to ICT; 2nd "Use" of ICT; 3rd "tangible outcomes" (Addeo et al., 2023, p. 2). This third level is associated with the effective contribution of opportunities generated by the digital capital. More broadly, and according to Benoliel & Schechter (2023, p. 239), working on digital capital strengthens and influences social capital, economic capital and cultural capital, allowing us to cultivate "educational capacity and resilience in the school ecosystem, with a particular focus on the role of digital capital in reinforcing the school ecosystem capitals"; therefore, the digital capital is the sixth capital. DuBose (2023, p. 50) also highlights the system of communicating vessels between the six capitals, thus stating that "Communities that are underrepresented in digital spaces are often also low in the traditional 5Cs", i.e., the "Social Capital", the "Economic Capital", the "Personal Capital", the "Political Capital" and the "Cultural Capital".

As for the "Digital Divide", currently three levels are also identified: 1st "inequalities in access to ICTs"; 2nd "inequalities in using ICTs"; 3rd "inequalities in tangible outcomes" (Addeo et al., 2023, p. 2). Other authors relate the digital divide to "Social Stratification", either through "Race", "Geographic Location", and "Gender" (Wilson, Wallin & Reiser, 2003), or "Age", "Gender", "Education", and "Region" (Singh, Singh & Nermend, 2022). These authors assume that "[t]he digital divide is one of the most unexpected outcomes of the digital revolution. It has a detrimental impact on all aspects of society and exacerbates existing socio-economic injustices. It is equally true that the formation of digital capital is the result of existing social and cultural capitals, as well as different forms of inequalities in society" (p. 7).

In line with the Bourdieu's definition of capital, Merisalo & Makkonen (2022) also relate different forms of capital as unavoidable elements for entering the digital world. Thus, these elements are linked to the possibilities, skills, and willingness to access and use digital technologies, i.e., to perform an activity in the digital space, which relates to the physical capital of the information society (namely, the information infrastructure, the Internet, the hardware, and the software). According to the authors, it was soon realized that restrictions on the Internet access and limited resources, in space and time, mainly due to the lack of quality and autonomy to the Internet access, burden economically disadvantaged groups, hence negatively impacting in all aspects related to a good online experience.

Wikipedia-based research projects can enable to overcome the digital divide, and therefore can enable to achieve the digital capital. So, if students participate in those projects, it is possible to foster the acquisition of a broad set of skills, explicitly the skills that shape the wikiliteracy. DuBose (2023) reminds us that although it is rather easy to find statements that anyone can edit the Wikipedia, the literature evidences the opposite, i.e., editing the Wikipedia, with the established requirements, and relating to the community of Wikipedians can be quite a challenge both for the students and the teachers. The author states that "[g]iven the uneven distribution of the digital capital required to represent one's community on Wikipedia, teaching community-based assignments using Wikipedia creates rich opportunities to extend an institution's digital capital to the community and promote student learning" (p. 55); these are the opportunities that we have been creating within the WEIWER® International Academic Network, as illustrated by the conceptual map below, which summarizes the theoretical framework of the curricular and pedagogical integration of Wikipedia we developed.

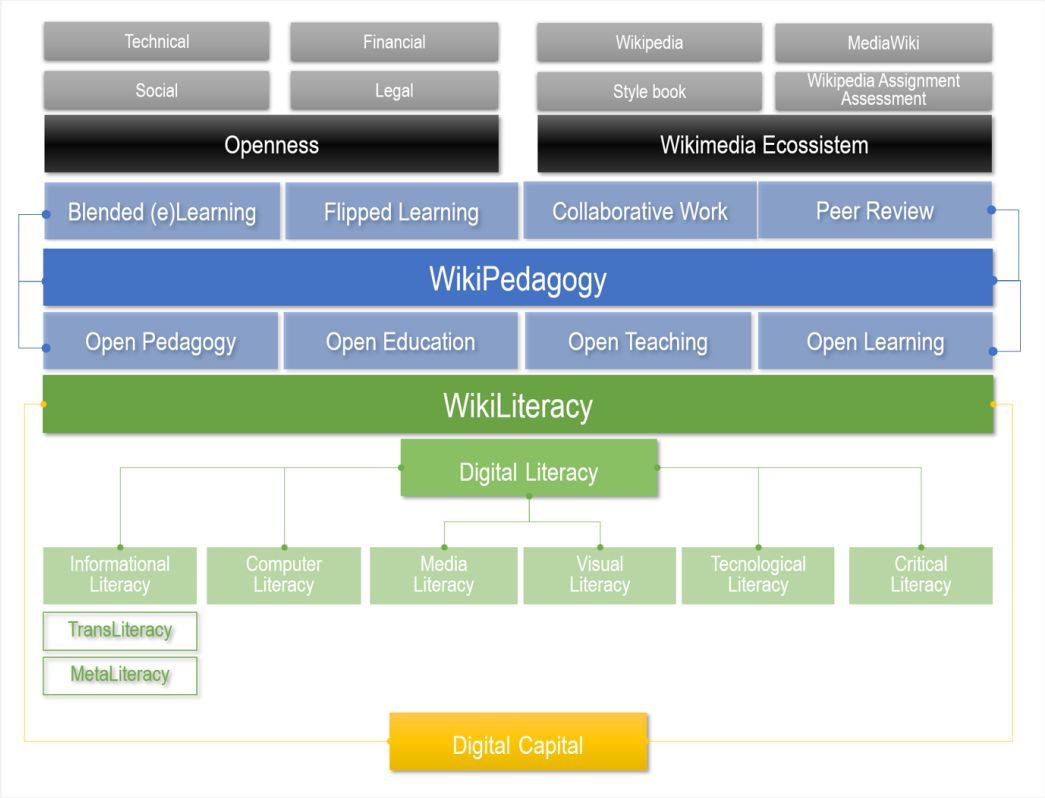

Figure 1. The WikiPedagogy in the light of the Digital Capital.

Conclusions

The curricular and pedagogical integration of the Wikipedia that we have been undertaking for over more than a decade, since 2014, includes the (re)creation of open educational resources, at all levels of education, which is carried out collaboratively through active methodologies, centered on students, such as Filipped Learning. Ultimately, students are challenged to develop a set of literacies converging to the digital literacy, which, in turn, sustains the wikipedagogy as we have redefined it. So, by reframing key concepts (open pedagogy, open teaching, open learning) in the light of the digital capital, particularly inspired by our work, it has led us to contribute to open educational practices. In a word, our path from open education to wikiliteracy has shown us possible ways to contribute to the learners' developing of a broad set of literacies, which, in the end, reduces the digital divide and simultaneously promotes meaningful learning impacting on learners.

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The role of personnel management at agricultural business

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Abstract

The relevance of improving the efficiency of enterprises in Albania and, accordingly, the role of personnel management in the implementation of this task has grown especially in recent years when the number of pastures and arable land has substantially decreased due to an increase in the area of mineral extraction. The purpose of the study is to determine the most effective motivation and planning system for them, considering the national characteristics and mentality of agricultural workers, mainly nomadic shepherds, and to form recommendations on the most acceptable management style for this group. The Holfstede typology of cultural dimensions was used as a key method to identify the cultural and behavioural characteristics of the target audience. In the course of the survey conducted among 1,514 staff representatives and processing of its results, the average indicators for six cultural dimensions were calculated, and estimates of these indicators were given. According to the obtained data on the typology of cultural dimensions, it was determined that values in the examined social group are largely determined by traditions and customs, which means that a managerial model is in demand that will not impose existing Western management principles but uses its own tools based on relatively democratic principles. Based on the obtained characteristics, recommendations were formed on such key management tools as the principles of subordination, the system of setting tasks and monitoring their implementation, and on the effective motivation of personnel. The practical importance of the study lies in the development of recommendations for improving personnel management and, as a result, increasing efficiency at agricultural enterprises in Albania.

Keywords: Management, performance, agrocomplex, enterprises, Hofstede method.

Introduction

Albania as a country at the stage of development, to one degree or another is characterised by the mentioned barriers to establishing and managing new business. However, along with a number of difficulties for development, the country also has significant advantages. One of the most important ones is the presence in Albania of a large part of the young population that is best adapted to rapid changes, ready to accept innovations and has the potential to produce and implement new ideas, in particular in the entrepreneurship area (Kruja & Kadiasi, 2020). Most start-ups in Albania are created in the area of ICT, education, as well as e-commerce. Such more traditional areas of operation as the agro-industrial sector are less popular among young entrepreneurs (Boshnjaku & Caro 2020). At the same time, the agro-industrial complex of Albania in general has a high potential: it provides a significant part of GDP and creates jobs for almost half of the working population (Kosta et al., 2022), plays an important role in the export of certain products types, its development is facilitated by climatic and geographical conditions. Nevertheless, at the end of the 20th century, after the transition of the economy of the state to market relations and the intensive development of mining technologies, the vector of the main economic area changed from the agro-industrial complex (AIC) towards the mining of deposits of copper, gold, coal, uranium, etc. Batmunkh (2021), who examined environmental problems in the mining sector, calculated that more than 8 thousand hectares of land were damaged by gold mining alone throughout the country.

In addition to mining, agricultural machinery also had a technogenic impact on pastures and arable land. Thus, in particular, the problem of land pollution with diesel fuel and engine oil was examined by Tserendorj (2022), who reflected the main risks of such pollution and formed recommendations for optimal cleaning and operation.

Thus, the explosive growth of technologies has substantially affected the agriculture of the country – territories that were recently occupied by pastures and acreage are intensively turning into mines and storage sites for waste soils, and these changes are irreversible. Forced land cuts had a negative impact on the routes of nomadic shepherds, the volume of fodder, livestock, and crops. The solution for the current situation is to increase the efficiency of agriculture, minimising the consequences of technogenic processes. A number of studies have been conducted in the search for ways to increase the productivity of AIC of Albania.

For example, Bayasgalankhuu et al. (2022) conducted an energy analysis of wheat yield and concluded the need to substantially limit the use of nitrogen fertilisers, since the energy costs of their use are unreasonably high.

Batmunkh et al. (2022), in the process of investigating economic globalisation and environmental sustainability in Central Asia, confirm the hypothesis that the region is at the stage of an industrial economy and propose a roadmap for expanding interstate relations, including joint reclamation of the lands, which will lead to an increase in the yield from steppe lands.

Regarding the efficiency of agriculture and productivity, such a negative natural phenomenon as drought should be considered. Nanzad et al. (2021) assessed the impact of droughts on the productivity of terrestrial ecosystems, identified signs of their approach at early stages and identified crops most susceptible to water scarcity. The results of their work are aimed to increase the readiness of staff and authorities for droughts, and, as a result, minimise negative consequences.

Therewith, one of the key factors in increasing the effectiveness of almost any process is the systematisation and improvement of its management. Regarding the situation under study, this refers to better management of personnel who are accustomed to existing in the traditional paradigm and avoid substantial changes – both in everyday life and in labour relations.

Filling the gap in the studies of new management solutions in enterprises in Albania, in this paper, the task was set to examine the specific features of the target audience and to identify the psychological and cultural characteristics of its representatives.

Literature review

The subject of enterprises in Albania, as a leading branch of the economy with a huge production potential, attracts the attention of many researchers, especially in the context of the global fight against hunger, which has been exacerbated in recent years.

In particular, Takahashi et al. (2019) examined the possibilities of increasing agricultural productivity in Albania through the use of information-communication technologies. As a result of the calculations he received, it was identified that investments in lightweight drones and automated crop control systems are economically justified even for small farms. Such innovations are impossible without the proper technical training of personnel, which means that the role of management in increasing productivity is especially high in that area.

Yuan et al. (2022), analysing the cyclical transformation of land cover between pastures and arable lands on the example of the aimags of Archangel, Tuve, and Dornod, noted that the spatial distribution of the intensity of land use indicates that its principles are largely influenced by short-sighted management decisions. Moreover, improper management and lack of high-quality information work with personnel lead to uncontrolled migration in rural areas of Albania (Amartuvshin et al., 2021).

Markovich (2013) warned about the risks of the raw material model of the Albanian economy in her work. According to the author, long-term mining hinders the sustainable development of the economy, because the funds received "at the moment" from coal or gold mining are spent over time, while crop and cattle breeding without proper support is declining. Consequently, according to the conclusions obtained in her study, a qualitatively different approach in the management of agro-industrial complex personnel is necessary for the formation of the food security potential of the country. Zandaria (2022), based on his own calculations, concluded that the total funds needed for the rehabilitation of the existing territories of Albania affected by mining are up to 51.1% of the budgets of local authorities. Therewith, without fundamentally new approaches in the management and implementation of planned measures for the reclamation of territories and the achievement of sustainable development goals, there is a risk of repeating the same mistakes that led to the current situation.

An important contribution to the examination of the psychology of farmers and their management approach was made by Shang and Xiong (2021), who surveyed representatives of 469 farms to determine their readiness to insure future crops and crop prices. As a result of that, it was identified that farmers have a low estimate of their own ability to predict crop prices, but, nevertheless, they do not trust such an assessment from specialists and, in most cases, refuse to issue insurance. This contradiction leads to the conclusion that to get the trust of the farmers, it is necessary to convey to them the essence of innovations (in this case, insurance products) in an accessible form.

Janz (2007) noted an important difference in the mentality of nomadic pastoralists and sedentary shrews.

Notably, almost all authors, researching ways of introducing innovations in the agro-industrial complex of Albania did so in the context of the existing Western management paradigm. Therewith, as can be seen from a number of studies mentioned above, the specific features of the personnel of Albanian farms are such that any management system should be adapted to the existing mentality and traditions of generations of nomads and pastoralists.

Considering the above, the purpose of this study is to identify key cultural codes and social characteristics of personnel and form a specialised set of recommendations for their management.

Materials and methods

Due to the evident specific features – geographical remoteness from settlements, closed communities, constant challenges, regular movements, and the absence of a stationary home in its conventional sense – this social group has been formed for many generations in a relative cultural and social vacuum.

Therefore, when it comes to managing such personnel, the existing experience of Western management is not applicable. It was decided to conduct a study according to the typology of cultural dimensions developed by Geert Hofstede to form a new approach and understand the logic, motivation, and values of Albanian agricultural workers. Within the framework of these measurements, the attitude of a person to work, the service hierarchy, life orientation, and ethnic cultural characteristics are determined.

The survey was conducted in six key categories listed below.

The *PDI* Power Distance index is the degree to which people who do not have power or have little power agree that power is distributed unevenly in society, i.e. the higher this indicator, the more society agrees that the leader has indisputable authority.

Individualism *IDV* – assessment of the dominance of individual interests. The higher this indicator, the less collective goals and collective responsibility are inherent in such a society.

Masculinity *MAS* is a focus on achieving results at any cost. The lower this indicator, the higher the value of intangible benefits, relationships in the team, quality of life.

Avoiding uncertainty *UAI* index is the need to have specific plans and understand how to achieve them. Consequently, the lower this indicator, the higher the willingness of this society to take risks.

The long-term orientation *LTO* is a kind of persistence coefficient, a willingness to endure hardships and failures here and now in the expectation of future well-being.

The *IVR* assumption is the degree of satisfaction with life, and readiness to fulfil one's own desires independently.

In the course of the study, 1,514 employees of agricultural facilities in Albania were interviewed, representing different groups – by age, gender, and labour specialisation. The studies were conducted in the field on the territory in the aimags. Respondents were asked to assess the degree of their agreement with the statements in six categories on a scale from "completely disagree" to "completely agree". The survey was conducted under the legend of a general sociological study to avoid distrust of the interviewer group.

For the convenience of respondents, the response scale assumed a five-point system, which was already translated into a generally accepted one-hundred-point system by the formula at the analysis stage

$$X_{100} = (X_5 - 3) * 25 + 50 \quad (1)$$

where,

X_{100} – evaluation of the indicator according to the hundred-point system,

X_5 is an assessment of the indicator on a five-point system.

The assessments of each respondent were recorded, after which average indicators were formed for each of the six categories of culture measurement, which, in turn, formed the basis of recommendations on personnel management.

Results

A survey of 1,514 representatives of this social group was conducted to identify the cultural characteristics of employees of the agro-industrial complex of Albania. The respondents were randomly selected in three aimags in the centre and east of the country. Their structure in the context of the main social characteristics is presented in Table 1.

Table 1. Structure of the respondent group

Groups	Indicator	Number, persons	Specific weight in the group, %
Gender	Male	1105	73
	Female	409	27
Age	Under 20	91	6
	20–40	954	63
	40–60	424	28
	Over 60	45	3
Specialisation	Cattle breeding	1019	67
	Agriculture	495	33

Source: survey data (2022)

Since the sample was random, these proportions of indicators in social groups can be considered representative.

All cultural features measured using the Hofstede methodology were formed under the influence of society throughout the respondents' lives – "cultural programming" was created by people around them, first of all, by family, and then by work colleagues. The uniqueness of the target audience of this study, that is, employees of small family farms, lies in the fact that often in relatively isolated sums, family members, neighbours, and colleagues are practically the same team, which means that in the absence of outside opinions, the "cultural programming" of the environment produces the maximum effect.

For better contact with the respondents and the formation of confidence in the questionnaire, the interviewers voiced the legend of the global social survey, because in this case, those taking part in the survey became the "majority" in their own eyes and reduced the number of psychological barriers.

First of all, it was necessary to identify the power distance index. The answers of all respondents were collected, the average score of the indicator was calculated and the index was determined according to the one-hundred-point system according to the formula (1). As a result, the *PDI* was 15 points out of a hundred. This means a low degree of power distance, characteristic of countries and communities where equality is valued, and the leader is perceived as a colleague and a reliable friend. This indicator also indicates the cultural traditions of decentralised management, which is evidently characteristic of nomadic life and scattered isolated farms.

The next indicator to be calculated was the individualism index. According to the results of the survey of the target audience, the average *IDV* was calculated – 18 points. A low indicator of this index indicates the presence of collective goals in society. Unlike individualistic cultures and companies, where employees overprotect their own personal space and rely only on themselves, the staff of Albanian agro-industrial enterprises embraces working in groups and the absence of pronounced internal competition. Historically, this is explained by the tradition of group nomadism and clan gatherings for making important decisions. Therefore, the leader should avoid accepting authoritarian expressions of will without consulting the team.

The so-called *MAS* masculinity index demonstrates which of the two value models the collective tends to – work (conditionally male role) or take care (conditionally female). Named according to conventional family stereotypes, the roles identify the true need of team members – to receive maximum income no matter what, or to maintain human and trusting relationships among employees. This index, according to surveys conducted in selected collectives, amounted to 42 points. This means that, despite a certain balance of interests, there is a certain bias towards the "female" team, when it is necessary to concentrate efforts on taking care of the staff. It is characteristic that this index in other cultures is much higher and definitely dominates the "male" indicator. The peculiarity of the Albanian culture in the value of the *MAS* index can easily be explained by the substantial isolation of nomads – in the wild and depending on natural disasters, good relations within the collective can be literally life-saving.

An important cultural feature is also the readiness for uncertainty. Harsh natural conditions and difficult life are already quite unpredictable factors, which means that the target audience of the study is trying to minimise at least those risks that they can affect. Thus, the *UAI* score was a substantial 83 points out of 100. From the standpoint of

management and personnel management, this refers to people's need for clear algorithms, formalised rules, conditions, and instructions. In addition, such a pattern of behaviour presupposes the willingness of employees to regularly interfere with management in the process as a momentary "pointing finger".

The next indicator of cultural dimensions – long-term orientation – was also examined using surveys. The resulting *LTO* index of 50 points indicates a predominantly neutral attitude to the idea of high goals pushed back in time. On the one hand, farmers are used to the fact that the result of their work is not immediately evident and it takes months and, sometimes, years to make sure of the successful implementation of the project. On the other hand, long hard work without visible confirmation of the correctness of the chosen path is also not for them. Evidently, in matters of long-term planning, a similar balance should be observed, and when forming global plans, intermediate control points and rewards should not be disregarded.

The final parameter is the assumption. The summed and analysed responses of the respondents eventually gave an indicator of this index of 35 points. Since communities with high *IVR* assumption rates are characterised as declaring relatively free satisfaction of desires, it should be stated that the target audience of this study does not perceive personal happiness as an unambiguous value. Difficult working conditions and limited resources have formed in generations of Albanian farmers the need to control the satisfaction of momentary desires and needs and introduced regulation of these impulses through a system of social prohibitions and norms.

In general, the indicators of cultural dimensions of the examined community are as follows (Table 2)

Table 2. Average indicators of respondents' cultural measurements

PDI	***IDV***	***MAS***	***UAI***	***LTO***	***IVR***
15	18	42	83	50	35

Source: survey data (2022)

Summarising the results of surveys on all indicators, it can be stated that from the standpoint of management, the audience does not tolerate an authoritarian style and is used to taking part in decision-making. Such decisions should be made together, while the absence of conflicts and mutual trust are important in the team. The staff should understand the purpose of management changes and have the tools for intermediate control of achieving this goal. In the process of management, it is necessary to remember the presence of certain self-restrictions and taboos among employees, which should not conflict with management decisions.

Based on the generalised portrait of the employee obtained, democratic principles of leadership should be adopted to improve the efficiency and productivity of labour in agricultural enterprises in Albania.

With a democratic approach to management, all decisions are made by the manager together with the team that is involved in the planning process. Therewith, it is important to maintain a balance and avoid unnecessary initiatives of the staff, since their lack of the necessary managerial qualifications can neutralise the whole essence of managerial reforms.

Among the positive aspects of the democratic style is the prevalence of a high degree of satisfaction with their work among team members and, consequently, increased productivity. Therewith, such an approach may be ineffective in the event of critical and time-pressure situations, when a decision is needed immediately.

Considering such specific features of AIC personnel as remoteness, isolation, lack of constant monitoring, and operational feedback, some aspects of socially oriented management should also be adopted. Despite the inevitable loss of efficiency, in some cases it is the approach in which human relations in the team and a friendly environment come first, that is able to provide results in the long term.

Setting tasks to staff in the context of the results of cultural measurements can be initially visionary – i.e. it is quite possible that employees can clearly and in detail describe the goal set, provide tools, and they will be able to choose the methods of achieving the result themselves based on their own experience. It is proposed to conduct such an experiment on a separate focus group under conditions of increased control, and if it is successful, introduce such an innovation in other areas.

In any case, the recommended democratic leadership style is also good because it allows using the knowledge and skills of individual team members in the common interests. The life experience, practical skills, and actual qualifications of experienced shepherds and farmers are valuable resources and the task of the manager is to direct these qualities in the right area, eliminate unnecessary prejudices and thereby increase the overall efficiency of the project.

The issue of productivity growth is key in this context. The economy of Albania, which has experienced explosive growth in mining, is still in a vulnerable state, and the level of poverty of citizens is one of the highest in the region. Consequently, the growth of labour productivity in the agro-industrial complex can be an impetus to the withdrawal from the economic crisis. Conversely, low labour productivity is a key element of a self-sustaining negative feedback system known as the poverty trap or development trap. Under this system, low productivity leads to a decrease in economic indicators; a budget suffering from a deficit is forced to limit investments in education; as a consequence, the decline of the vocational training system leads to a decrease in the number of qualified personnel, which ultimately leads to an even more critical decrease in labour productivity. Therewith, it is important to understand that this refers not to the abstract productivity of some administrative or economic enterprise, but to specific people, individual labour indicators, whose effective work should form the basis of the economic revival of the country.

A qualitative growth of management in the agricultural sector is necessary to break this vicious circle.

The management principles proposed above, formed considering the special mentality of Mongolian farmers, are designed to normalise productivity indicators in the medium term. In addition, it is necessary to move away from the legacy of the period of a rigidly planned economy in Albania and introduce into the study such value concepts demanded by respondents as friendly patronage from the head, decentralisation of management sources, regular industry khurals for consultations and exchange of experience, and an effective motivation system.

The motivation here can be values that are also unique and unusual for other economies and societies. In particular, the overwhelming majority of respondents noted that the best reward for effective work for them would not be money or premium household items, but young cattle, the value of which grows as they grow older. In addition, such "alive bonuses" do not require a separate transport resource, especially valuable for a nomadic lifestyle.

Within the framework of increasing overall efficiency, the recommendation of mutual rotation of employees of the agricultural sector deserves special attention – mentally being part of the nomadic culture, employees of settled agricultural farms demonstrate greater efficiency after a temporary change of situation and work in other fields. In addition, such rotations also contribute to the exchange of experience between farms.

It is important to emphasise that the growth of labour productivity as such is not an end goal in itself – even with a certain increase in indicators, the focus on primary production with a low added value substantially limits the development of farms, making them dependent on circumstances. Consequently, the increased resources obtained as a result of increasing the productivity of enterprises, yields, and livestock, it is necessary to invest in agro-processing – even the simplest points of processing of raw materials substantially increase the income of both pastoralists and farmers.

It is the adapted control system that will help to make this qualitative leap in the foreseeable future. Farmers who have established primary processing points on the territory of their farms will be able to increase income by supplying higher-grade products to the market.

Discussion

The problems of personnel management have been examined quite extensively before, but there has not been a narrow focus on the Albanian specific features. Nevertheless, a number of issues and solutions examined in this study resonate the conclusions of other authors.

In particular, Berber and Slavić (2022) investigated the nature and specific features of human resource management in the agro-industrial field, described the practice of the main and most important personnel management measures on the example of 12 operating enterprises in the agricultural sector. In the process of investigating motivational mechanisms in the personnel management structure of specific enterprises, the authors analysed the main management models that showed practical positive experience and proposed the most effective scheme. Such a motivational model includes in its structure a number of constituent elements – goals, objectives, principles, methods, and tools – and priority areas that allow the management of the company to increase the effectiveness of employees' work.

Adeel (2017) also examined the problem of systematisation of human resource management in agriculture. The author calculated that human capital is a more important and valuable resource than technological developments and financial sources since the time to train a qualified specialist is measured in years. In addition, he suggested that finding a person in the hierarchical structure of the company is in itself a satisfaction of internal ambitions and needs for socialisation, which serves as a certain motivation for productive work.

Zhai et al. (2020) examined the agricultural sector of the economy in the context of the global challenges of the growing world population and the fourth evolution of technology, reviewed thirteen different representative

decision support systems and concluded that the importance of systematic development of skills and technological savvy of agro-enterprise personnel is critically high.

Since the northern regions of China have similar geographical problems to the Albanian one, the experience of researchers of this country in the integration of agriculture and tourism is interesting. Liu, Zhang et al. (2023) examined the development of remote territories in the context of green tourism gaining popularity around the world. The results of their study show that attracting tourists who want to personally experience the exoticism of remote pastures and nomadic life has a substantial positive impact on the development of rural areas. In the context of the national and cultural characteristics of the Mongolian peasants identified in the course of the study, it can be concluded that this innovation will take root in their environment, which means that it is necessary to promptly develop appropriate personnel management systems and logistics processes.

Its mountainous regions, due to objective geographical reasons, have a relatively low economic potential, which leads their inhabitants to lag behind in the social field. Despite the general increase in prosperity, which began in 1991, the transition to a market economy has increased the property stratification of residents of different regions of the country. Insufficiently developed regional policy has led to such negative consequences as unemployment, increased social tension, an increase in the volume of the shadow economy, and, as a result, the state budget deficit. The heterogeneity of indicators for the economic and social development of the population requires intervention. Consequently, a precise regional policy with clear algorithms for the individual development of separate districts should be the basis for the updated management concept at all levels.

Guliyeva et al. (2021), investigating a similar subject of the effectiveness of a personality-oriented approach in working with agricultural workers, identified that the development of employee value is directly proportional to labour productivity in the agro-industrial sector. According to the results of the analysis of the econometric model, the most stimulating factors influencing labour productivity in the agro-industrial complex were such values as the moral qualities of employees, a democratic approach in relations with subordinates, self-development, assistance in self-realisation, tolerance, and dedication to the common cause. In other words, the desire for improvement and development, the achievement of goals (both personal and corporate), freedom of expression, and the absence of total control by management with a high level of development of moral values, and tolerance in the team, leads to a substantial increase in labour productivity. All this, in a certain sense, echoes the above-mentioned results of the study and the recommendations of a democratic style in management.

Evidently, a long-term increase in labour productivity is impossible without the personal positivity experienced by employees from the work done. Bodescu et al. (2022) examined the relationship between productivity and satisfaction of food industry workers by conducting surveys of 254 employees and 17 managers from 60 companies. As a result, it was determined that a low level of staff satisfaction requires higher remuneration for their work. All other things being equal, it is more financially costly for employers than the services of employees with a high level of satisfaction.

Cock et al. (2022) analysed labour productivity in global agriculture through the prism of a choice between two concepts – nominal quantitative yield growth and efficiency of return from a conditional unit of labour expended. The authors of the study recommend further development of labour productivity according to the second concept, which assumes an increase in farm income from the transition to higher-value agricultural crops to avoid impoverishment of small farms and relocation of their employees to cities in search of more profitable work.

Colnago and Dogliotti (2020) also conducted their study on the subject of labour productivity in agriculture. As a result of their work, it was confirmed that labour productivity is a key factor in increasing the sustainability of family farm systems, income, and quality of life. The main factors shaping labour productivity were the difference in crop yields, the distribution of the labour force across various types of production activities, and their efficiency and profitability.

The essence of the study by Hogan et al. (2022) on the subject of efficiency growth in the field of agriculture was to identify productive techniques and technologies of work when performing specific tasks, and an assessment of the time savings that could be obtained by performing them during the peak labour intensity on dairy farms of spring calving. Labour savings were assessed for 12 substantial individual work methods and technologies, of which 5 were related to milking, 4 to calf care, 2 to cow care, and one to pasture management.

Another aspect of the problem of personnel management in agriculture is the age of employees. Urbancová and Vrabcová (2020), using the example of agricultural enterprises in the Czech Republic, examined demographic trends and the resulting problems of workforce shortage. Based on a quantitative study of 136 companies operating in the raw materials sector, the authors identified organisational advantages and effective human resource management strategies designed to ensure a generational change in farms. The surveyed respondents see the main advantages in keeping key employees, increasing motivation and productivity, and improving the organisational

climate. Drawing parallels with the survey data obtained as a result of the current study, the absence of an age problem and, accordingly, the need to manage demographics can be stated.

In the process of investigating the role of personnel management, it is important to consider the information received in the context of sustainable human resource management (HRM), a trend that has been dynamically developing over the past 15 years. Kramar (2022) notes that HRM strategies are designed to define goals, methods, and types of management that personnel management specialists will be able to apply in the medium term in the context of the global sustainable development movement, involving concern for the environment and the well-being of present and future generations. The author formulates the six defining characteristics of HRM as readiness for contradictions, concern for the development of abilities, the need to recognise negative results, attention to the practical implementation of knowledge, a clear statement of values, and the development of a system of unified measurable indicators.

Thus, the results of the work done and its comparison with the experience of other studies indicate that the approach to assessing labour productivity indicators was correct. The role of management in increasing these indicators is also confirmed by the experience of a number of authors. Therewith, the unique situation that has developed in remote pastures and isolated agricultural enterprises in Albania requires substantial amendments when trying to transfer this experience to local realities.

Conclusions

The data obtained as a result of the study confirm the initial hypothesis that quality management has a positive effect on labour productivity and performance growth in enterprises in Albania. Therewith, any innovations in management should be evaluated in advance from the standpoint of cultural characteristics and national traditions of the farm and of remote pastures staff.

The results of a survey conducted in the field among the target audience of interest showed that according to Hofstede's typology of cultural change, the most effective management style is democratic when leadership takes place in a relatively mild manner and the boss is an understanding friend and attentive supervisor, not a soulless commander. Therewith, it is important to maintain good relations within the team and to involve the collective council in making key decisions.

Thus, the goal of forming recommendations for effective management, which was originally set, was successfully completed. In subsequent studies, it will be necessary to analyse the results of the factual implementation of the proposed management style.

In addition, among the innovations recommended by the results of the study are:

– state control over the exploitation of mining areas, the reclamation of those arable lands that were polluted by mining operation;

– introduction of the simplest relatively inexpensive technical means in farms on the level of a reconnaissance drone, sensors of humidity, acidity, temperature, lighting, etc.;

– the unification of the remote control system by technical means by developing an Android programme for remote monitoring of sensors in the national language;

– the creation of local places for the primary processing of raw materials;

– development of conditions for the launch of the so-called green tourism programme, which should include the development of routes, the preparation of a cultural programme, the regulation of medical insurance, and the development of logistics infrastructure.

From a practical standpoint, following these recommendations will improve the quality of management and labour productivity in the agro-industrial complex of Albania, which will provide an important impetus for the development of the economy.

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Lecturers' Perspectives of Augmented Reality in Teaching ODL Courses

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Abstract

The integration of augmented reality (AR) in education holds promise for transforming traditional and Open and Distance Learning (ODL). However, past studies have yet to investigate lecturers' views on the integration of AR in practice in the ODL context. The objectives of the study are to identify the advantages and disadvantages of using AR in teaching ODL courses and to explore the lecturers' perceived support from the university's top administrators and suggestions regarding the use of AR in teaching and learning. A qualitative method with a phenomenology design was adopted for the study. Six male and seven female full-time lecturers across disciplines, currently attached to the Universiti Sains Malaysia were selected as participants. The data collected were analysed using the deductive coding approach, to identify key themes and patterns. Findings showed that AR is perceived as advantageous particularly for language and technical courses, while enhancing engagement, motivation, and information retention among students. Challenges are attributed to domain-specific issues, information overload, costs, technical complexity, resistance, and concerns over health effects. Lecturers believed that with proper support, AR could boost student interest, interaction, and immersive learning experiences with 3D virtual objects. Successful implementation of AR requires more training, funding, and technical expertise support. Further studies are to refine its implementation and gauge the impact on learning from learners' viewpoints.

Keywords: Augmented reality, distance education, educational technology, metaverse, open and distance learning.

Introduction

Open and distance learning provides an opportunity for prospective students who require flexibility in education, enabling learning without traditional face-to-face lecture sessions. Though, one of the most frequently mentioned problems in distance education is the inadequacy of communication and interaction between users (Calisir, 2022), specifically the learner-content interaction for higher-level learning. With the change in the understanding of education, students' access to technology has become a necessity.

The adoption of Internet technologies as a learning tool facilitated the adoption of the augmented reality environment. Results from past review studies found that the adoption of AR in higher education contributed to learner engagement and enhanced learning outcomes and thus could benefit ODL. Moreover, the literature revealed that immersive learning is best utilised as a complement to traditional face-to-face learning as opposed to a replacement (Ntaba & Jantjies, 2021). Thus, AR has become more popular in this process with the interaction opportunity it offers to users as it is based on the interaction of technologies, which include virtual environments and objects that provide close to real-life experience.

While many studies exist that explore the educational advantages of AR (Perifanou, Anastasios, Economides, & Nikou, 2023), not many studies exist that investigate lecturers' views on the integration of AR in educational practice. Lecturers are catalysts in the educational process at the tertiary level of studies. Given AR is a new technology that has not yet been introduced massively in the educational system except, in some sporadic experimental cases, their involvement in any educational intervention is necessary. Thus, it is important to understand the lecturer's perspectives about integrating AR in teaching at higher educational institutions.

Background of Study

The integration of augmented reality technology in the classroom or in ODL settings holds great potential for transforming traditional educational practices. However, despite the growing interest and implementation of AR in educational settings, there remains a significant gap in understanding lecturers' perspectives on the utilisation of this technology. The problem lies in the lack of comprehensive research exploring lecturers' attitudes, beliefs, and experiences regarding the integration of AR into their teaching practices.

Studies conducted in Malaysia have explored the implementation of augmented reality technology in various educational contexts. For instance, Jamrus and Razali (2021) investigated the use of AR in teaching English

reading and found it significantly enhances student engagement and enjoyment in learning activities (Jamrus & Razali, 2021). Similarly, Hanefarezan Asbulah et al. (n.d.) demonstrated that AR facilitates the teaching of the Arabic language by making the learning process more interactive and engaging. In the realm of technical and vocational education and training (TVET), Syafiq Yusof (2022) emphasized the overall positive impact of AR on student learning experiences, noting increased fun and engagement. Despite these benefits, studies have shown that the level of acceptance and readiness to use AR technology among Malaysian teachers and lecturers ranges from moderate to high, indicating variability in AR adoption (Shanmugam, 2023). Furthermore, research by Bistaman et al. (2018) discussed the potential and challenges of using AR in primary education in Perlis, Malaysia, suggesting that while promising, AR integration faces practical hurdles. Overall, the use of AR technology in Malaysian education is in its early stages but shows considerable promise in enhancing teaching and learning methods across various subjects and educational levels.

Literature Review

Open and Distance Learning has gained significant traction in recent years as a flexible and accessible form of education (Nolasco, 2022). ODL courses are typically designed to accommodate learners who are unable to attend traditional face-to-face classes due to various constraints, such as geographical distance, work commitments, or personal circumstances. In ODL, technology plays a vital role in delivering educational content and facilitating interactive learning experiences. While numerous studies have explored the use of various technologies in ODL, there remains a considerable research gap concerning the integration of augmented reality (AR) and its impact on teaching and learning within the ODL environment (Saykili, 2019).

Augmented reality is a technology that superimposes digital content, including visuals, sounds, and videos, onto the real-world environment, enhancing learners' engagement and understanding of complex concepts (Avila-Garzon, Bacca-Acosta, Kinshuk, Duarte, & Betancourt, 2021). It is essential to differentiate AR from virtual reality (VR), which creates entirely synthetic environments. Being collectively known as extended reality (XR), these technologies drive transformative changes across various industries. According to IDC, the AR/VR market is projected to experience substantial growth, from $16.8 billion in 2019 to an estimated $160 billion by 2023 (Maryville University, 2023). The advancements in technology and the widespread adoption of smartphones have led to the increasing expectations for educators to incorporate AR into their teaching practices (Avila-Garzon, et al., 2021; Sirakaya & Sirakaya, 2018).

Previous research has demonstrated the potential benefits of AR whereby AR technology can make learning more enjoyable, relevant, and personalized, thereby motivating students to engage more actively with the content. This heightened interest can translate into better learning outcomes (Sahota, 2023). Another significant benefit of AR is its ability to enhance the retention of information. By supplementing traditional teaching methods with AR, students can visualize and interact with an augmented world, which aids in understanding and remembering complex concepts (Sahota, 2023). Moreover, AR can improve learning outcomes by providing innovative teaching methods that lead to deeper comprehension and knowledge retention (Bistaman et al., 2018). Lecturers also highlight the interactive learning experiences facilitated by AR. By allowing students to engage with 3D virtual objects in real time, AR creates a more immersive and hands-on learning environment (Hanefarezan Asbulah et al., n.d.). Despite these benefits, the use of AR in education is still in its early stages, and challenges such as domain-specific, pedagogical, and psychological aspects need to be addressed (Bistaman et al., 2018).

Other potentials include increased student motivation, improved knowledge retention, and enhanced spatial understanding (Atalay, 2022; Avila-Garzon et al., 2021; Eldokhny & Drwish, 2021; Sirakaya & Sirakaya, 2018; Perifanou et al., 2023). However, the unique characteristics and challenges of ODL necessitate a focused examination of lecturers' perspectives on the use of AR particularly in the ODL context. For instance, the participants stated their opinions regarding the facilitating effect of using AR applications in the teaching program (Atalay, 2022). Another study found that AR improves student engagement during courses (Wei et al., 2021). A study investigating the effectiveness of AR in online distance learning during the COVID-19 pandemic found that AR can be effective in enhancing online learning experiences (Eldokhny & Drwish, 2021). Instructors' views on integrating AR in education were explored in a study that identified several research questions, including what they think about the level of their AR competencies, what they think are the important digital skills for integrating AR in education, and how easily they find AR educational resources. (Perifanou et al., 2023). The benefits of AR in education were explored in an article that noted how AR can transform learning and teaching. However, a lack of quality content focused on education is a noted concern among instructors who are hesitant to use AR in education (Maryville University, 2023). Despite a significant volume of empirical research suggesting that AR has a positive impact on student learning outcomes, AR has not been widely adopted in education (Lima et al., 2022), particularly in ODL settings. Although there is a growth of interest and implementation of AR in educational settings which primarily focus on students' experiences, there remains a significant gap in understanding lecturers' perspectives on the utilisation of this technology in teaching ODL courses (Wei, Kuah, Ng & Lau; 2021).

While augmented reality technology offers several benefits in education, various drawbacks are identified which can impact its effective implementation. One significant issue is the potential for information overload. AR can present a large amount of information simultaneously, which can be overwhelming for students, leading to cognitive overload and reduced learning effectiveness (Galati et al., 2019). Resistance from teachers is another notable challenge. Some educators may be hesitant or resistant to incorporating AR into their teaching practices, often due to a lack of familiarity with the technology or concerns about its efficacy. This resistance can significantly hinder the adoption of AR in educational settings (Galati et al., 2019). Health concerns also pose a drawback. Prolonged use of AR technology can lead to eye strain and other vision problems, as well as potential social isolation due to decreased face-to-face interactions. Cost is a critical barrier to AR implementation, particularly in low-income schools. The high expense of AR materials and the necessary technological infrastructure can prevent widespread adoption (Talan, Yilmaz, & Batdi, 2022). Lastly, technical issues present a significant challenge. AR technology can be complex and may require substantial technical expertise, which can be a hurdle for both teachers and students who may lack the necessary skills (Jamrus & Razali, 2021). While AR technology holds promise for enhancing education, addressing these drawbacks is essential for its successful integration into teaching and learning environments.

The integration of augmented reality in education holds significant promise for transforming teaching and learning. However, the successful implementation of AR requires robust support from university administrators. Faculty members often need training on how to prepare proposals for AR/VR use in education and access necessary funding. This support is crucial for ensuring equitable access to these technologies (Lee et al., 2022). Some universities have taken proactive steps by employing multimedia teams to design and develop AR applications and instructional design teams to assist instructors in incorporating AR into their teaching practices (Thomas et al., 2019). These resources help bridge the gap between technology and pedagogy, facilitating a smoother integration of AR in the classroom. Additionally, a multidisciplinary study highlighted the provision of training and support to pre-service teachers as they incorporated AR lessons into elementary school classrooms. This training is vital for building confidence and competence in using AR technology (Delello et al., 2015). AR technology overlays digital content onto the physical world, enabling both visual and hands-on instruction from any setting. This capability can significantly enhance the learning experience (Ramani, 2020). In short, administrative support plays a pivotal role in the adoption and successful integration of AR in teaching and learning environments.

Understanding lecturers' perspectives is crucial as they play a central role in shaping the educational experience and pedagogical approaches. Lecturers hold a crucial role in designing and delivering ODL courses, and their insights are invaluable in evaluating the potential of AR technology for enhancing teaching and learning (Perifanou et al., 2023; Wei, Kuah, Ng & Lau; 2021). The investigation of lecturers' perspectives on AR in teaching ODL courses can shed light on various aspects that are unique to this educational setting. For instance, lecturers' experiences and perceptions can provide insights into the practical considerations of implementing AR in an ODL environment, such as technological constraints, accessibility, and support requirements. Additionally, lecturers' views can illuminate the effectiveness of AR in addressing the specific challenges faced by ODL learners, such as isolation, lack of hands-on experiences, and the need for personalised instruction (Eldokhny & Drwish, 2021). Furthermore, understanding lecturers' perspectives on the integration of AR can help identify potential barriers, such as the need for training, time constraints, or institutional support, and facilitate the development of strategies to overcome these challenges.

Therefore, this study aims to identify the advantages and the disadvantages of using AR in teaching ODL courses according to lecturers and explore lecturers' perceived support from the university's top administrators regarding the use of AR in teaching and their suggestions for implementing AR in teaching ODL courses.

Methodology

A qualitative method with a phenomenology design was adopted for the study. Six male and seven female full-time lecturers across disciplines, currently teaching ODL courses at Universiti Sains Malaysia were selected as participants. The data collected were analysed using the deductive coding approach to identify key themes and patterns. Deductive coding is a top-down approach whereby a codebook will be created based on the research questions of the study which comprise; the advantages and disadvantages of using AR in teaching ODL courses, plans or knowledge required to integrate AR in teaching ODL courses, perceived support from institutions in using AR for teaching, and the ideal implementation in teaching ODL courses based on suggestions by participants. The process was repeated until there was no new excerpts that could be assigned to codes. Feedback from other researcher was obtained to validate the emerging items and themes which later formed the key findings of the study.

Results and Discussion

The level of acceptance and readiness to use AR technology among lecturers varies from moderate to high. Among the advantages of AR perceived by lecturers are it is suitable for language-based courses such as English and Bahasa Malaysia and technical-based courses. AR could increase students' interest, engagement, and motivation and the technology can make learning more fun, relevant, and personalised. AR is also believed to enhance the retention of information. By using AR to supplement traditional teaching methods, students can see an augmented world that can help them better understand and remember the information. AR could improve learning outcomes by enhancing the pedagogy in teaching. AR is also flexible. By overlaying digital content onto the physical world, both visual and hands-on instructions can be enabled from any setting. With regards to the impact of AR on students learning, lecturers perceived that AR seems to increase students' interest, curiosity, and fun in learning, as they can interact with 3D virtual objects in real time. The interactive learning resulted in a more immersive and interactive learning experience for students.

However, among the disadvantages of AR are challenges that lecturers need to consider, such as domain-specific, pedagogical, and psychological aspects. There is an overload of information, whereby AR technology can provide a lot of information at once, which can be overwhelming for students. Some lecturers tend to be resistant to the use of AR technology in their teaching, which can hinder its implementation. There are concerns about the potential health effects of using AR technology, such as eye problems and social isolation. It is also costly to have AR materials, especially when the faculty's budgets are low. AR technology can also be complex and require technical expertise, which can be a challenge for some teachers and students (steep learning curve).

In terms of perceived support from the university's top administrators regarding the use of AR in teaching, the faculty members agreed that the level of training provided, and available funding are still lacking. Only a few centers with very niche specialisation in AR technology are equipped with proper AR tools and equipment and there are also limited resources and expertise sharing with other faculties or centres at the university.

To ensure the successful implementation of AR in teaching, the lecturers would require more training on how they can integrate AR use in education and access the funding they need. Due to insufficient developers/expertise in AR, the university needs to employ more technical experts to design and develop AR applications and also the instructional design teams to help instructors use AR in their teaching.

Table 1. Findings of the study

Advantages of AR	Disadvantages of AR	Perceived support	Suggestions
increase students' interest	information overload	lack of funding	more training
increase students' engagement	resistant to use	lack of training	access to funding
increase students' curiosity	adverse health effects	limited resources	employ technical experts
improve learning outcomes	costly	lack of expertise	instructional design team
enhance pedagogy	technical complexity		
flexible	steep learning curve		
fun			
relevant			
personalised			

Discussion and Conclusions

Although the use of AR technology in teaching is still in its early stages, the advantages and results are impressive in enhancing the content and pedagogical aspects of teaching ODL courses. There is a need to investigate lecturers' perspectives of AR in classroom teaching to identify the benefits, challenges, and opportunities associated with its implementation. By addressing this knowledge gap, the study provides valuable insights that can inform higher educational institutions, policymakers, and instructional designers in effectively integrating AR technology to enhance teaching and learning experiences. By gaining insights into lecturers' perspectives, the study provides valuable information for the successful integration of AR technology in ODL pedagogy and contributes to the ongoing discourse on effective and innovative approaches to distance education while providing practical recommendations for educators, instructional designers, and policymakers involved in ODL programs. In short, the success of AR in teaching and learning depends on the readiness of educators and students to embrace this

technology as well as strong support by the top management of the universities in training, infrastructure, and enculturation of AR in teaching and learning experience.

Understanding lecturers' perspectives on AR can provide insights into the challenges and barriers associated with the adoption and acceptance of this technology, which assists in the successful integration of AR into teaching practices. This study identifies the key factors that contribute to lecturers' acceptance or resistance to using AR, aiding in the development of strategies to overcome barriers and facilitate technology adoption. By addressing this gap, the study hopes to provide valuable insights that can inform educational institutions, policymakers, and instructional designers in effectively integrating AR technology to enhance teaching and learning experiences in ODL settings.

As for the limitations of the study, the current findings provide basic insights into the current scenario of AR in teaching ODL courses. Further investigations are welcomed to expand the operationality of the constructs into the quantitative studies, evaluating the effectiveness of AR in achieving the learning outcomes of the courses, or in other modes of teaching such as MOOCs, and micro-credential courses.

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Understanding Tutor Perspectives: Evaluating Learning Management Systems at UT Surabaya Using the Technology Acceptance Model

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Abstract

The use of an LMS is a key factor in the learning process. This paper focuses on understanding tutors' perspectives when using an LMS, specifically how they utilize its features in their online classes. We collected data using a questionnaire based on the Technology Acceptance Model (TAM), given to 120 tutors working at Universitas Terbuka, specifically in the Surabaya Region Unit. We examined three external components of TAM: system quality, perceived self-efficacy, and facilitating conditions. The collected data were then analyzed using structural modeling, resulting in three main findings. Firstly, the functionality of the LMS affects how confident tutors feel about using it. This includes aspects such as its smoothness, speed, features, content, and user-friendliness. Secondly, a tutor's proficiency in using the LMS does not affect their ease of access to additional resources for the LMS, such as technical support, internet connectivity, hardware, software, training, or user guides. Most importantly, tutors find it easy to create learning materials in the LMS based on students' needs and to integrate technology into the learning process.

Keywords: learning management system, tutor's perception, technology acceptance model, distance learning, education

Introduction

The covid-19 pandemic in 2020 education had to be redesigned to meet needs and circumstances (Urankar & Jamšek, 2022). Conditions at that time encouraged the world of education to implement a distance learning system. Learning Management System accessible through various platforms such as Moodle, Blackboard, WebCT, Desire2Learn is a popular Internet technology that has supported remote, face-to-face, blended, and hybrid teaching & learning methods (Dahlstrom, Brooks, & Bichsel, 2014; McGill & Hobbs, 2008; Connolly, MacArthur, Stansfield, & McLellan, 2007).

A single web page with integrated educational capabilities is what is known as an LMS, and it enables users to arrange academic content and actively involve students in learning activities (Gautreau, 2011, p.2). The LMS offers a virtual way to improve and speed up communication between students and teachers, as well as speed and effectiveness in the educational process. It does this by integrating computer technology and the Internet into the learning process and by providing a wide range of learning activities.

LMS with adaptable and modifiable content allows for greater flexibility in instructional design and can increase student engagement and satisfaction with the learning experience (Shen & Sun, 2017). Also, the capacity for content modification enables educators to maintain the learning materials' relevance and up-to-dateness, which is crucial in quickly evolving industries like technology (Gao, Luo, & Zhang, 2013).

LMS more accessible for tutors who may have limited technical knowledge, Li and Irby (2018) suggest providing user-friendly tutorials and guides, as well as offering technical support services. Additionally, LMS providers can ensure that the platform is designed with a simple, intuitive interface that is easy to navigate, regardless of a user's technical expertise (Jung & Choi, 2016).

To ensure that the content remains relevant and up-to-date, experts recommend regularly reviewing and updating the materials to reflect changes in the field or industry (Gao et al., 2013). Educators can also solicit feedback from students to identify areas where modifications and adaptations may be needed or use analytics tools to track student engagement and performance and modify content accordingly (Lin et al., 2018).

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Some earlier studies on LMS have discovered that not all LMS functions are utilized equally by users, with certain functions being utilized more frequently than others (Jaschik & Lederman, 2014, Weaver, Spratt & Nair 2008, Panda & Mishra, 2007; Woods, Baker & Hopper, 2004). Fathema and Sutton (2013) learn how to submit documents; how to post grades and assignments; and how to The learning management system feature that teachers use the most is Blackboard. Teachers claim that particular difficulties with an LMS, such as system problems and a less user-friendly design, diminish teachers' overall utilization of the LMS.

Similar research in the use of LMS with during the pandemic focused on student engagement, even in 2019 in Arabia considered LMS as a new technology (Alturki & Aldraiweesh, 2021; Binyamin et al., 2019). Especially for universities with distance learning, there is not much discussion, while this is only in conventional universities (Al-Rahmi et al., 2015; Scherer et al., 2019; Zaineldeen et al., 2020).

Holden and Rada (2011) demonstrate how teachers' usage of technology is affected by their level of technology self-efficacy in grades K–12. Panda and Mishra (2007) discovered that the difficulties of internet access, a lack of training, followed by institutional rules and instructional design for less suitable e-learning, were the most important hurdles to the adoption of e-learning as felt by faculty members inside universities. They discovered that a teacher's own interest in using technology, intellectual challenges, and the availability of adequate technological infrastructure were significant factors in motivating teachers, both teachers and lecturers, to adopt e-learning. At UT, this motivation was undoubtedly shared by tuweb tutors.

The foundation of the Technological Acceptance Model (TAM) on Ajzen and Fishbein's (1980) Theory of Reasoned Action (TRA). According to TRA, whether a person intends to engage in a behavior depends on their attitude toward acts or behaviors and societal norms. A person's attitude foreshadows his goals, and those intentions shape his actual behavior.

The degree to which a person feels that adopting a specific technology will be free of user-related challenges is known as PEOU (Davis 1989). The degree to which a person believes that utilizing a certain system will increase his performance at work is known as PU (perceived usefulness) (Davis, 1989). According to TAM, PEOU will have an impact on PU since consumers will see a technology as useful if they find it to be 'simple to use.

These two fundamental constructs (PEOU and PU) are connected causally by TAM to three further constructs: attitude to use (ATT), behavioral intent to use (BI), and actual usage (AU). An individual's favorable or negative feelings about engaging in the target behavior are referred to as ATT (e.g., using the system) (Fishbein & Ajzen 1975). According to TAM, consumers' attitudes toward utilizing technology are influenced by both PEOU and PU. It makes the claim that if technology is useful and easy to use, people would see it favorably. The amount to which a person has consciously made a plan to engage in or refrain from engaging in a specific activity in the future is the definition of the fourth component, behavioral intentions (BI) (Davis, 1989). TAM claims that PU and ATT have an immediate impact on BI. People will be more likely to employ a certain technology if they think it will be useful (PU). Similar to this, people are more inclined to adopt a technology if they have a positive attitude toward it. TAM found that user behavioral intentions (BI) influence how technology is actually used (AU). A user only employs a particular technology if they intend to do so.

TAM was selected for this study because it is the most significant, frequently used, and highly predictive IT adoption model (Adams, Nelson & Todd, 1992; Davis, et al., 1989; Venkatesh & Davis, 2000; Lee, Kozar, & Larsen, 2003; Venkatesh & Bala, 2008). TAM adoption as a descriptor and measurement tool for examining the e-learning process has gained popularity recently (Taman, 2009).

This study seeks to learn more about TAM by applying it to education at UT, a school that uses distance learning, specifically by analyzing how three external factors affected the first five TAM builds. There are two important elements that will be a contribution to the learning process at the Open University as a pioneer of higher education with a distance learning system. The first element, as a form of evaluation of the use of LMS by UPBJJ Surabaya as the frontline in the distance learning process. So, it can be known for sure the technical problems in the field because students are scattered to the village. A very important element as a form of projection to strengthen the position of the Open University as a cyber university in a time of global competition. Based on this, it is very important that this research be carried out.

Methodology

In this study, the three external TAM components of system quality, perceived self-efficacy, and facilitating conditions were investigated. The model used to investigate how the suggested external variables might affect how users interact with the UPBJJ-UT Surabaya tutorial webinar of the LMS.

Participants

Every tutor is needed to hold a second-degree diploma and have gone through tutor training in accordance with the rules and regulations of the Universitas Terbuka. Due to this, there are two requirements for informants in this study. The first is tutors who have at least taught at UPBJJ Suabaya and have utilized LMS for one semester. There were 120 tutors who received the questionnaire.

Instruments

Data collection is carried out by distributing questionnaires developed from SQ, PSE and FC. In the SQ section, there are 4 statements about satisfaction using the likert namely, 1 is very dissatisfied to 4 is very satisfied. Three assertions about PSE are rated on a likert scale from 1 (very displeased) to 4 (very satisfied). Also, three statements regarding FC are ranked on a likert scale from 1 (very upset) to 4 (satisfied) (extremely satisfied).

Data Analysis

The initial mapping uses a web-based survey, which then from the data, samples are taken from several tutors for interviews based on the specified levelling. Then, the data is analyzed based on categories related to TAM factors. All construction concepts (except ATT self-developed constructs) are adapted from previous studies.

SQ was outlined in this study as a quality associated with the LMS's features, functionality, speed, content, and interaction capabilities. Perceived self-efficacy (PSE) is defined as an individual's assessment of his or her ability to plan and carry out the steps necessary to perform the specified type of task. As it relates to system usage, FC refers to the availability of resources such technical assistance, internet infrastructure, hardware, software, training, and online help.

The existing data were analyzed with SPSS to calculate the results with Structural Equation Modeling (SEM) which was considered the most appropriate to use in this study.

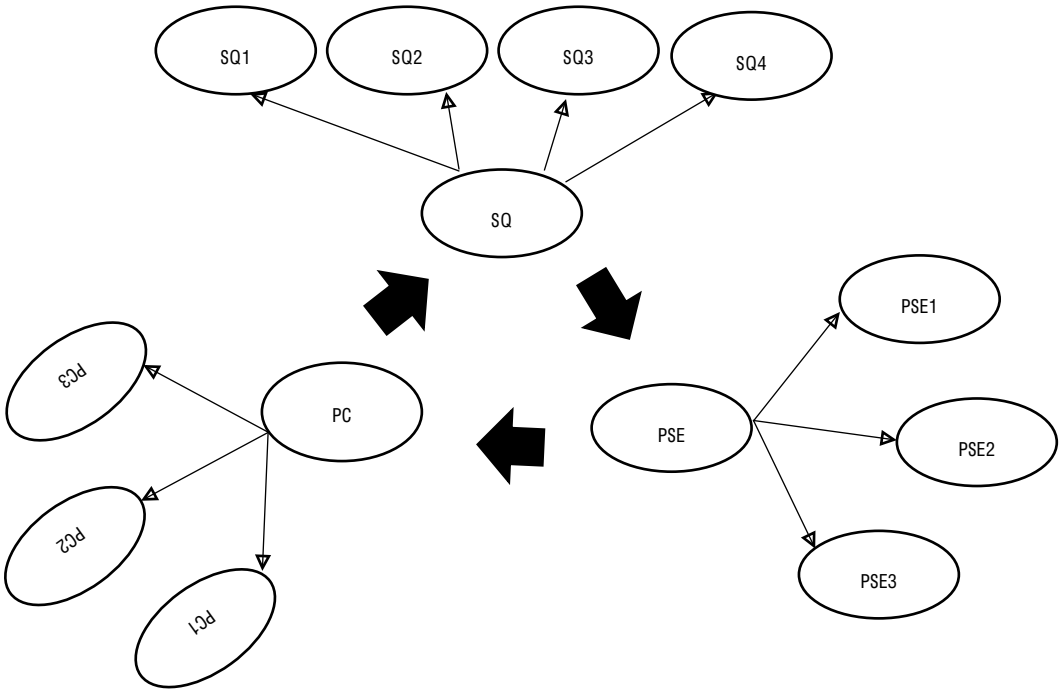

Figure 1. Path diagram

System Quality (SQ) on Internet coverage is used to measure the desired characteristics, four variables are developed (functions in the LMS, the LMS's usability in relation to the speed of the internet used, content in the LMS, interactions that can be done in the LMS). For Perceived Self-efficacy (PSE) focus on three variables, namely, confidence in the ability to use NGOs, confidence in operating functions in the LMS, confidence in using online learning content in the LMS. And in the third variable, there are also three variables, namely, the availability of a help menu to overcome the obstacles of the tutors, in addition to the menu there are also officers who are on standby to help every tutor who has problems, and finally in this section there is a guidebook for the use of LMS.

Results

Data Normality Test

Table 2. Normality Test Results

	Kolmogorov Smirnov Z	Asymp. Sig. (2-t ailed)
SQ	1.400	0.04
PSE	0.538	0.93
FC	0.827	0.50

The results of the Kolmogorov-Smirnov test in Table IV.1, obtained the values of Asymp. Sig. (2-tailed) which is greater than 0.01 so that it can be concluded that the data used, data SQ, PSE, and FC are attributable normally. Hypothesis testing data are evenly distributed and get normal data.

Correlation Coefficient Significance Test

Table 3. Significance test results Correlation Coefficient

		Pearson Correlation	Sig.(2-tailed)
SQ	PSE	0,490	0,000
	FC	0,301	0,008
PSE	SQ	0,490	0,000
	FC	0,641	0,000
FC	SQ	0,300	0,009
	PSE	0,645	0,000

Note: all the coefficient correlation are significant at the level of 0.5%.

Discussion

This section discusses system quality, perceived self-efficacy, conducive circumstances, and tutor perceptions of LMS use. SQ is typically asked to have an impact on PSE. It directly affects FC for PSE. And SQ was directly impacted by the FC outcomes as well.

System Quality

The value of the path coefficient p31 = 0.62 > 0.05 (significant path coefficient) then the conclusion in the testing of the research hypothesis 1 is that H0 is rejected and H1 is accepted, so it can be stated that there is a direct influence of SQ on PSE. This means that the tutor's assessment or confidence in his or her own capacity to operate/navigate/work with the LMS is impacted by SQ, i.e., attributes relating to the function, speed, features, content, and interaction capabilities of the LMS.

Human-computer interaction (HCI) and usability literature generally agree that there is a connection between system quality and user self-efficacy. For example, in a study by Venkatesh and Davis (2000) They discovered that system quality has a considerable impact on users' perceptions of the technology's usability and utility, which in turn affects users' intentions to utilize the technology. Similarly, in a study by Zhang and Li (2010) They discovered that system quality, together with information quality and service quality, had a considerable impact on users' happiness and intention to continue using e-learning systems.

LMS and other educational technologies should be designed and evaluated with this relationship between system quality and user self-efficacy in mind. By providing high-quality, user-friendly, and reliable systems, educators can enhance their own confidence and effectiveness in using these tools, leading to better teaching, and learning outcomes for students.

Perceived Self-Efficacy and Friendly Environment

The value of the path coefficient p32 = -0.02 > 0.05 (the path coefficient is insignificant) then the conclusion in the testing of the research hypothesis 2 is that H0 is accepted and H1 is rejected, so it can be stated that there is a direct influence of PSE on FC. This means that the availability of related resources, such as technical support, internet infrastructure, hardware, software, training, and online assistance for using the system, is not directly influenced by the tutor's assessment or confidence in his or her own ability to operate/navigate/work with the LMS.

Based on the results, it appears that the adoption and adaptation of Learning Management Systems (LMS) used in higher education by tutors at Universitas Terbuka is directly influenced by Perceived Self-Efficacy (PSE) on

Facilitating Conditions (FC). This means that the availability of relevant resources such technical support, internet infrastructure, hardware, software, training, and online assistance to use the system is not directly influenced by the tutor's assessment or belief in their capacity to operate/navigate/work with the LMS.

In relation to this finding, experts have emphasized the significance of perceived self-efficacy in shaping educators' use and uptake of technology. Perceived self-efficacy, as defined by Bandura's social cognitive theory, is a person's confidence in their capacity to carry out a certain task successfully (Bandura, 1997). Perceived self-efficacy has been discovered to be a significant predictor of educators' acceptance and usage of technology in the context of technology adoption (Teo, 2009; Venkatesh, Morris, Davis, & Davis, 2003).

Although perceived self-efficacy has been found to be a key predictor of educators' acceptance and utilization of technology in the context of technology adoption, experts also believe that the availability of enabling resources may be important. greatly affect how technology is actually used and used in education (Venkatesh et al., 2003). Therefore, while perceived self-efficacy is an essential factor in determining technology adoption, it must be supported by adequate facilitating conditions to ensure successful adoption and use.

Tutor's Perception of LMS

Since the path coefficient's value $p21 = 0.01 > 0.05$ (the path coefficient is insignificant) it is concluded that there is a direct influence of FC on SQ. As a result, the accessibility of resources like technical support, internet infrastructure, hardware, software, training, and online help to use the system has no direct bearing on the LMS's functionality, speed, features, content, and interaction capabilities.

Based on the results, it appears that the acceptance and adaptation of Learning Management Systems (LMS) used in higher education by tutors at Universitas Terbuka is directly influenced by Facilitating Conditions (FC) on System Quality (SQ). This indicates that the quality relating to the function, speed, features, content, and interaction capability of LMS is not directly influenced by the availability of related resources such as technical assistance, internet infrastructure, hardware, software, training, and online assistance to work with the system.

In relation to this finding, experts have emphasized the importance of separating the effects of facilitating conditions and system quality in determining technology acceptance and use. Perceived utility and perceived ease of use are the two main determinants of technology adoption and use, according to the Technology Acceptance Model (TAM), with system quality and facilitating conditions indirectly impacting these two criteria (Davis, Bagozzi, & Warshaw, 1989).

Specialists have discovered that while enabling circumstances can increase perceived usability, perceived usefulness, which is strongly tied to the caliber of the system's functionality and content, is not always improved (Venkatesh & Davis, 2000). Therefore, while facilitating conditions can encourage technology adoption and use, it is essential to ensure that the system's quality meets users' needs and expectations to ensure successful adoption and use.

The benefit of having self-confidence in using the LMS is that tutors can effectively integrate the online learning materials into their teaching practice. This can result in a more efficient and effective teaching and learning process. The discussion can focus on the importance of confidence in the effective use of an LMS and the possible strategies to enhance tutors' self-confidence in using the LMS.

According to research, teachers' ability to effectively use learning management systems (LMS) depends greatly on their level of confidence. A study by Arbaugh and Benbunan-Fich (2006) found that American faculty members' perceptions of the usefulness and usability of an LMS were positively influenced by their sense of self-worth.

Regarding LMS, a study by Liu et al. (2021) found that teacher satisfaction with the LMS had a positive impact on student satisfaction and engagement in a Chinese online learning environment. The study also suggested that training and support for teachers in using the LMS can enhance their satisfaction with the system.

Similarly, a study by Liu, Bonk, and Magjuka (2005) found that self-confidence in using an LMS positively future intention of faculty members to use the technology was forecasted. The research also found that providing faculty members with training and support can increase their self-confidence in using the LMS.

Another study by Teo and Noyes (2014) found that self-efficacy, which is a related construct to self-confidence, positively predicted teachers' intention to use an LMS in Singapore. The study also found that training and support for teachers can enhance their self-efficacy in using the LMS.

Overall, this research shows that self-confidence and self-efficacy are important factors in the effective use of an LMS by tutors. Another important factor in the form of training, intense communication between tutors and UPBJJ Surabaya is part of the support that can increase their confidence and proficiency in using the system.

Conclusions

The LMS system's (SQ) quality at UT has a number of favorable effects on how it is used, including: (1) The use of LMS features and functions is friendly to the tutor's internet speed; (2) The content created in the LMS is simple to adapt and modify; and (3) The tutor is satisfied with the LMS's use. Depending on how the instructor feels about or is confident in his own abilities to use, manage, and work with the LMS, it has an impact on confidence in operating the functions in the LMS and using online learning content.

The positive impact of having a user-friendly LMS is that tutors can easily navigate and access the features and functions of the LMS, even with limited internet speeds. This can result in a seamless learning experience for both the tutors and the students. The discussion can revolve around the importance of having a user-friendly LMS and the possible ways to make the LMS more accessible for tutors who may have limited technical knowledge.

The benefit of having adaptable and modifiable content is that tutors can customize the learning materials based on their students' needs and preferences. This can result in a more engaging and personalized learning experience for the students. The discussion can focus on the significance of having adaptable and modifiable content in an LMS and the strategies that can be employed to ensure that the content remains relevant and uptodate.

The positive impact of tutor satisfaction is that tutors are more likely to use the LMS, engage with the students, and provide timely feedback. This can result in a better learning outcome for the students. The discussion can center on the factors that contribute to tutor satisfaction and the potential ways to increase tutor satisfaction by improving the LMS and providing training opportunities for the tutors.

The future research specifically on the impact of tutor satisfaction on learning management systems (LMS), but several studies have found a positive correlation between teacher satisfaction and student outcomes in traditional classroom settings.

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Effectiveness of Formative Assessment as a Pedagogical Tool in Management Education: A Case Study with an Indian B-School

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Abstract

Effectiveness of pedagogical tools has always remained an important topic of research.in the education industry. The development of information and communication technology and subsequent changes in the behavior and expectations in the learners' community has forced the policy makers and educationists to come up with more innovative ways of course delivery to make the classroom experience more enriching both at school level and at higher education. Formative assessment is a way of ongoing evaluation and feedback process which entails more interaction between the instructors and the learners resulting in an enhanced learning outcome. This case study was conducted to evaluate the effectiveness of formative assessment for the postgraduate management students in an Indian business school. The result of our study showed that the score in formative assessment remains the most important predictor for the overall performance of the students and the general learning outcome for the subject treated with formative assessment methods was also enhanced. Qualitative analysis of the students' feedback on their overall experience with formative assessment also revealed their high level of satisfaction and sense of fulfilment.

Keywords: Formative Assessment, education, evaluation, evaluation and feedback, learning outcome. Pedagogical tool.

Introduction

Blended learning pedagogical practices supported by learning management systems have become an important part of higher education curricula. In higher education, formative assessment refers to the ongoing evaluation and feedback process that takes place during a course or learning experience. Unlike summative assessment, which typically occurs at the end of a course to evaluate students' learning outcomes, formative assessment is designed to provide feedback to both students and instructors throughout the learning process. Key characteristics of formative assessment include continuous feedback, variety of assessment methods, and enhanced students' engagement. With the growing popularity of e-learning platforms and increased interests of students in self-regulated learning formative assessment has become an integral part of evaluation method for effective learning outcomes (He et al., 2024)

This method focusses on continuous both-way interaction between instructors and students, working on the improvement suggestions and thus improving continuously on teaching and learning cycle. The feedback not only helps the instructors to adapt the changing need of the students but on reflection helps the students also identify their strengths and weaknesses as well as the target areas that they need to work on (Roslan et al., 2023)

Formative assessment is especially relevant in the context of higher education for management studies where students come from various backgrounds and hence increases the heterogeneity of a class. This makes content delivery and evaluation more challenging for an instructor. Any prior assumption made by the instructor regarding the receptivity of the group can have serious impact. Formative assessment is more agile in nature and avoids pitfall of summative assessment. The method of evaluation is becoming all the more relevant with the advent of new education policy of ministry of education focusing more on experiential learning.

Formative assessment can be multimodal taking many forms, including quizzes, polls, class discussions, peer assessments, self-assessments, concept mapping, and problem-solving activities (Kohnke et al., 2022). These methods encourage active participation and engagement in the learning process and help the instructors to gather diverse types of feedback from the students. Overall, formative assessment plays a crucial role in supporting student-centric learning and improving teaching effectiveness in higher education settings. It fosters a dynamic and responsive learning environment where students and instructors can collaborate to achieve meaningful learning outcomes.

The present case study was an attempt to address the challenges faced by the educators today due to a decreasing trend in students' interest and engagement level in the class. After internal discussion and subsequent approval from the board of studies one subjects out of ten subjects from the curricula of postgraduate students in the first semester of the business school was decided to be taught and evaluated following formative assessment pedagogy. The impact of changed teaching and evaluation methods on the learning outcome was a matter of interest for future decision making.

The main objectives of our case study were to collect students' feedback on the new learning methodology, assess the learning outcome for the subject taught using formative assessment and propose change to course design, delivery and evaluation techniques based on our result.

Literature Review

Before designing the course-outline and delivery plan a brief literature review was done to understand the applicability of the method, its impact on learning outcome and the procedure for designing and delivering the course following formative assessment methodology.

Previous research work has indicated that formative assessment method motivates the participants and improves teaching and learning experience and the assessments using digital technology is being increasingly used at the university level education. It plays a pivotal role in assuring quality teaching and better learning experience and outcome in universities (Liang et al., 2022). Earlier studies have also compared the benefits and challenges of formative versus summative assessments in various disciplines including management science, engineering, medical, language and other professional courses both at university and pre-university levels involved in literature and STEM education (Bazelais, et al., 2022). Mixed responses received in some cases especially with faculties and students of language department (Hysaj and Haroon, 2022; Muck and Cope, 2021). However researchers are in overall agreement that adjustments in the course content, delivery plan and evaluation methods based on continuous feedback from the students have been an enabler in terms of increased students' satisfaction, engagement level and better learning outcomes.

Proliferation of online teaching and learning during and post pandemic years has led to the emergence of the alternatives to the traditional evaluation model of examinations conducted with pen and paper based on the main reference to textbook and lecture notes for assessing the knowledge level of students (Mellado et al., 2021). Over the time formative assessment has proved to be an effective evaluation pedagogy to bridge the perception gap between the teachers and the students (Barana et al., 2021). The teaching model proposed by Quinton and Smallbone, (2010) outlines an approach to reflective learning that focusses on the students' engagement in the classroom with feedback which on a continuous basis is taken to the next assessment period to complete the learning cycle.

The study results of Gopal et al., (2021) based on the survey with 544 students of business management from Indian universities and subsequent analysis of data using structural equation modelling showed that the factors like quality of instructors, course design following the expectation levels of the students, promptness of feedback positively impact students' satisfaction leading to enhanced performance. In the context of higher education for professional services in China, Guan, H and Liu, (2015) concluded that the transition from the traditional methods of evaluation to the formative method will adapt to the new trend of talent pool and cultivation. Based on a similar study conducted in the context of Malaysia, Fook et al., (2016) asserted that design and implementation of inquiry-based instruction, active learning through formative assessment is the key for effective learning outcome. Findings of He et al., (2024) showed that through formative assessment instructors and practitioners can assist the students to demonstrate a better self-regulated and structured learning behavior.

Considering the increased use of learning management systems and availability of data attention is being given by educational institutes in building learning analytics capabilities. The research conducted by Bulut et al., (2023) showed that the results on formative assessment have consistently remained the strongest predictor of the overall performance. The predictive power of these methods for the final learning outcome depends on students' understanding of the subject and relevance of the assessment method (Kohnke et al., 2022). The experiment of Alt et al., (2023) based on a sample of 300 students from Israel showed that competency-based learning through formative assessment bears a positive correlation to the soft skills acquisition of the students. Study by Lu and Cutumisu (2022) discovered a mediating role of formative assessment on the relation between lecture attendance and course academic performance.

Tsakiridis and Photopoulos (2022), showed that use of formative assessment method for a group of undergraduate engineering students resulted in increased students' satisfaction and engagement level through interactive learning in a non-competitive environment, followed by a moderate improvement in their final grade. Ritchie et al., (2020)

in their study on effectiveness of formative assessment conducted with medical students concluded with all the students agreed on the fact that the formative assessments at the end of each lecture helped them in summarizing the concepts of the delivered topic and consolidating the received information.

Research has been conducted on assessing the overall effectiveness of formative assessment in various disciplines and at various levels of university education. However this is a new learning methodology and is still not very common in the post graduate university education in India. More empirical and experiment-based studies need to be conducted to better understand the benefit and challenges of this method and increase its acceptability. Our present case study focusses on empirically assessing the learning outcome for our business school students with formative assessments.

Methodology

Our methodology involved experiment and observation and also secondary data collection. First method was used to gather data related to class participation and students' feedback which was subsequently used for qualitative analysis and the second method involved data collection from the concerned departments of the university to do quantitative analysis to assess learning outcome.

A teaching circle was formed with the faculties teaching the subject identified for formative assessment. The subject was taught simultaneously in three sections each with approximately 45 to 60 students. After finalizing the course outline a project guideline was prepared which was shared with the students upfront. The idea of sharing the project guideline upfront was to prepare the students to think, reflect and effectively apply the concepts learnt in the class through the project. At the beginning of the session each section of sixty students were divided into groups of six and each group of students were asked to take up a project based on their common interest and exposure. Along with the progress of the coursework they were expected to apply the concepts learnt during the course delivery in their projects. Project based learning is a learner-centric approach (Chanpet et al., 2020) that works on the principle of formative assessment with the continuous feedback from the students to help them to move forward through their learning process and finally creating artefacts related to the project identified by them.

The identified course being a three credit one there were total thirty hours of lecture delivery which were divided into three hours per week. The students were encouraged to actively participate in the class discussion and their participation was evaluated and recorded following a five-point rubric (Crosthwaite et al., 2015) with equal weightage to all the points.

1) Active Engagement
2) Attendance and Punctuality
3) Contribution to Class Discussions
4) Overall contribution to Course Learning
5) Pre-class Preparation

The feedback from the students was collected after every two weeks. The feedback was collected through informal discussion between the instructor and each group of students separately. The feedback mechanism was purposely kept informal so as to give the students a comfort feeling to share their honest feedback. However, within the teaching circle all the faculties jointly decided to conduct the discussion in a structured manner to gather feedback that helped them to understand the learning progress of the students, the challenges faced by them and the areas for improvement (Holger, 2014). Questions typically asked during the feedback collection discussion are summarized in the table below.

Table 1. Questions asked in Feedback Collection Discussion

Area of Feedback	Specific Questions asked
Understanding of Concepts	How well do you feel you understand the key concepts taught in last two weeks? Can you identify any concepts or topics that you found particularly challenging to grasp?
Application of Knowledge	How confident do you feel in applying the concepts learned to real-world business scenarios? Have you been able to apply any of the concepts learnt to the project identified by you?
Engagement and Interaction	Did you find the teaching methods used in this subject engaging and effective? Did you actively participate in class discussions and activities? If not, what factors hindered your participation?

Resources and Support:	Were the learning resources provided (reading material, videos, online materials) helpful in understanding the subject? Did you seek additional support outside of class to enhance your understanding of the topics covered? If yes, what kind of support did you find most beneficial?
Assessment Method	How useful did you find the feedback provided on your assignments, quizzes, or other assessments? Do you feel the assessments accurately measured your understanding of the material covered?
Suggestions for Improvement	What suggestions do you have for improving the teaching and learning experience in this subject? Are there any specific topics or areas you would like to see covered in more detail in future sessions/modules?

Apart from the structured question asked through subjective discussion students were also asked to reflect on their learning experience and share their general opinion on the subject and learning methodology.

Next, to quantitatively evaluate the learning outcome data were collected to test our hypotheses formulated based on the earlier researchers finding on the effectiveness of formative assessment. Based on the research findings of Bulut et al., (2023), Siau et al., (2020) and Akin et al., (2019) on the prediction of overall learning outcome for subjects taught using formative assessment we developed our first hypothesis as below.

Hypothesis 1: The students' score in the formative assessment is the best predictor of their overall performance for postgraduate management students.

Supported by the research of Fook et al., (2016) and Bazelais, et al., (2022) for enhanced performance and better learning outcome achieved through adoption of formative assessment our second hypothesis was as below.

Hypothesis 2: General learning outcome for the subjects taught using formative assessment method is better than that in the subjects taught using traditional summative assessment method for post graduate students at business school.

For testing our hypotheses, we collected the internal marks of 140 students of the first semester of the postgraduate program of the business school for all ten subjects taught in the first semester. These internal marks were the score obtained by the students as part of their during semester assessments (DSA) which was collected from the concerned staff of the academic section of the business school. Next from the examination department students' percentage score in the semester end examination (SEE) for the same 140 students were collected.

Results and Analysis

Analyzing the students' feedback it was found that overall, they were better satisfied with this new method of assessment. With the burden of end semester examination going out of their mind they could engage in the class and participate in discussions, and debates more openly. Also, identification of a project at the beginning of the session helped them to think in the line of application for every concept discussed in the class.

To test Hypothesis 1 multiple linear regression model was run using IBM SPSS v26 where the dependent variable SEE score which represented the overall percentage score of semester end exam was regressed against the ten predictors which were the DSA scores of the students in all ten subjects. Records for ten students who were barred from writing the semester end examination due to ineligibility were dropped from our data set to test the hypothesis. The result of the regression analysis (R-square = 0.734) is displayed in the tables below.

Table 2. Regression Analysis - Coefficients

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	9.251	6.676		1.386	0.168
DSA_sub 1	0.657	0.193	0.585	3.397	0.001
DSA_sub 2	0.107	0.076	0.244	1.413	0.160
DSA_sub 3	0.082	0.084	0.048	0.973	0.333
DSA_sub 4	0.036	0.070	0.026	0.522	0.602
DSA_sub 5	0.168	0.060	0.133	2.782	0.006

DSA_sub 6	0.155	0.062	0.124	2.517	0.013
DSA_sub 7	0.244	0.060	0.198	4.040	0.000
DSA_sub 8	0.137	0.059	0.114	2.349	0.020
DSA_sub 9	0.078	0.055	0.070	1.420	0.158
DSA_sub 10	0.161	0.053	0.147	3.028	0.003

The result shows that the coefficient for the variable DSA_sub_1 which is the DSA score for the subject taught using formative assessment method is the highest among all the coefficients with a significance level of 0.001. This suggests that students score in formative assessment is the best predictor of their overall performance and can be used as a reliable measure for their final examination performance.

Next to test the Hypothesis 2 we compared DSA scores of 140 students in subject 1 taught using formative assessment methodology with those of another subject, mentioned here as subject 2 taught using summative assessment. All ten subjects taught in semester 1 in the postgraduate management programme are offered from five different areas namely General Management, Finance, Marketing, Human Resource and Operations Management. Subject 2 which was taken as reference was selected from the same area as for subject 1 to maintain parity of evaluation. Independent sample t-test was performed to compare the means. Mean, standard deviation and standard error of mean were 39.45, 6.28 and 0.53 respectively for subject 1 and 35.35, 6.47 and 0.54 respectively for subject 2. Results of independent sample t-test (Table 3) indicate that the mean score of students in subject 1, taught using formative assessment method is significantly higher than that of subject 2 taught using summative assessment method.

Table 3. Comparison of Mean Score of two different Subjects

Levene's Test for Equality of Variances		**t-test for Equality of Means**			**Mean Difference**	**Std. Error Difference**	**95% CI of the Difference**	
F	**Sig.**	**t**	**df**	**Sig. (2-tailed)**			**Lower**	**Upper**
8.74	0.003	5.378	278	0.002	4.1	0.76238	2.5992	5.60076

In order to eliminate any bias that might have occurred due to the difference in the nature of the subjects, students' scores on subject 1 for two different batches were compared. Batch 1 was the previous year's batch to whom the same subject (subject 1) was taught using traditional summative method of assessment and Batch 2 was the current year's batch for whom the same subject was taught using formative assessment methodology. Independent sample t-test was performed and significant difference in the mean score is observed for the two different batches (Table 4). Mean, standard deviation and standard error of mean were 34.1, 6.33 and 0.53 respectively for batch 1 and were 38.67, 6.38 and 0.54 respectively for batch 2.

Table 4. Comparison of Mean score of two different Batches

Levene's Test for Equality of Variances		**t-test for Equality of Means**			**Mean Difference**	**Std. Error Difference**	**95% Confidence Interval of the Difference**	
F	**Sig.**	**t**	**df**	**Sig. (2-tailed)**			**Lower**	**Upper**
9.468	0.002	-6.015	278	0.003	-4.57143	0.75998	-6.06747	-3.07538

Comparative analysis of students' performance scores in subjects treated with formative assessment method and summative assessment method indicates that students perform well in an open environment as designed in case of formative assessments. Improved engagement in the class results in an enhanced learning outcome. From the qualitative analysis of the students' feedback on their overall learning experience with the subject treated with formative assessment method also reveals a high level of satisfaction and a sense of fulfilment.

Conclusion

The main limitation in the current study was the size of the sample and the limited scope of the study to generalize any assumption on the effectiveness of formative assessment in the context of higher education in management. The present study was conducted only with a small set of data containing 140 records and the effectiveness of formative assessment was checked with only one subject taught using formative assessment. To generalize our claim of higher effectiveness of formative assessment in terms of enhanced learning outcome and predictability of students' overall performance in a business school perspective, experiment needs to be conducted with a larger dataset and different choices of subjects treated with formative assessment. Generally the students' attendance percentage for the subject taught with formative assessment methodology has been observed to be higher. But whether the higher attendance percentage has any impact on the learning outcome is an area to be further explored. However the results of the present case study can work as an inspiration both for the instructors and the students in the context of a business school to move towards a more open teaching and learning environment that can help develop an inquisitive and research-oriented mindset among the students.

Formative assessment encourages experiential learning and also helps to build the capability of fundamental thinking which is the need of the hour. In today's age of generative AI, solutions to all kinds of problems related to their academics are easily available to the students. Among the students the number of assignments and even thesis works done using the generative AI capability is on the rise. While use of latest technology in completing academic assignments and course work is always encouraged but the same should not be done at the cost of sacrificing the fundamental thinking capability and depth of conceptual clarity on any subject. Pedagogical tools need to be more engaging that can ensure better participation, thinking and interaction within the class and provides a sense of fulfilment among the students through experiential learning. This type of study can also be useful for educators and policy makers to bring more uniformity in the structure of university education across the different countries of the world so that the students face minimum barrier and experience a seamless learning experience in foreign universities.

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Computer-Assisted Platform for the Intuitive Learning of Electromagnetic Modes Propagation in Broadband Domestic Optical Fiber Networks

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Abstract

The aim of this work is to facilitate the learning of complex and abstract information transmission concepts in Fiber to the Home (FTTH) networks by providing students with a visual tool based on Information and Communication Technologies. The student will not only analytically understand the abstract electromagnetic concepts in lectures, but also graphically, being able to observe the associated phenomena. Also, it is an aim of this work to involve the student as an active element in the learning process by using a tool that is not only visual but also interactive. The student will be able to experiment with extensive configurations and conditions that determine FTTH communication properties. Particularly, a computer-assisted platform based on MATLAB is provided, integrating a Graphical User Interphase (GUI) for the learning of propagation of step-index optical fibers operating both in single-mode and multi-mode, of particular importance in the last sections of domestic FTTH infrastructures. The provided tool integrates the possibility to analyze the dispersion equation of optical fiber through numerical analysis and, automatically, obtain the number and type of exact electromagnetic modes, as well as the associated propagation constant. Furthermore, the linearly polarized modes (LP) modes are obtained for weak guiding conditions in the fiber. The application can be distributed as a MATLAB application and it can be run in both Windows and MacOS.

Keywords: Optical Fiber, Electromagnetism, Engineering, Telecommunications, Fiber to the Home, Propagation.

Introduction

The great information transport capacity of optical fiber, currently unsurpassed by any transmission medium, makes it key in the study of current broadband telecommunications infrastructures, where telecommunications engineers have high employability rates. One of the challenges that students of this technology face is the understanding of very abstract electromagnetic signal propagation concepts, in general, and in particular, the propagation of electromagnetic signals in the last section of FTTH access networks, called client or home networks. However, it is important that students of fiber optic technologies clearly know the way in which the signal propagates, know its limitations, and how to overcome or avoid them to take advantage of its advantages and be competent in the deployment and use of FTTH infrastructures that are of great extension and professional and social relevance today, greatly associated to the impact of Cloud/Grid Computing and IoT Services (Prado et al., 2009-2020). Thus, the problem that arises in this paper is to have a teaching tool to help students understand critical effects in FTTH fiber propagation in client networks and, in this way, to make them capable of detecting, predicting, avoiding and intuitively learn the mechanisms to counteract them at the transmission medium level, and consider them in different areas and design levels. In particular, this project aims to provide students with a teaching tool for analyzing multimode optical fibers for FTTH optical networks in their domestic sections that allows, based on physical parameters of the fiber and working frequency, to automatically provide the user with the exact, linear and degenerate modes that propagate in the fiber. The methodology can be summarized into five parts. First, using numerical methods with MATLAB, for a given step index fiber - given by the radius and refractive indices of core and cladding - and the working wavelength, obtaining the propagating modes and the values of its propagation constants. Secondly, to obtain the propagation constants of exact modes, a graphical method will be used to find the cut-off points of two eigenvalue functions, and the value of said propagation constants will be given in consideration of the transmission characteristics of optical fibers. Next, the automatization will be considered to obtain the nomenclature of the modes and value of the constants with MATLAB, so that these values, in addition to being displayed graphically, are offered numerically without needing

to refer to the graphs obtained previously. In addition, the automation of the obtention of the linearly polarized modes will be carried out using numerical methods with MATLAB, that is, from the previous values of exact modes (propagation constants and identifiers) it will be indicated which are the linearly polarized modes automatically. Finally, the coding of the GUI graphical interface for a Windows/MacOS computer will be carried out to allow intuitive and interactive use of the software.

The rest of the work can be summarized as follows. In Methodology the main concepts behind the implementation of the tool will be presented. In Results, the computer-aided platform and its GUI will be explained, including examples of its performance and features. Finally, the main conclusions of the work will be drawn in Conclusions.

Methodology

The equations governing the propagation of light in the dielectric media of which the optical fiber is composed are the Maxwell's equations for linear, non-dispersive (in time and space), homogeneous, isotropic, non-magnetic and free-charge (Aicklen et al., 1993, Bottachi, 2006, Capmany et al., 1999, Keiser, 2006, Prado, 2023). From these equations it is possible to obtain the associated dispersion equation:

$$(J_v + K_v)(k_1^2 J_v + k_2^2 K_v) = \left(\frac{\beta v}{a}\right)^2 \left(\frac{1}{q_1^2} + \frac{1}{q_2^2}\right)^2 \quad (1)$$

where:

$$J_v = \frac{1}{q_1} \frac{J_v'(q_1 a)}{J_v(q_1 a)} \quad (2)$$

$$K_v = \frac{1}{q_2} \frac{K_v'(q_2 a)}{K_v(q_2 a)} \quad (3)$$

$$q_1^2 = k_1^2 - \beta^2 \quad (4)$$

$$q_2^2 = \beta^2 - k_2^2 \quad (5)$$

a is the radio of the fiber, k_1 and k_2 are the wave numbers in core and cladding of the optical fiber, respectively, and v is an integer number, $J_v(x)$ are Bessel functions of first order v, $K_v(x)$ are modified Bessel functions of second kind of order v and β is the propagation constant. The key aspect is that from the analysis of the dispersion equation is possible to know the propagating modes (or solutions to the electromagnetic field) in an optical fiber. Specifically, the analysis of the possible values for β let us know the number and type of propagating or guided modes. Firstly, it can be proved that condition to be a guided mode in the fiber (guided mode condition) is:

$$n_2 k = k_2 \leq \beta \leq k_1 = n_1 k \quad (6)$$

where the refractive index in the core is n_1 and the refractive index in the cladding is n_2. Secondly, each of the solutions to Maxwell's equations or modes meet the dispersion equation (1) from which the characteristics of the modes are derived. On the one hand, when v =0:

- The m solutions to dispersion equation satisfy that electric field component $E_z = 0$ and are designated as TE_{0m}, where m is an integer number.
- The m solutions to dispersion equation satisfy magnetic field component $H_z = 0$ and are designated as TM_{0m}.

On the other hand, when v >0:

- Fields components E_z and H_z may be different from zero at a time, so the solutions or modes of this equation are called hybrid, and they are designated as HE o EH depending on the dominant components. In modes EH_{vm} the electrical components are the dominant ones and in modes HE_{vm} the magnetic components are the dominant ones.

As studied earlier, eq. (6), each solution or fiber guided mode is characterized by a propagation constant β in the range $n_2 k = k_2 \leq \beta \leq k_1 = n_1 k$. Hence, the possible number of propagation constants that the dispersion equation gives us, tells us the number of possible guided modes. Specifically, from the study of the dispersion equation, the following transcendent equations or eigenvalues equations of the different types of modes considering weak guide ($n_1 \sim n_2$) are obtained:

Modes TE_{0m} y TM_{0m} $$\frac{u_{0m}J_0(u_{0m})}{J_1(u_{0m})} = -\frac{w_{0m}K_0(w_{0m})}{K_1(w_{0m})} \quad (7)$$

Modes EH_{vm} $$\frac{u_{vm}J_v(u_{vm})}{J_{v+1}(u_{vm})} = -\frac{w_{vm}K_v(w_{vm})}{K_{v+1}(w_{vm})} \quad (8)$$

Modes HE_{vm} $$\frac{u_{vm}J_v(u_{vm})}{J_{v-1}(u_{vm})} = \frac{w_{vm}K_v(w_{vm})}{K_{v-1}(w_{vm})} \quad (9)$$

where:

$$u_{vm} = aq_1 = a\left(\sqrt{n_1^2k^2 - \beta_{vm}^2}\right) \quad (10)$$

$$w_{vm} = aq_2 = a\left(\sqrt{\beta_{vm}^2 - n_2^2k^2}\right) \quad (11)$$

By solving these transcendent equations, it is possible to obtain the propagation constant of each fiber guided mode, β_{vm}. In this work will use numerical methods though MATLAB in order to solve these equations. Particulary, every part of the transcendent equations will be represented graphically with respect to a range of values for propagation constant β. Where the two parts of these equations intersect, the value of one of the propagation constants β_{vm} corresponding to a propagating mode in the fiber will be obtained. Furthermore, the automatization from this procedure, beyond the graphical representation will be considered, obtaining the nomenclature of all propagating modes and its associated propagation constants.

Also, the tool will be able to derive the LP modes from the obtained exact electromagnetic modes. From the analysis of propagation constants for all possible modes in a fiber versus the normalized frequency it can be seen that some modes follow very similar curves when it is observed that the refractive indexes of the core and the cladding of the fiber are very close, i.e., $n_1 \sim n_2$ (guided weak condition). From a physical point of view, the coincidence of propagation constants means that the dispersion relations between modes are equal. This makes all modes with the same propagation constant indistinguishable in terms of their propagation characteristics. To this end, all these degenerate modes are usually grouped to form a group of modes. These modes group formed by modes with equal propagation constant values are referred as LP modes and are denoted by:

- LP_{0m} for HE_{1m} modes
- LP_{1m} for TE_{0m}, TM_{0m} and HE_{2m} modes
- LP_{lm} for EH_{vm} and $HE_{(v+2)m}$ $v \geq 1, l = v + 1 \geq 2$ modes

It can be proved that, by adequately composing these modes, a linearly polarized electromagnetic field vector (hence LP modes) can be obtained. The provided tool will offer as a result all propagated LP modes propagation constant, cut-off frequency and their associated identifier.

Results

The graphical interface has been developed using the MATLAB R2019a App Designer tool. Firstly, as shown in Figure 1, there is an area reserved for the introduction of physical input parameters by the user to perform the fiber analysis. Each parameter is defined by its name and symbol, as well as the units in which it is measured, if any. Values can be entered in the corresponding input box or using the slider bar. The value will be updated instantly on the unused option. The values that can be entered are limited to those specified in the limits of the slider bar, these ranges are limited to typical values for this type of optical communications. In case of error when entering a value in the input box, it will automatically be set to the closest limit value. Two buttons are also included, the analysis button calculates the propagation constants of the propagating modes (graphically and numerically), in addition to the guided modes to which they correspond. This is the first button that must be pressed to begin the study. After this the second button, LP modes table, calculates the linearly polarized modes.

Also, in the second section on the left, the propagation solutions of the guided modes of the fiber are graphically represented as can be seen in Figure 2. This area is organized by sections named after the mode types (TE, TM, EH and HE). In each of the sections, the graphs corresponding to the type of mode appear. This design is due to the fact that a very high number of modes can be propagated in a fiber and, as a consequence, in a large number of graphs.

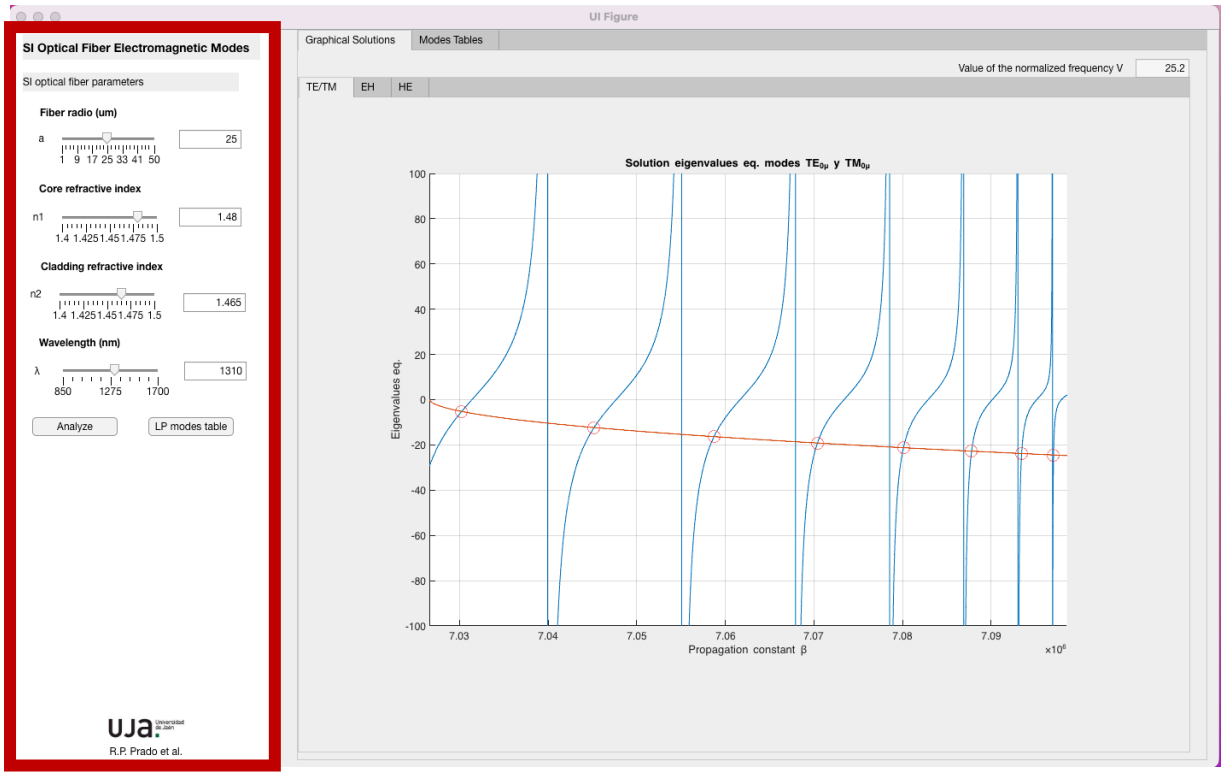

Figure 1. Parameters' definition section.

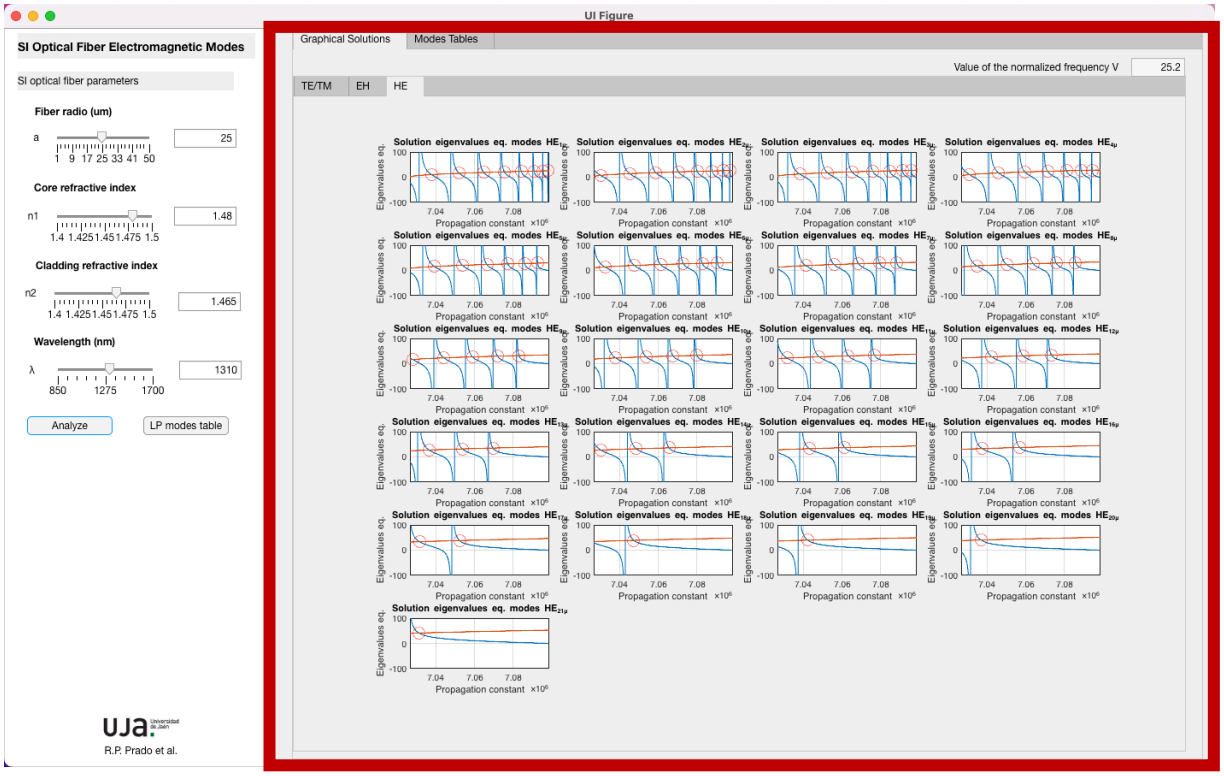

Figure 2. Graphical representation of the eigenvalues equations solutions.

Next, as shown in Figure 3, the propagating modes are represented in table form. This information is extracted from the graphs in previous sections. The tables show the propagation constant and the corresponding modes. If a mode has a propagation constant zero, this means that that mode does not propagate in the fiber.

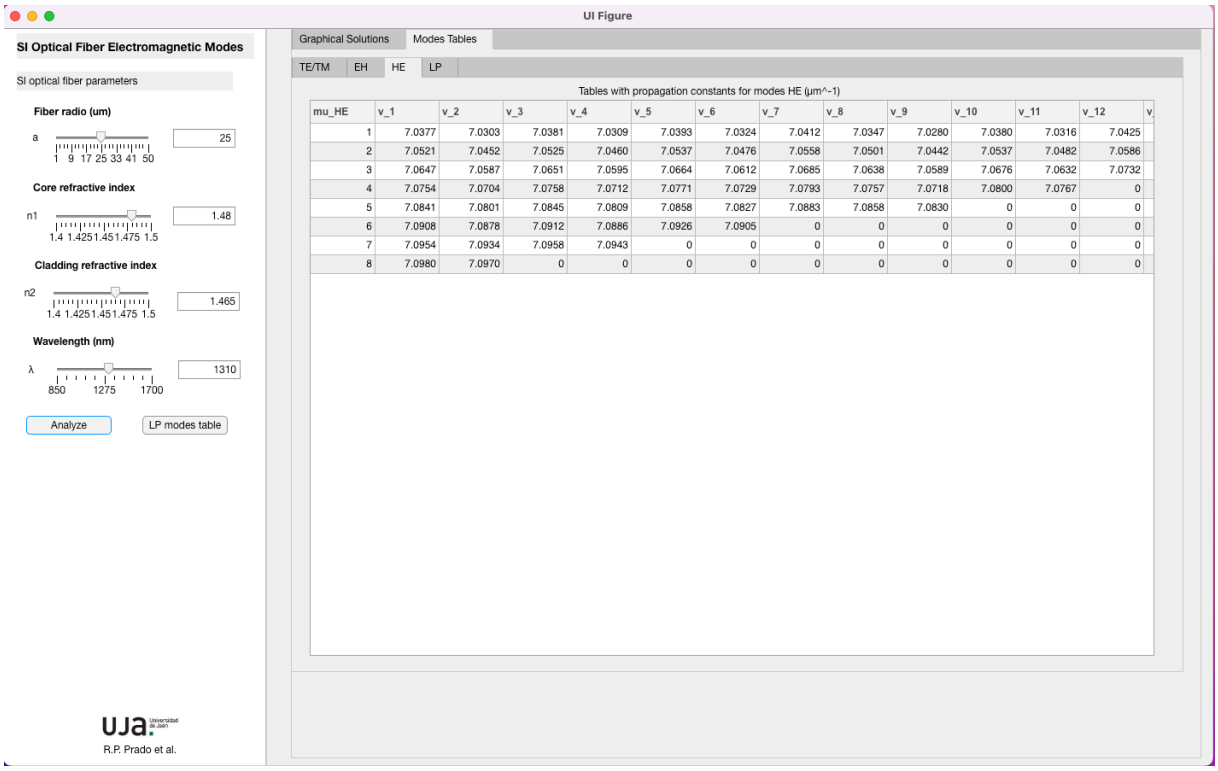

Figure 3. Exact modes identification.

This section has a second subsection, which represents the tables with the LP modes that propagate and information about them: the number of modes that make up the set and their normalized cut-off frequency as seen in Figure 3.

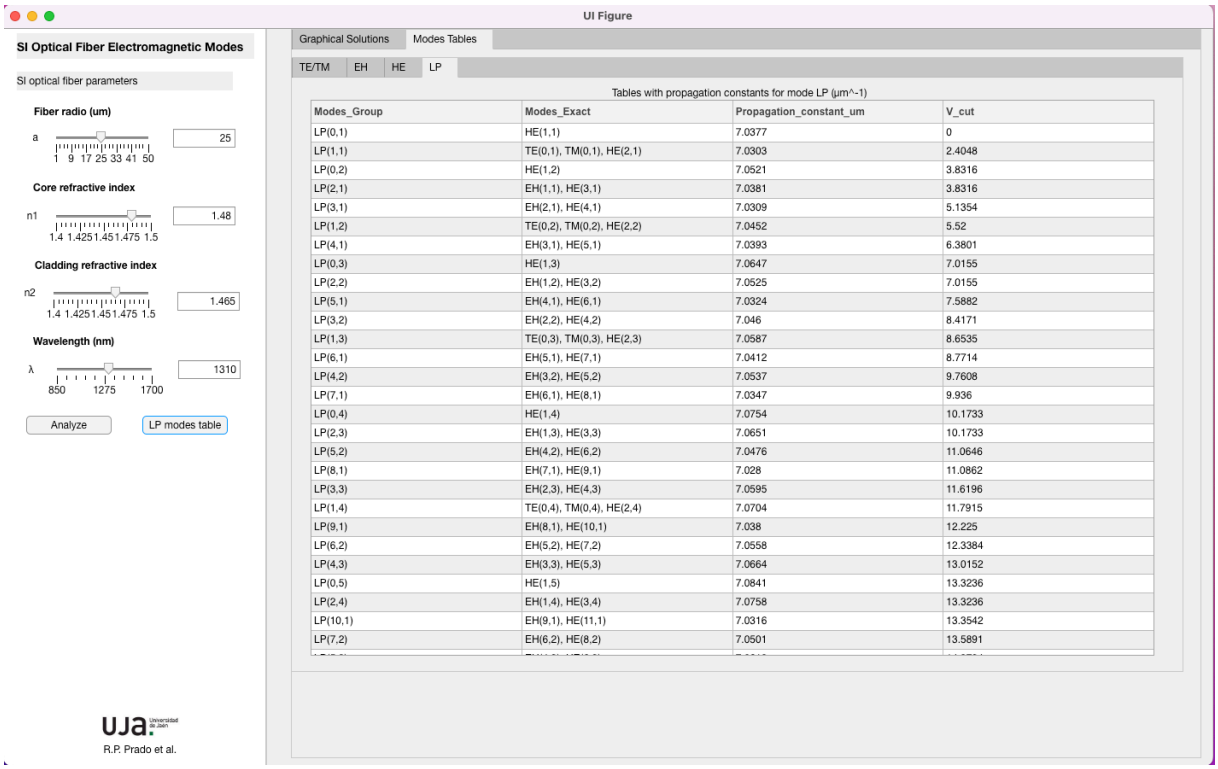

Figure 4. LP modes identification.

Conclusions

This work has presented a computer-assisted platform to help to achieve a better understanding and consolidation of knowledge on the electromagnetic propagation in optical fiber, and to provide an initial tool that promotes students' ability to design complex FTTH infrastructure systems. Thus, the student is trained to solve questions and problems using the theoretical knowledge taught in lectures related to the propagation of exact modes and LP modes by his/her own experimentation. Furthermore, the student is introduced to the concept of numerical methods to find solutions when an analytical expression has not an overtly solution, which is key in many telecommunications deductions within electromagnetism. Additionally, the tool can be easily deployed in both Windows and MacOS operating systems through the installation of a MATLAB application.

Acknowledgements

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Optical Field, Intensity and Power Analyzer in FTTH Client Networks for the Comprehensive Analysis of Macrobending using Smart Devices

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Abstract

Understanding the signal characteristics in client FTTH (Fiber to the Home) networks is especially relevant given the reduced dimensions of the common telecommunications infrastructure pipelines in them, which lead to the appearance of both macrobends that drastically limit fiber capacity to transport information due to the increase in losses in the associated signal. In this context, it is important that students of fiber optic technologies know the way in which the signal propagates, its limitations, and how to overcome or avoid them to be competent in the deployment and use of FTTH infrastructures. Thus, the problem that arises is to have a teaching tool to help students understand critical effects in FTTH fiber propagation in client networks and, in this way, make them capable of detecting, predicting, avoiding and intuitively learn the mechanisms to counteract them at the transmission medium level. This project proposes a teaching tool for analyzing step-indexed optical fibers working both on single and multimode for FTTH optical networks in their domestic sections that offers, based on physical parameters of the fiber and working frequency, the spatial distribution in field, intensity and its behavior in confinement in the core and cladding regions to provide information on their resistance to attenuations due to macrobeding. Also, this analyzer is integrated in a unified in an intuitive graphical user interface (GUI), adapted to smart devices, such as digital tablets and touchable screens, and focused on professional skills.

Keywords: Optical Fiber, Macrobending, Telecommunication Engineering, Fiber to the Home.

Introduction

The global fiber optic components market is projected to reach $25.3 billion by 2024. Notably, the emerging growth factors driving the deployment of these fiber optic-based FTTH networks are Cloud/Grid Computing and IoT (Prado et al., 2009-2020), where telecommunications engineering and connected industry students find many professional opportunities. Understanding the characteristics of the optical signal in FTTH client networks is especially relevant given the limited dimensions of the common telecommunications infrastructure conduits in them, which lead to the appearance of macrobending that drastically limit the fiber's ability to transport information due to the increase in losses in the associated signal and that contribute to define the transmission capacity of fiber information background in many Cloud/Grid Computing or IoT services (Prado et al., 2009-2020). The background found in the literature for the interactive analysis of field, intensity and optical power is very limited: the only didactic application of fiber optic modal analysis in home networks found in the current literature is the one defined in the work of (Aicklen et al., 1993). Furthermore, the features of this tool are very restricted. On the one hand, for example, it does not allow representations of power and/or confinement relationship, indication of modal field diameter or calculation of V/b curves, which are key to the study of fiber strength in the face of macrobending. On the other hand, the characteristics of the application are obsolete, corresponding to software from 1993 with great visual and interaction limitations, and which, in addition, cannot be deployed on the smart devices that students have in the laboratories or use both in class and in their homes to study such as iPad digital tablets. In this work, an interactive and didactic tool will be presented capable of offering the spatial distribution in field and power of these modes, and their behavior in confinement in the core and cladding regions, analyzing the result to provide information on their resistance to attenuations due to macrobending and other customizable features that define the information transmission capacity of the fiber, all of this unified in an intuitive graphical user interface, adapted to current equipment, and focused on professional skills. Specifically, the following methodology is proposed. Firstly, the simulation and graphical representation of the transverse electric field and intensity of the modes is proposed using MATLAB. Next, the analysis and programming of the power and/or confinement representation analysis tool will be carried out (part by core and part by cladding). Thirdly, the modal

field diameter will be obtained to determine the resistance to macrobending of the fiber in the home network and its transmission capacity in home networks to offer Cloud Computing and IoT services, for example. Fourthly, the calculation and recreation of V/b curves will be considered. Finally, the coding of the GUI will be carried out, observing the results on smart devices such an iPad and a touchable screen, for a more intuitive and attractive use for students.

The rest of the work can be summarized as follows. In Methodology the main concepts of optical field, intensity V/b curves and power confinement within a step-index optical fiber are presented. In Results, the analyzer and its GUI will be introduced, showing different examples of its performance and deployment in smart devices. Finally, in Conclusions, the key conclusions will be discussed.

Methodology

Optical field and intensity distribution

Field and intensity distribution of the linearly polarized (LP) propagating modes in a step-index optical fiber allows us to characterize the spatial propagation behaviour of the power in the transverse section of the optical fiber (Aicklen, 1993, Bottachi, 2006, Capmany, 1999, Keiser, 2006, Prado, 2023). Specifically, the order (l, m) of the mode $LP_{l,m}$ rules the symmetry of the field and the intensity:

- Index l: indicates the number of field intensity maxima that appear in a complete turn (2π) of the fiber section with respect to its axis, divided by 2. If its value is 0, it indicates that there is a maximum in the axis and the distribution have axial symmetry. If it is greater than 0, there will be a minimum on the axis.
- Index m: Provides the number of intensity maxima that can be cut from the axis to the core-cladding interface (radio).

It can be proved that the more concentrated the energy of the fields is around the axis of the nucleus, which can be observed through this spatial distribution, the less likely this mode will be subject to bending losses.

Moreover, LP modes are composed of fields with two polarizations, generally analyzed though the electrical field. The difference between the field components, E_x and E_y, are determined by the azimuthal dependence in cylindrical coordinates:

$$E_x(r,\phi,z,t) = \begin{cases} \frac{J_v(q_1 r)}{J_v(q_1 a)} \cdot \sin(v\phi) \cdot e^{j(\omega t-\beta z)} & core: \quad r \le a \\ \frac{K_v(q_2 r)}{K_v(q_2 a)} \cdot \sin(v\phi) \cdot e^{j(\omega t-\beta z)} & cladding: \quad r > a \end{cases} \tag{1}$$

$$E_y(r,\phi,z,t) = \begin{cases} \frac{J_v(q_1 r)}{J_v(q_1 a)} \cdot cos(v\phi) \cdot e^{j(\omega t-\beta z)} & core: \quad r \le a \\ \frac{K_v(q_2 r)}{K_v(q_2 a)} \cdot cos(v\phi) \cdot e^{j(\omega t-\beta z)} & cladding: \quad r > a \end{cases} \tag{2}$$

where $\boldsymbol{J_v(x)}$ are Bessel functions of first order $\boldsymbol{v}$, $\boldsymbol{K_v(x)}$ are modified Bessel functions of second kind of order $\boldsymbol{v}$, $\boldsymbol{\beta}$ is the propagation constant, $\boldsymbol{\omega}$ is the angular frequency, $\boldsymbol{a}$ is the radio of the fiber, $\boldsymbol{q_1^2 = k_1^2 - \beta^2}$and $\boldsymbol{q_2^2 = \beta^2 - k_2^2}$, $\boldsymbol{k_1}$ and $\boldsymbol{k_2}$ are the wave numbers in core and cladding of the optical fiber, respectively**.** Also, the intensity can be obtained from this electrical field as follows:

$$I(r,\phi) = |E_x(r,\phi)|^2 + |E_x(r,\phi)|^2 \tag{3}$$

V/b curves

V/b curves provide information on the number and type of guided modes that propagate within a step index optical fiber, as well as the associated cut-off frequency and propagation constant to these modes. Each curve is associated with an exact guided mode and indicates the value of the propagation constants (β) or normalized propagation constants (b) for all possible values of the normalized frequency V for the mode. Furthermore, depending on the value of V, two regions can be identified, the single-mode region (V≤2.405) where only the fundamental exact mode $HE_{1,1}$ propagates and the multimode region. The variation of any of the technological parameters of the fiber

will imply a change in V, and as a general rule, will modify the number and type of guided modes that propagate in the fiber. When approximating the field solutions by weakly guided approximation, many exact mode curves do not present appreciable variation. That is, as n_2 tends towards n_1, curves with similar characteristics tend to converge into a single curve, and so, they are integrated in LP modes.

The calculation of the V/b diagram for LP modes is calculated in this work using numerical methods, since no analytical solution can be found for the related transcendent equations or eigenvalues equations. The way to obtain the V/b relation for each one of the modes is the following. Starting from the equation:

$$(q_1 a)^2 + (q_2 a)^2 = V^2 \tag{4}$$

we substitute in the eigenvalues' equation of every mode $q_2 a$ with the expression $q_2 a = \sqrt{V^2 - (q_1 a)^2}$. Setting V, that is a, n_1, n_2, λ, and considering the possible range for propagating modes $n_2 k = k_2 \leq \beta \leq k_1 = n_1 k$, we can obtain the values of q_1 that meet the equation and the process is repeated for each of the values of V in the range to be represented. Then the value of q_2 for each value of V can be calculated and the value for b (normalized beta) can be obtained using:

$$b = \frac{(q_2 a)^2}{V^2} \tag{5}$$

Power graphs

Power graphs represent the proportion of power that propagates through the cladding of the optical fiber with respect to the total power propagated for every mode. The power of a guided mode in optical fiber is calculated by integrating the Poynting vector in the z direction over the cross section of the fiber. Performing the calculations, the fraction of power in core P_{core} and cladding P_{clad} can be derived:

$$\frac{P_{core}}{P} = \left(1 - \frac{{q_1}^2}{V^2}\right) \cdot \left(1 - \frac{J_v^2(q_1 a)}{J_{v+1}(q_1 a) \cdot J_{v-1}(q_1 a)}\right) \tag{6}$$

$$\frac{P_{clad}}{P} = 1 - \frac{P_{core}}{P} \tag{7}$$

where P represents the whole transmitted power. As in the previous cases, the resolution is carried out using numerical methods. To obtain representation of the power graphs work is done using the same procedure that has been used to obtain the V/b graphs. In this case, once the normalized transverse frequency $q_1 a$ has been obtained, this is used in equation (6) to obtain the proportion of power that propagates in the cladding compared to the total power for the mode, for each of the values of V in the range to be represented and for each propagated mode. In these graphs can be observed that:

- The fraction of power carried by the cladding for each mode increases as the mode approaches the cut-off frequency V_c.
- Below the cut-off frequency V_c, each mode is radiative (it is not guided because the guided mode condition is not met).
- Modes with a higher cut-off frequency V_c (higher order modes) tend to concentrate less energy in the core (less confined) for a given V than lower order modes.
- The power graphs constitute confinement graphs, providing us with information on how confined a mode is for a given V.

Results

The deployed application has been implemented as an extension of an exact and LP computer-assisted teaching tool developed with MATLAB R2019a App Designer tool for propagation analysis and a new MATLAB app has been designed, suitable to be run in Windows and MacOS operating systems. Beyond the section to introduce the technological parameters of the optical fiber, that is, a, n_1, n_2 and λ, a second area (Figure 1) is included to introduce parameters and action buttons to be performed after the propagation analysis for the analysis of electrical field, intensity, V/b graphs and power confinement. Particularly, the Calculate button obtains the field and

intensity distribution of the $LP_{l,m}$ mode indicated from those propagated in the specific optical fiber. The indices l and m correspond to the radial and azimuthal number value, respectively. Below, the V/b and power graphs can be obtained, corresponding to the indicated normalized work frequency. If an incorrect value is entered, the user will be notified via a message.

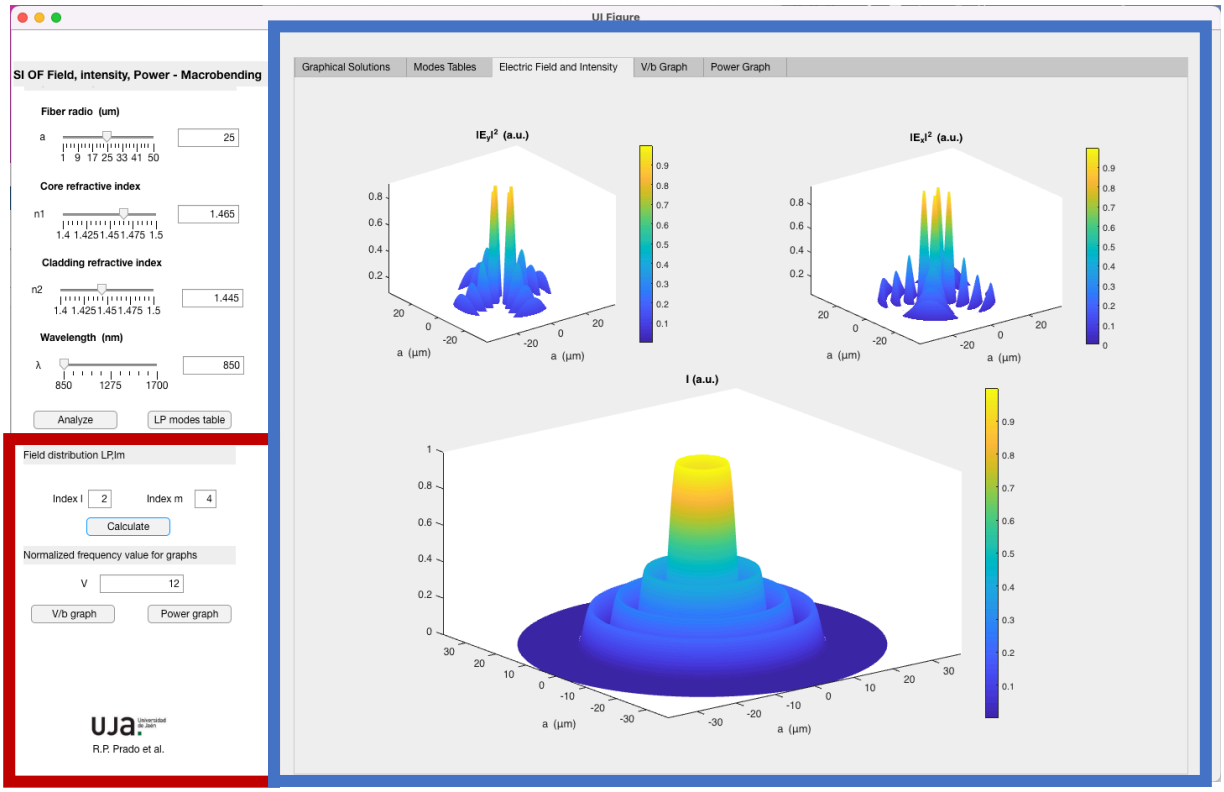

Figure 1. Parameters' introduction and representation of electrical field and intensity distribution.

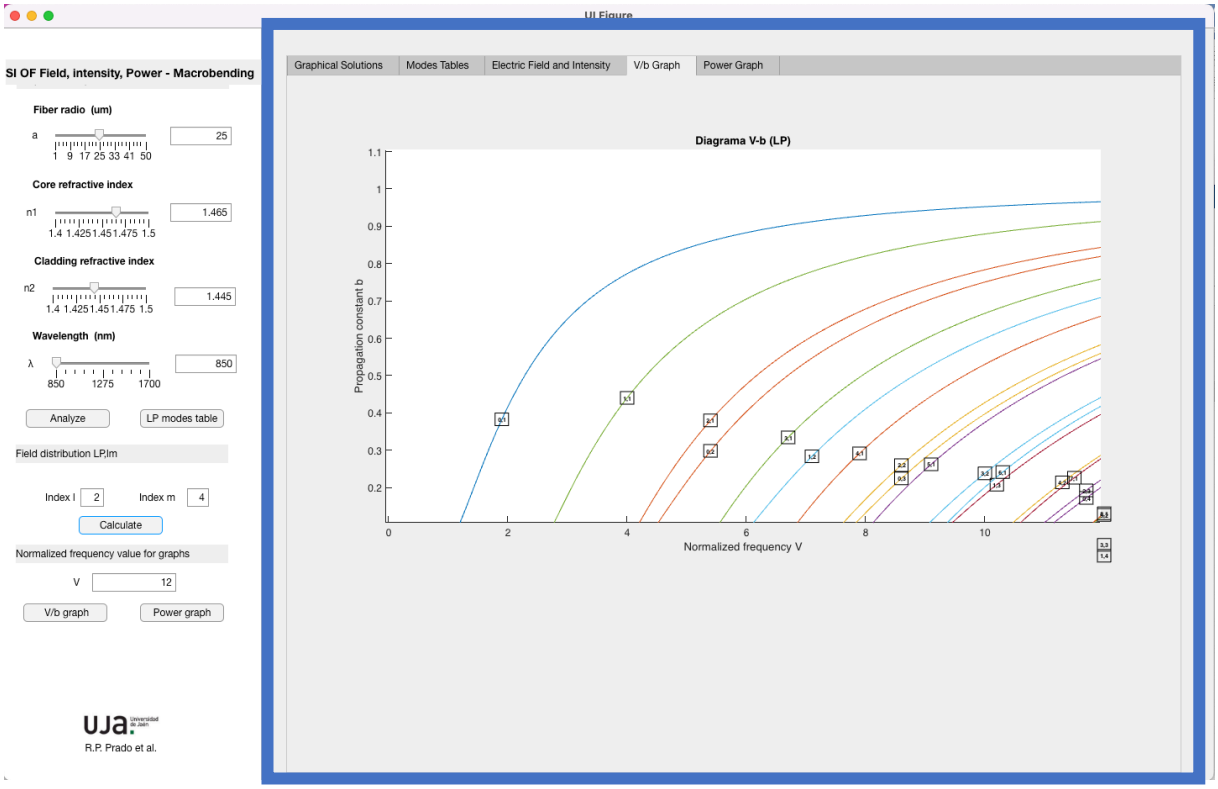

Figure 2. Representation of V/b curves.

As shown in Figure 1, the Electrical Field and Intensity section tap represents three 3-D graphs where the study of field and intensity distributions is carried considering the introduced input parameters. The first two show the field squared module distribution E_x and E_y, respectively. The lower graph represents the intensity distribution. These distributions correspond to the LP mode chosen by the user.

In Figure 2, the V/b diagram is shown, representing the normalized propagation constant of the LP modes that propagate as a function of the normalized frequency. This diagram will be represented up to the V indicated by the user.

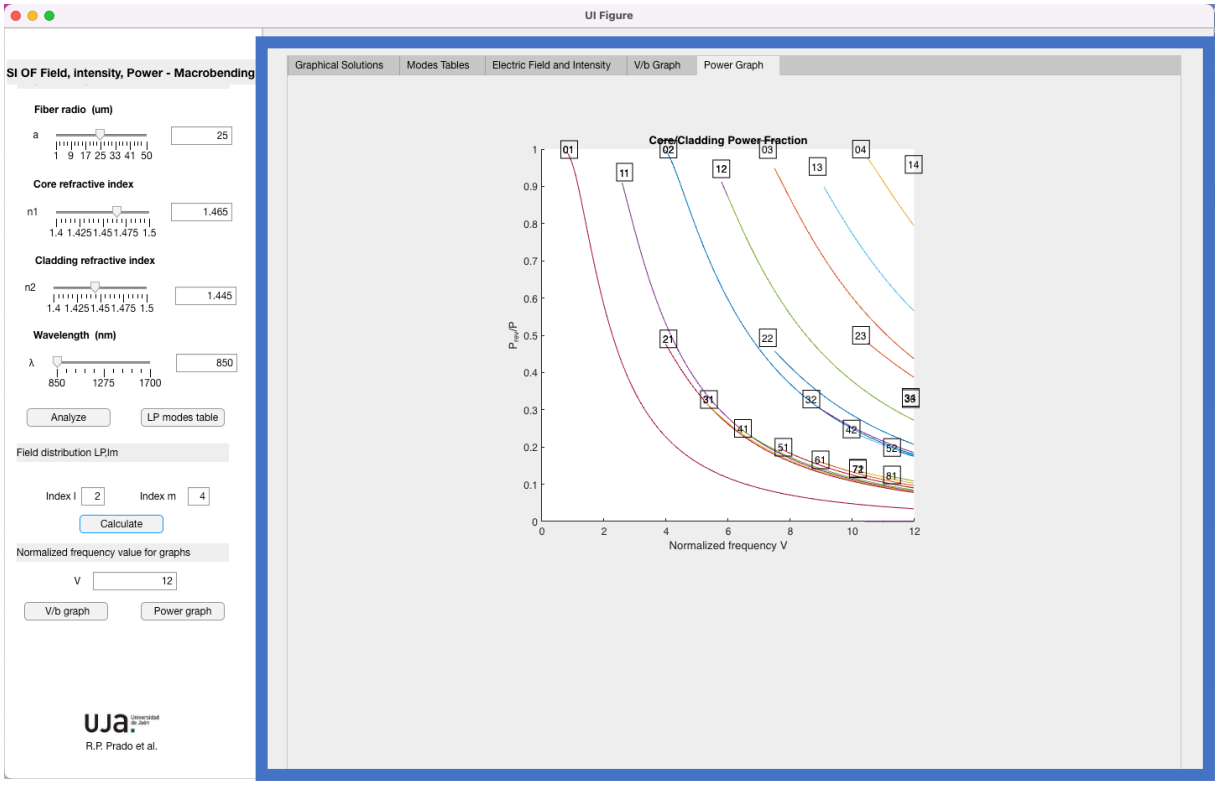

Figure 3. Representation of power fraction graphs.

Next, the power graph is represented in the learning tool, indicating the proportion of power that goes through the coating of the propagated LP modes with respect to the total power of the mode, this as a function of the normalized frequency as can be seen in the Figure 3. As in the previous section, V limit is set by the user.

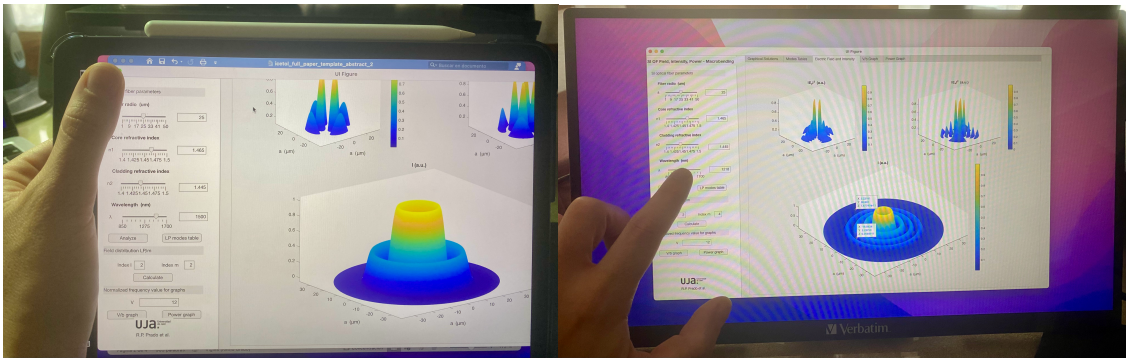

Figure 4. GUI deployed in iPad and Verbatim touchable screen.

All graphs can be modified individually, i.e., zoom, zoom, mark a value, save, etc. Additionally, when you click on the name of any of the parameters, the user gets a help menu with the meaning of the parameter. Finally, as it can be observed in Figure 4, the application GUI can be used in smart devices such as digital tablets and touchable screens to make the tool more comfortable and playful by the student.

Conclusions

Within the telecommunications sector, with the explosion of internet traffic in relation to electronic commerce, multimedia services, voice, data and video, etc., the need for a medium with high transmission capacities to handle large amounts of information it is of vital importance. Thus, the great information transport capacity of optical fiber, currently unsurpassed by any transmission medium, it key in the study of current broadband telecommunications infrastructures. In this work, a graphical and interactive tool for the learning of field, intensity, propagation and power confinement in step index fiber in domestic FTTH networks is proposed for students in telecommunication engineering. Furthermore, the analyzer is integrated in a GUI suitable to be deployed in diverse smart devices such as digital tablets and touchable screams. With the presented tool it is intended to make more efficient the practical and autonomous work, motivate the student, facilitate the non in person learning, and foster the participation of students though the use of smart devices, integrated in their reality and preferences.

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Sentiment Analysis for ESP: Mining Students' Feedbacks for a Successful Teaching Process

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Abstract

Sentiment analysis (SA) is the field of study that involves employing methods from natural language processing, textual analysis, and statistical analysis to examine subjective data, including opinions, attitudes, impressions, and emotions (Esparza et al., 2018). SA has been adopted across a range of fields for years, including business and finance (Saura et al., 2019; Sun et al., 2021), politics (Groshek & Al-Rawi, 2013), health and medicine (Denecke & Deng, 2015) and entertainment (Thetet al., 2010) because of its considerable benefits in pinpointing target opinions. In educational settings, however, SA has recently started to be recognized and studied. SA has the invaluable potential to enhance the quality of the teaching practices due to its critical and practical ability to reflect students' feedback about instructors' teaching performance. SA deserves further exploration and recognition within the academic realm, especially in English for specific purposes (ESP) education. In the process of addressing the needs of ESP students, which is one of the fundamental concerns of ESP teaching (Mustafayeva, 2019; Chalikandy, 2013; Dudley-Evans & St John, 1998), SA is an effective application for providing or reshaping the appropriate methodology for ESP, which remains as a long-lasting challenge in the literature. Therefore, the purpose of this paper is to provide thorough insights into SA for ESP education, aiming to enhance the teaching practices of ESP practitioners.

Keywords: Sentiment analysis, English for specific purposes, natural language processing

Introduction

This study aimed to provide basic knowledge of Sentiment Analysis (SA) and to incorporate it into English for Specific Purposes (ESP) education. The objective was to leverage SA's practical and informative capabilities to uncover ESP students' feedback, thereby addressing the persistent challenges faced by ESP practitioners. Previous research of SA were conducted in different fields such as social media (Abdelrazeq et al., 2016), marketing (Aung & Myo, 2017), health (Kaewyong et al., 2015) and tourism (Altrabsheh et al., 2014). When the literature is investigated, it is obvious that there is a dearth of study on the impact of SA on ESP education in regards of being a both practical and informative tool for analyzing students' classroom feedback. Utilizing natural language processing, SA interprets the emotional tone of students' responses, offering educators valuable insights into learners' attitudes, difficulties, and overall satisfaction. By systematically classifying feedback into positive, negative, or neutral categories, SA allows instructors to swiftly pinpoint areas of concern, adjust instructional strategies to meet specific needs, and improve the overall learning experience. Additionally, SA aids in monitoring the effectiveness of course content and teaching methods over time, ensuring that ESP programs remain flexible and responsive to student needs. Consequently, SA supports the creation of a more adaptive, student-centered learning environment, fostering higher engagement and improved educational outcomes.

Literature

Sentiment Analysis (SA)

Being a technique of natural language processing (NLP) that aims at detecting expressions that convey the one's opinion-based stance towards features or their attributes, SA is also known as subjectivity analysis, opinion mining or appraisal extraction (Li & Hovy, 2017). It is regarded as a classification process. There are three main classification levels in SA:

- Document-level: It aims to classify an opinion document as expressing a positive or negative opinion or sentiment.
- Sentence-level: It aims to classify sentiment expressed in each sentence.
- Aspect-level SA: It aims to classify the sentiment with respect to the specific aspects of entities.

Although new attempts have been still performed to reveal new SA methods, the current SA methods are:

- Machine Learning approaches,
- Lexicon-Based approaches, and
- Hybrid approaches (Thakkar & Patel, 2015).

Machine learning strategies operate by training an algorithm on a training dataset before deploying it on the actual dataset. These techniques involve initially training the algorithm using specific inputs with known outputs, enabling the algorithm to later process and analyze new, unknown data (He, 2012). Lexicon-based techniques operate on the premise that the overall sentiment of a sentence or document is the cumulative sum of the sentiments of its individual phrases or words. This method utilizes sentiment analysis dictionaries, developed through emotional research, tailored to each domain. Each domain-specific dictionary is augmented with appraisal words from an appropriate training collection, weighted according to the Relevance Frequency (RF) method (Lan et al., 2012). Word modifiers adjust the weight of the subsequent appraisal word by a specific percentage, while word negations alter the weight of the following appraisal word—decreasing it for positive words and increasing it for negative words. The text sentiment classification procedure involves several steps. Initially, the weights of all training texts for the classified text are calculated, and all texts are mapped into a one-dimensional emotional space. The proportion of deletions is determined using cross-validation. Subsequently, the average weights of training texts for each sentiment class are computed. The classified text is then assigned to the sentiment class that is closest in the one-dimensional emotional space (Devika et al., 2016). The hybrid approach, on the other hand, combines lexicon-based methods with machine learning techniques. The primary objective of this integration is to achieve optimal results by leveraging the effective features of both lexicon-based and machine learning approaches, thereby addressing and mitigating the deficiencies and limitations inherent in each individual method (Ahmad & Aftad, 2017; Jurek et al, 2015).

SA for ESP

As its name indicates, ESP can be defined by the specific purposes and the precise nature of these purposes that necessitate English instruction. This underscores the significance of the 'needs' of learners who study English to meet the distinct requirements of the target situations in which they will use the language. The language must be 'genuine' and 'authentic' rather than 'contrived' to fulfill its intended purpose. Therefore, ESP encompasses (a) purpose, (b) specificity, (c) learners' needs, (d) target situation, and (e) authenticity and genuineness (Donadio, 2019; Fiorito, 2019; Francomacaro, 2019). According to Robinson (1991, p.7), “needs analysis is generally regarded as critical to ESP, although ESP is by no means the only educational enterprise which makes use of it”. Hamp-Lyons (2001) contends that needs analysis is a fundamental component of an ESP/EAP approach in course design. Similarly, Strevens (1980) proposes that needs analysis is an essential initial step in teaching languages for specific purposes, emphasizing its relevance to the nature of scientific discourse. In a nutshell, need analysis remains at the core of any ESP classroom and it is vital to observe these needs for a successful ESP education. The current literature on ESP identifies several key needs. These needs can be broadly categorized into issues related to curriculum design (Belcher, 2006), teacher preparedness (Basturkmen, 2010) and student engagement (Long, 2005). SA has a great potential to significantly mitigate these challenges. By systematically analyzing students' feedback, SA provides real-time insights into their perceptions and experiences, allowing educators to refine and tailor the curriculum more precisely to meet learners' specific needs and professional contexts. For teacher preparedness, SA identifies areas where instructors may lack confidence or effectiveness, informing targeted professional development and resource allocation to bolster their subject-specific knowledge and pedagogical skills. Furthermore, by continuously monitoring student sentiment, educators can detect and address engagement issues promptly, ensuring that course content remains relevant and motivating. This responsive approach not only enhances the overall quality and effectiveness of ESP programs but also fosters a more dynamic and supportive learning environment.

Conclusions

SA can serve as a both practical and effective tool to understand students’ needs by getting their feedbacks. Students share their opinions on various platforms, providing critical feedback on their subjects, tutors, and the facilities available to them. The detection and classification of this feedback are essential for analyzing students' sentiments towards courses, teaching faculty, and academic amenities. This analysis is also advantageous for categorizing student feedback and quantifying their satisfaction, which can assist in improving academic services and preparing annual confidential reports (Asghar et al., 2019; Rajput et al., 2016). Onan (2020) also echoed this by stating that SA of educational data can be utilized to gather feedback on learning content and resources. This feedback offers valuable insights for improving the quality of learning materials and understanding students' learning behaviors (Onan, 2020). Additionally, SA aids in monitoring the effectiveness of course content and teaching methods over time, ensuring that ESP programs remain flexible and responsive to student needs.

Consequently, SA supports the creation of a more adaptive, student-centered learning environment, fostering higher engagement and improved educational outcomes.

Furthermore, addressing the challenges in ESP education specifically curriculum design, teacher preparedness, and student engagement is essential for the effective delivery of specialized language instruction. SA emerges as a powerful tool in this context, offering a data-driven approach to understanding and responding to students' needs and feedback. By providing actionable insights, SA facilitates the creation of more relevant and tailored curricula, supports the professional development of educators by pinpointing areas requiring enhancement, and ensures higher levels of student engagement through timely and responsive adjustments to course content. Integrating SA into ESP programs not only enhances their effectiveness and relevance but also promotes a more adaptive and learner-centered educational environment, ultimately leading to improved educational outcomes and learner satisfaction.

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Technology and Collaborative Research in Open and Distance Learning: A post-pandemic view

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Abstract

Rethinking the role Open Universities in the digital age is crucial especially in the post pandemic. Numerous studies have indicated a digital divide due to limited technology access during the pandemic in education and more so in higher education. However, a post-pandemic view is also important in reference to technology for scholars engaging in research. Therefore, this paper's main objective is to explore technology and collaborative research in Open and Distance Learning (ODL) with a post-pandemic view. Additionally, the specific objective is to explore the benefits of technologies and multidisciplinary collaborative research for ODL scholars in the post-Covid-19. The methodology approach for this study involves the application of Scholarly Personal Narrative (SPN) approach and content analysis. The findings show that technologies including WhatsApp, Zoom and Teams Microsoft are beneficial in multidisciplinary collaborative research. The emerged benefits like "communication efficiency", "sharing expertise" and "knowledge transfer" are key to achieving successful multidisciplinary collaborative research. This implies that ODL scholars should fully utilize technologies to enhance multidisciplinary collaborative research towards increasing knowledge production within Africa and beyond.

Keywords: technology, collaborative research, Open and Distance Learning, post-Covid-19

Introduction

Rethinking the role Open Universities in the digital age is crucial especially in the post pandemic. Past studies (Bozkurt, 2020: Mkwizu & Sabio, 2022, 2024) have indicated a digital divide due to limited technology access during the pandemic in high education particularly Open and Distance Learning (ODL). In the context of African and Asia, the study by Mkwizu and Bordoloi (2022) explored Augmented Reality (AR) and education for girls using an inclusive approach. Mkwizu and Bordoloi (2022) noted that the digital divide involves girls not having access to digital tools and as well as internet connectivity challenges. The study suggested that in order to enjoy technologies like AR integration in education particularly ODL then overcoming challenges of internet connectivity and accessibility to digital tools should be considered and given priority. Other studies (Ghazali et al., 2024; Ifanov et al., 2023; Mendolia, 2023; Mkwizu, 2022a, 2022b) explored technologies such as Virtual Reality (VR) and Artificial Intelligence (AI) in education but also ODL.

In ODL, the existing past studies have looked at collaborative research but from an authorship, training, crises, and benefits perspective. These studies on collaborative research include Berents et al. (2024), Howell and Willcox (2024), Karel (2014), Mkwizu (2019, 2024), and Mkwizu and Ngaruko (2019). Moreover, Howell and Willcox (2024) concentrated on shared creative work experiences for successful collaboration while Karel (2014, p. 381) noted that ODL institutions work in separate silos that are full of experiences but unable to share with those who are still developing. The issue of working in silos means that it is difficult to share experiences. It is also a clear evidence that more research is needed on the aspect of collaborative research in ODL particularly in alignment with existing technologies.

Technologies are helpful in online learning. In fact, UNESCO (2023) revealed that in terms of technology preference for ODL, Cambodia is focused on using Learning Management System (LMS) while the Philippines have combined LMS, Massive Open Online Courses (MOOCs), and online resources into its education system. However, a post-pandemic view is also important in reference to technology for scholars engaging in research. Therefore, this paper's main objective is to explore technology and collaborative research in ODL with a post-pandemic view. Additionally, the specific objective is to explore the benefits of technologies and multidisciplinary collaborative research for ODL scholars.

Literature Review

Technology

Technology is referred to as ideas of things that are created or human-made (Anderson & Anderson, 2011). Technology in education assists in taking the teaching and learning activities forward, for example, students are able to use mobile phones and social media applications for blended learning (Selvaras, 2020). Furthermore, Islam and Hasan (2016) describes technologies that support ODL in Bangladesh are hardware like radio, television and telephone while for software it is Learning Management Systems (LMS). According to Mathew and IIoanya (2016), the emerging technologies used in ODL by lecturers and students in Botswana are virtual learning platforms like Moodle and Edmodo as well as social network platforms such as Facebook and WhatsApp. In this paper, technologies used in ODL are those created or human-made such as Zoom, WhatsApp, ChatGPT, Google Meet, Teams Microsoft and AI Assistant.

Collaborative Research

The concept of collaborative research has various definitions. Bansal et al. (2019) define collaborative research as research that involves coordination between the researchers and other stakeholders such as institutions, organizations, and communities. In addition, collaboration is also on a voluntary, consortia, federation, affiliation or merger and this can occur at different levels including disciplinary, interdisciplinary or multidisciplinary (Bansal et al., 2019). Further information on multidisciplinary in collaborative research from Turner and Baker (2020) is on the opinion that multidisciplinary research presents a shift in traditional academic practices of research. Therefore, for purposes of this paper, multidisciplinary collaborative research is defined as a scientific activity done by two or more researchers from different disciplines.

Theory frame

Network perspective theory is applied in this study. According to Zhang (2014, p. 14) there are many theories of collaboration including the network perspective theory and the contributors of this theory include Eccles and Crane (1987). The network perspective theory is focused on the dynamics of developing, maintaining, and terminating inter-firm relationships (Zhang, 2014, p. 14). Subsequently, Zhang (2023) delved on interfirm collaboration by conducting research in China and used the qualitative-constructivist methodology and discovery-driven research method to investigate inter-firm collaboration by SMEs. Guided by the network perspective theory, the study found that when broker firms reproduce institutional logics then this helps in the facilitation of the development processes of interfirm collaboration among SMEs. However, the study by Zhang (2014) stated that there are limitations of the network perspective theory and these include the inability to adequately account for alliance performance and results.

In view of the limitations on network perspective theory, the focus for this paper is on collaboration in research among higher education institutions such as ODL. Whereas these past studies focused on inter-firm collaboration, this study argues on collaboration among scholars in ODL settings by applying the network perspective theory. The network perspective theory guides this paper to explore collaborative research in ODL scholars particularly a scholar in tourism. Additionally, the application of network perspective theory in this study assumes that the actors are scholars engaging in multidisciplinary collaborative research. Furthermore, this paper specifically explores the benefits of technologies in relation to multidisciplinary collaborative research for ODL scholars in the post pandemic using the Personal Scholarly Narrative (SPN).

Technology and Collaborative Research in Open and Distance Learning (ODL)

Collaborative research studies in relation to ODL exist. For instance, the study by Karel (2014) was conducted in South Africa using a qualitative approach through interviews. The findings indicated that institutional collaboration can improve research output in ODL (Karel, 2014, p. 381). This shows that collaborative research is vital in knowledge production emanating from research. However, Berents et al. (2024) carried out a study in South Sudan, Afghanistan and Myanmar using qualitative approach. The findings from the interviewed youth researchers show that the idea of care-full research is helpful in knowledge creation. Furthermore, Berents et al. (2024) coined the term *care-full* research as an approach that is considered to be a very important methodological evolution in conducting participatory research. Whilst Berents et al. (2024) and Karel (2014) focused on issues of *care-full* research and knowledge production, this paper explores collaborative research in ODL in relation to technologies.

Technology usage in institutions is vital. For ODL institutions, researchers use technologies to advance knowledge production, for example, Nsamba and Chimbo (2023) conducted a study in South Africa involving lecturers. The lecturers were interviewed and the qualitative data revealed that the strides in adoption of technologies by the lecturers to support graduate students is small (Nsamba & Chimbo, 2023, p. 1). This is clear that the adoption of technologies in ODL is small in the context of the examined lecturers. Furthermore, Hallem et al. (2022) noted

that the Sustainable Development 2030 agenda considers digital technologies as important tools to achieve inclusive and equitable quality education for all. In addition, Mathew and IIoanya (2016) found that in Botswana, the lecturers and students revealed that there are benefits in using technologies and these range from interaction, student engagement, accessing information, content sharing to communication.

This paper supports the sustainable development 2030 agenda and acknowledges the existence of limited studies on technologies in relation to collaborative research. In fact, Mai et al. (2024) stated that there are mixed reactions to technologies like ChatGPT although it can also be used as a powerful writing tool. Other scholars like Fuchs (2023) have mentioned that ChatGPT is useful in enhancing teaching and learning. In terms of literature on technologies, Coudhury et al. (2023) commented that in the ODL context, there is a shift from self-learning materials to technology-mediated platforms. However, Mathew and IIoanya (2016) cited challenges in accessing technologies which include affordability and technophobia. Therefore, this paper specifically explores the benefits of technologies and multidisciplinary collaborative research for ODL scholars in the post-Covid-19. Whilst past studies such as Berents et al. (2024), Karel (2014), Hallem et al. (2022) and Nsamba and Chimbo (2023) used interviews to examine collaborative research and technologies in ODL, this paper applies the Scholarly Personal Narrative (SPN) as a methodology approach.

Methodology

The methodology approach for this study involves the application of Scholarly Personal Narrative (SPN) approach. Heidelberger and Uecker (2009) described SPN as a constructivist research methodology which actually recognizes the researcher's personal experiences as a valid object of study. In conducting the SPN, Heidelberger and Uecker ((2009) stated that the researchers do the study, frame it, and actually share their personal experiences in clear, contextual, first-person language. Studies like Ng and Carney (2017) used SPN to examine scholarship of teaching and learning with findings showing that SPN does enrich and contribute to knowledge of complex contexts. In addition, Ng and Carney (2017) commented that SPN approach allows for analysis of personal experiences as a pool of data. In this paper, SPN avails the personal experiences of a tourism scholar (Author of this paper) as a valid object of study to explore technology and collaborative research in ODL.

Furthermore, the study by Ng and Carney (2017) indicated that the use of SPN can also employ a range of analytical techniques. For purposes of this paper, the analytical technique selected is content analysis in order to provide themes. Bengtsson (2016) defined content analysis as a way of organizing collected data and draw realistic conclusions. Past studies like Zhang (2023) applied content analysis for qualitative data obtained through interviews, observation note-taking, and archival documents when investigating interfirm collaboration. In using content analysis, this study adhered to the steps of summarizing, coding and interpreting of the personal experiences in reference to technology and multidisciplinary collaborative research using SPN so as to avail relevant themes to address the paper's objective.

Findings and Discussion

The findings in Figure 1 show that the technologies namely WhatsApp, Zoom and Teams Microsoft are used. The personal experiences are mostly the use of WhatsApp, Zoom and Teams Microsoft for "*scheduling online meetings and discussing research between scholars*". In addition, these technologies are "*useful during online training where physical interaction is not possible due to distance in location*". Therefore, accessibility of WhatsApp, Zoom, Google Meet and Teams Microsoft enables training sessions to happen virtually. In fact, for Teams Microsoft there is a "*Co-Pilot that acts as an assistant that attends meetings and records the discussion*" which can later be useful for replay purposes to revisit the online discussions.

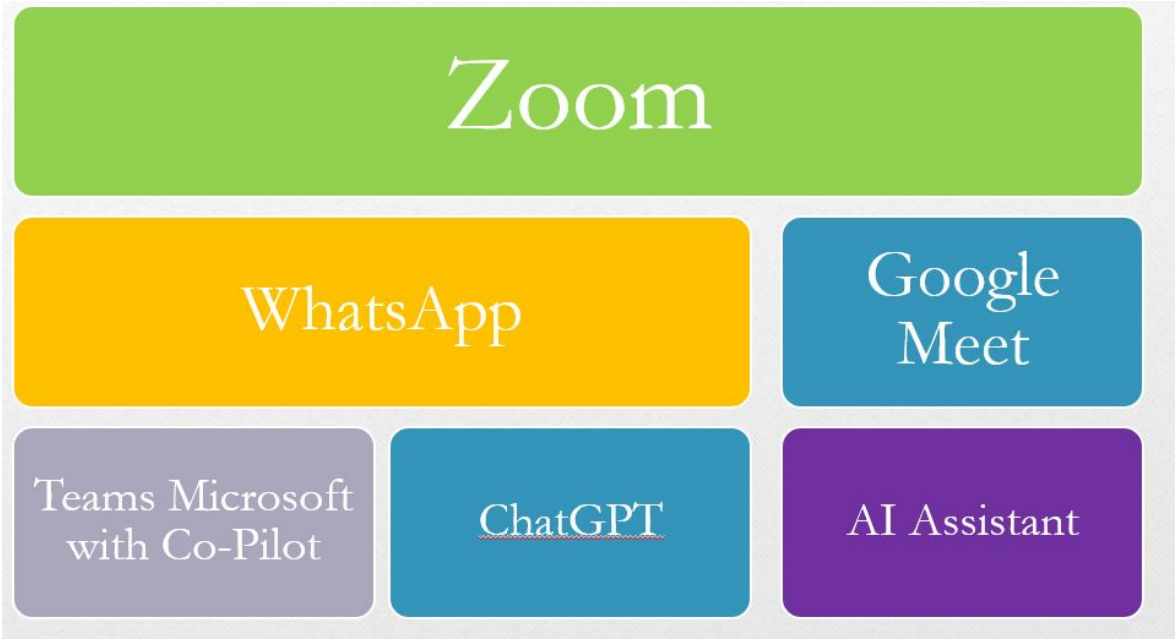

Figure 1: Technologies

Source: Author's compilation

On the other hand, ChatGPT as an AI Assistant is "useful in assisting to search for the words to write in given assignments". Additionally, AI assistant can also "guide in the search of articles or direct on options of available articles related to the topic of interest". The results on technologies in particular ChatGPT supports Mai et al. (2024) that ChatGPT is very helpful as a writing tool. However, these SPN findings from this study are also not in line with Mathew and IIoanya (2016) due to the fact that the object of study for this paper was able to access these technologies for purposes of conducting meetings, discussions, training and assisting in writing.

More findings show that these technologies like Zoom and Co-Pilot are beneficial in multidisciplinary collaborative research as indicated in Figure 2 of this paper. The emerged benefits like "communication efficiency", "sharing expertise" and "knowledge transfer" are key to achieving successful multidisciplinary collaborative research. Technologies such as ChatGPT and AI assistant supports past studies like Bozkurt (2023) that highlights the importance of AI in education particularly language. This implies that AI can facilitate communication efficiency. Zoom sessions allow scholars to communicate thus provide room for sharing expertise and knowledge transfer whereas Co-Pilot improves skills by enabling presence in meetings simultaneously. Whilst Mathew and IIoanya (2016) indicated benefits in using technologies like interaction, student engagement, accessing information, and content sharing to communication, this study has added sharing of expertise and knowledge transfer.

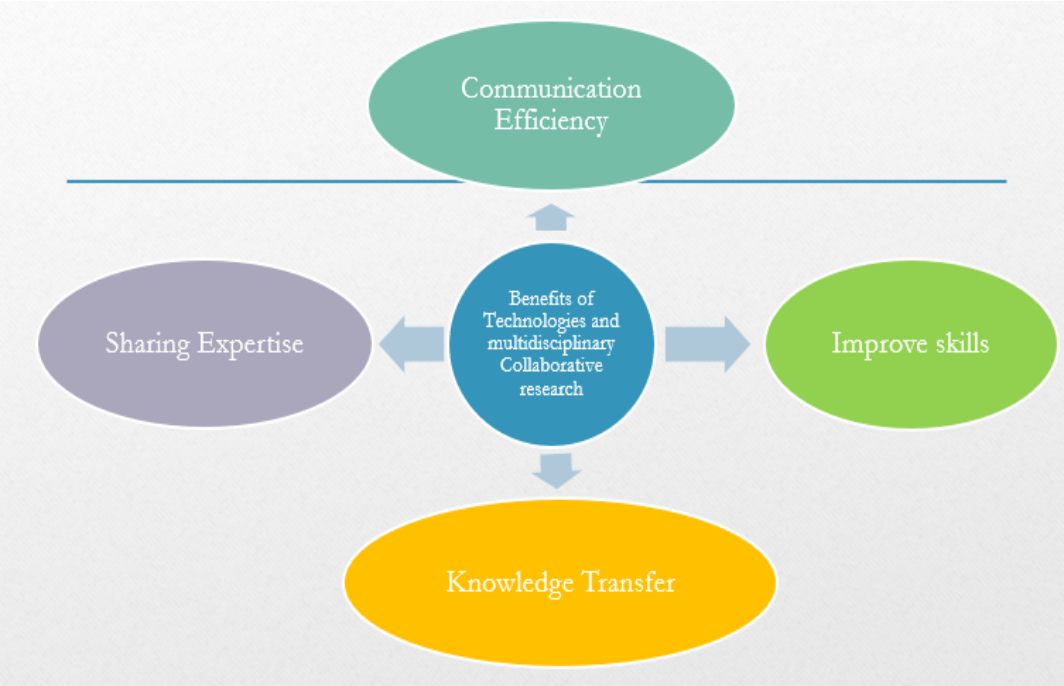

Figure 2: Benefits of technologies and multidisciplinary collaborative research

Source: Author's compilation

From a network perspective theory that guided this study, the findings show that the technologies such as Zoom, Google Meet, WhatsApp, AI Assistant, Teams Microsoft and ChatGPT are beneficial in multidisciplinary collaborate research to achieve communication efficiency, sharing expertise, knowledge transfer and improving skills.

Conclusion and Implications

This papers' objective was to explore technology and collaborative research in ODL. This study concludes that technologies (Zoom, WhatsApp, Teams Microsoft, ChatGPT, Co-Pilot, and Google Meet) are beneficial for multidisciplinary collaborative research for ODL in the post pandemic. There are both practical and theoretical implications from the outcome of this study. The findings of this study practically imply that ODL scholars should fully utilize technologies to enhance multidisciplinary collaborative research towards increasing knowledge production within Africa and beyond. Guided by the network perspective theory, further findings show that these technologies allow scholars to network and collaborate with benefits which include communication efficiency, sharing expertise, knowledge transfer and improve skills especially digital skills.

Study Limitations and suggestions for future research

The use of SPN and content analysis was the limitation of this study. Future research may consider using mixed methods to analyze patterns of technology usage and multidisciplinary collaborative research.

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Evaluation in Game-Based Educational Software: Systematic Literature Review

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Abstract

Aim of the research is to find out the assessment and evaluation methods and ways preferences in graduate thesis studies including educational digital game work in Turkey. In order to present a clear map, the classification tree is created belonging to literature and research, then the research results are matched with the tree. The research method is systematic literature review. In the aim of systematically review, two filtering steps are used on the master and PhD thesis at Council of Higher Education; the first filter is "digital game" and the second one is "Education and Training". According to the results, the most worked research method is correlational research and the most used data collection tool is scale. The least preferred assessment types are in-game, embedded and formative assessment. The most preferred people to collect data are parents of preschool and elementary school students whereas at least one is peers. The general overview of the evaluation in educational digital game academic studies, which are graduate theses, is the assessment and evaluation methods and ways are not distributed normally. It may stem from working on similar topics and parameters and also more easily accessible measurement tools. For the future research, it is recommended that the reason of this distribution would be analyzed.

Keywords: digital game, education, evaluation

Introduction

Education and instruction facilitate to use multifarious sources in order to make the learning more effective and efficient. Educational digital games or game-based educational software is one of these tools using in teaching and learning. According to Ball et al. (2020) digital educational games provide a motivational virtual world with game mechanic and engaging learning environment. Moreover, Mayer (2014) claims that digital educational games support the academic performance of students. Digital game based learning (DGBL) includes constructivist principles of active learning (Raziūnaitė et al., 2018) and it provides real world environment with low physical risk and also it support learning pace tailored to individual students (Bakhsh, 2022). For research with divergent areas digital educational games are used or new games are developed. To illustrate, educational digital games are used in health (Kayyali et al., 2021; Lemos et al., 2023), international trade and logistics (Süygün et al., 2019), electric energy and recycling (Kırmızıyüz et al., 2021). When an effective digital game is developed, instructional design principles have an important role as make the process meaningful and purposeful. One of these principles is ADDIE model, which is analysis-design-development-implementation-evaluation, has 5 main steps. First step is analysis and, in this step, the instructional problem is identified and the learner characteristics and process analysis are clarified. The second step is design, which is the outline of the process and instructional strategies are clarified and being ready for the development. The third step is development, which is the creation part of the aimed product according to the design steps and learning assignment and assessment which are built. The fourth step is implementation, which is the application part of the process, firstly it may be testing the prototype. The last step, evaluation, is very critical and make the whole process measurable (Davis, 2013). Therefore, the researchers should make a proper decision about the ways and methods in order to evaluate and assess the process. With a view to clarify the connection among measurement, assessment and evaluation; Kizlik (2012) claims that we measure distance, assess learning, evaluate the results according to some base. In other words, the three main terms about "evaluation step" behaves like a link of a chain.

Research questions, purpose, research method, research groups, developed educational digital game, research process have an importance on assessment. Therefore, in digital game studies, it can be seen that different ways and methods of evaluation are preferred by researchers. In this study, a classification tree for assessment and evaluation is created in order to make the preferred methods and ways clarified. For the tree is get inspired from literature review and the research about the topic. To illustrate, Caballero-Hernández et al. (2017) uses a kind of classification with the main title of "implementation" and the subtitles "game scoring, external assessment, embedded assessment"; with the main title of "primary types of assessment" and the subtitles "in-process assessment, completion assessment, teacher assessment". Classification trees provide statistical data from the systematic review. The main purpose of this study is to find out the assessment and evaluation methods and ways preferences in graduate thesis studies including educational digital game work in Turkey.

Methodology

The research method is systematic literature review. Systematic literature review is a kind of research method that focuses to identify, evaluate and interpret the resource according to a set of aimed research topic (Caballero-Hernández, 2017). According to Kitchenham et al., (2019), systematic literature review focuses on research question, and it provides search process, data extraction and data presentation. In this research, Kitchenham's definition is considered and the ways based on this definition is applied. For the research resource, Council of Higher Education (Yükseköğretim Kurumu) (https://tez.yok.gov.tr/UlusalTezMerkezi/) is used and Master and PhD theses are systematically analyzed. For the systematic review, two main steps are applied. Firstly, "digital game" term is filtered in the resource, 277 results are listed. When the results are considered, range of the topic area is wide and topics are diverse, for example, sociology, psychology, education, sport, public relations, communication sciences etc. Because the work is related to educational digital games, the topic area is narrowed and the second step which is "Education and Training" is applied for filtering. 119 results are listed. Publication of year comprises 2014-2024 and the distribution of the publications according to years as below (Table 1). The data extraction is applied for the 5 research due to the fact that research has data extraction reasons determined for the study. To illustrate, the research has a wide range of age for the research group like X,Y,Z generation or it has document analysis research methodology. For the presentation step, classification tree and the graphical presentation with statistical data is preferred.

Table 1. Publications according to years

Year	Number of Publication
2024	4
2023	27
2022	25
2021	20
2020	11
2019	15
2018	5
2017	3
2016	2
2015	1
2014	1

Results

Firstly, the general information about the academic publications is demonstrated at tables. The research that are included to analysis are divided 2 level of graduate programs. The number of master thesis is 96 whereas the number of PhD thesis are 18, so the total of reserch is 114. When it comes to research group distribution, the highest number of research group is middle school students. Then, the number of preschool and elementary level students are following the first group. The least number of research group in educational digital game works belongs to adults (Figure 1).

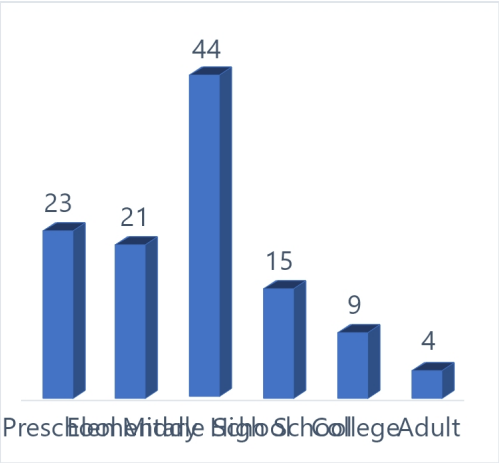

Figure 1. Research Group Distribution

Research methods which are preferred in educational digital games are generally correlational research. In other words, the researchers mostly wonder about the relation of X parameter and Y parameter. 70 of 114 research method is built on correlational research; the second most preferred research method is experimental research which has number of 33 of 114. Compered to these, case study 8, action research 1 and design-based research are the least preferred research methods in educational digital game works (Figure 2).

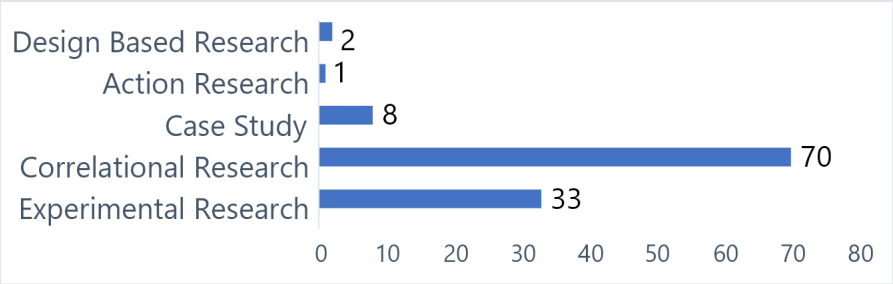

Figure 2. Research Methods Distribution

Evaluation Classifications

In the light of literature review and the research overview, classification main titles and subgroups are determined as like below:

1. Tool – Scale, Interview, Observation, Report
2. Time – Before Game, In-Game, After Game
3. Human - Individual Assessment, Researcher Assessment, Parent Assessment, Teacher Assessment, Peer Assessment
4. Aim & Process – Formative, Summative, Diagnostic, Embedded

According to these titles and subgroups, assessment and evaluation of 114 graduate research are handled.

Tool

As seen at previous table, the most used research method is correlational research. In parallel to the result, scale is the most preferred data collection tool, in some research, interview tool is preferred as a second tool. In 4 research survey tool is used. For the second research method, which is experimental research, pre-test – post-tests are the most preferred data collection tool including scale or academic achievement test. For 2 of experimental research interview and observation tools are preferred. On the other hand, in design-based research only interview tool is used whereas in action research scale, survey, interview, video, photograph, observation are used. Similarly, in

case studies, test, rubric, diary, product, video, voice record, interview, observation data collection tools stand out (Figure 3).

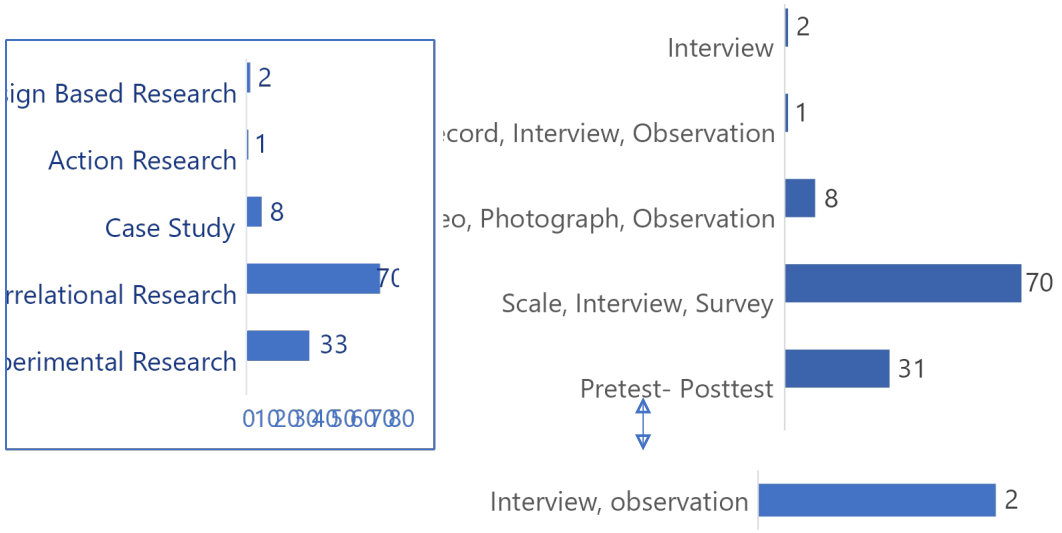

Figure 3. Data Collection Tools Distribution

Time

Second classification title, time, has three subtitles: Before game, in-game, after game. This kind of classification actually depends on a game action. Before game evaluation means the evaluation without any kind of application; after game means the evaluation whenever aimed application is realized. In contrast to these, in-game evaluation is concerned with during the application. As it shown at Figure 3, pre-test and post-test are utilized in experimental games with same quantity, which is 31. In graduate theses, it is found that in-game evaluation is not in the foreground. The number of research including in-game evaluation is 6. The preferred tools are data report, interview, observation, test within scenario and checklist.

Human

The third part of classification, human refers to person who engages in assessment of the research. Human may be the researcher, parent, teacher, peer or the student making self evaluation. Considering the research, individual assessment is the most chosen for the studies. Then, the parents are the second most preferred people to get involved. The main reason according to explanations, generally preschool and elementary schools parents provide data, because of the fact that the students may not clearly answer the questions or the questions are intended for parents or the most effective way to getting answer to questions is to pose questions to parents. There would be more reason for that. Secondary, teachers or teacher candidates are also involved at evaluation part of academic studies, in this research it found 7 times. Thirdly, the researchers also can able to attend assessment during the application. In these studies, researchers make observations, fill some checklists related to research group, listen and note the works. Briefly, the researcher assessment is found for 6 times. Academician assessment, which is also being in excluded studies, is generally needed for designing a material or creating a new product for the research. It is unexpected result that there is no strictly peer assessment in master and PhD thesis eventhough in some scales there are a few questions about peers. Although report is not a human, artificial intelligence or coded system can create some argument based on gathering data from research group. Therefore report can be a outside assessment figure apart from the research group, it is used in one work (Figure 4).

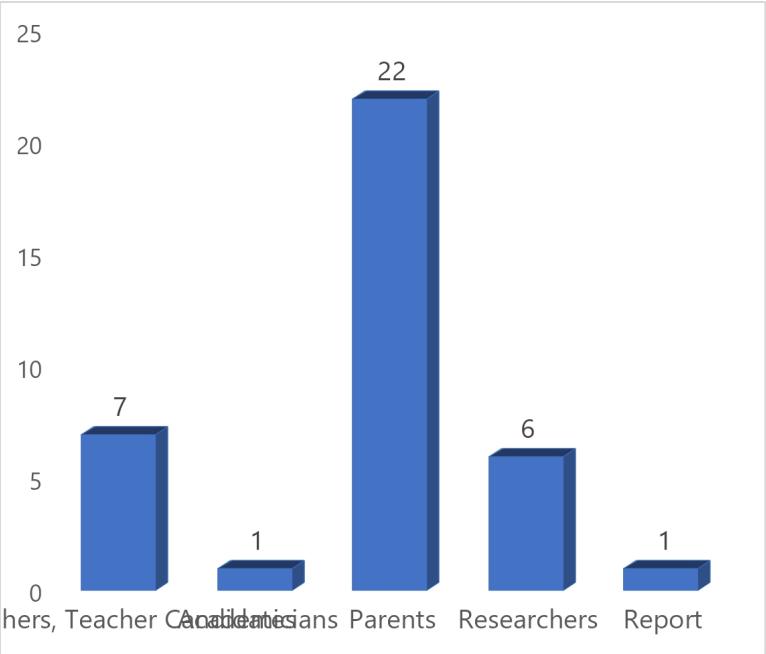

Figure 4. Human Title Distribution

Aim and Process

To summarize the research, it is shown that summative assessment is the most preferred assessment type than diagnostic, embedded and formative assessment. For the evaluate students' strength, weaknesses, knowledge and skill, the diagnostic assessment is needed and the researchers use the diagnostic assessment for pre-tests especially in experimental research. According to Center for Community College Student Engagement (CCSSE) formative assessment includes feedback to adjust ongoing teaching and learning to make better students' achievement of aimed instructional outcomes. However, in graduate thesis mostly it is not aimed such an improvement, mostly. Therefore, it can be said that formative assessment is not included into most chosen assessment types (Figure 5).

Figure 5. Aim and Process Title Distribution

Conclusions

The reason of why this research is realized is to discover the evaluation and assessment ways and methods in graduate thesis including educational digital game study. In order to put forth the findings in a clear map, classification method is preferred. In the light of 4 main titles and totally 16 subtitles, 114 graduated thesis is analysed. According to the results, the most used research method is correlational research and the most preferred data collection tool is scale. Experimental research method is found 33 of 114 academic study and the pre-test, post-test data collection technique is used 31 of these studies. This kind of technique has a clue about before game, after game assessment, also. In-game assessment is rarely chosen assessment which is found in 6 studies. When it comes to human assessment, parents are the most requested people apart from research group. They are generally preschool or elementary school students' parents due to the fact that students have not totally competence for providing data.

It was discovered that there is an eye-catching result about these academic studies. In 59 of 114 researches, focused on digital game addiction. In digital game topic, the reason of working on addiction should be analyzed deeply.

To sum up, 114 research are analyzed, firstly the abstract is examined, in case of requirement, the thesis is examined. Some branches of classification tree, which is created according to both literature and the researcher, is

fulfill whereas some of branches has lack of response. It should be suggested that the reason of not to prefer peer assessment, in-game assessment, embedded assessment can be researched for the future works.

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Developing an Open Educational Resource for Dagbani Language Learning

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Abstract

Open Educational Resource (OER) development in Africa is a challenging task especially looking at issues of the platform to host the OER and skills needed to develop the content. The choice of the right platform is usually constrained by the lack of free availability of such platforms. There are a number of skills that one needs to be able to develop good quality OER some of which are to do with instructional design, curriculum development and quality assurance. This research work looks into the development of an OER for learning Dagbani for beginners. An estimated 1.17 million people speak Dagbani language in Ghana and Togo. The task to create a language OER for learning Dagbani was commissioned as part of the Open Education or a Better World 2024 project. The two-man development team proposed a beginner's online course which faced issues on; which would be the best platform to host the OER, updating of OER content to better suite online presentation, training on online course development and instructional design, learning how to use social media to market the OER and time management. Issues on ensuring that the OER content is of good quality also came up. This paper reflects on the process undertaken by the team to successfully develop the learning Dagbani OER. Even though the OER is geared towards beginners, the duo planned so as to have future expansion which will cater for the language all the way to advanced level.

Keywords: Open Educational Resource, language learning, Dagbani

Introduction

Open Educational Resources (OER) are of late being seen as a way to solve some of the existing issues in education. According to Colvard, Watson, & Park (2018), "OER address affordability, completion, attainment gap concerns, and learning." This paper reflects on the process undertaken by a team of OER developers to develop the Dagbani Literacy Made Easy OER. The objectives of the study include: outlining a brief history of the previous attempts to develop a Dagbani language learning OER; describe the development of the latest Dagbani language learning OER; discuss future plans for the Dagbani language learning OER development team.

The Dagbani Literacy Made Easy OER is part of the Open Education for a Better World (OE4BW) Programme. The Programme "enrolls mentees from all over the world to, under a guidance of internationally recognized mentors, develop and implement OERs based on the UN Sustainable Development Goals" (Open Education for a Better World [OE4BW], n.d.). The two OER developers for the Dagbani. Literacy Made Easy OER are therefore one mentee and one mentor making a team of two. According to Organisation for Economic Co-Operation and Development (OECD), "Some initiatives have institutional backing involving professional staff, others build on communities of practitioners and rely on their voluntary work" (2007). In the case of the Dagbani Literacy Made Easy OER, the two are both volunteers under the OE4BW Programme 2023/2024. The project was also part of previous OE4BW programmes for the years 2021/2022 and 2022/2023. The 2021/2022 project achieved a self-hosted website which featured text, audio and video content of the available OER. The website is currently offline. The 2022/2023 project intended to use a Learning Management System (LMS) to host the OER, but this did not materialise. The current development team learned from previous experiences which were invaluable.

As such, the team began by tackling the issue of a platform to host the OER to which the team partnered with the owner of an existing online resource named Learn Dagbani. "Learn Dagbanli is a collective effort by volunteers who want to make the Dagbani language more accessible and available," (Learn Dagbani, n.d.). The partnership came about after the developers learned of that fact that the Learn Dagbani team is in need of "contributions from people who know more and are experts in their own right" (Learn Dagbani, n.d.).

Overview of OER Development

"It is not an easy task to find appropriate language OER for specific language and educational objective" (Perifanou, & Economides, 2021). This is caused by the fact that developing resources for online learning is complicated in addition to the challenges faced when developing any other OER. Some of the challenges in developing an OER are attributed to, "the rapid growth of technology, globalism, licensing, economic, social and the constant competition among leading higher institutions in order to provide free access to educational resources"

(Pena, 2009). Hylén (2020) adds that there is a "lack of awareness of copyright issues, quality assurance, sustainability of OER initiatives." According to Schuwer, Lane, Counotte-Potman, & Wilson (2011), the following are the characteristics for an OER development process; start with a curriculum, keep in mind the delivery deadline, process requires a "variety of special skills", use of a top-down approach in terms of creating the content, create teaching support material, allow for variations in delivery and use of resources. In the end, the OER development team would ideally need to have educational skills, including but not limiting; pedagogical, technical, creative, and management. Figure 1 is an illustration of the OER production process which the team used to produce the Dagbani Literacy Made Easy OER.

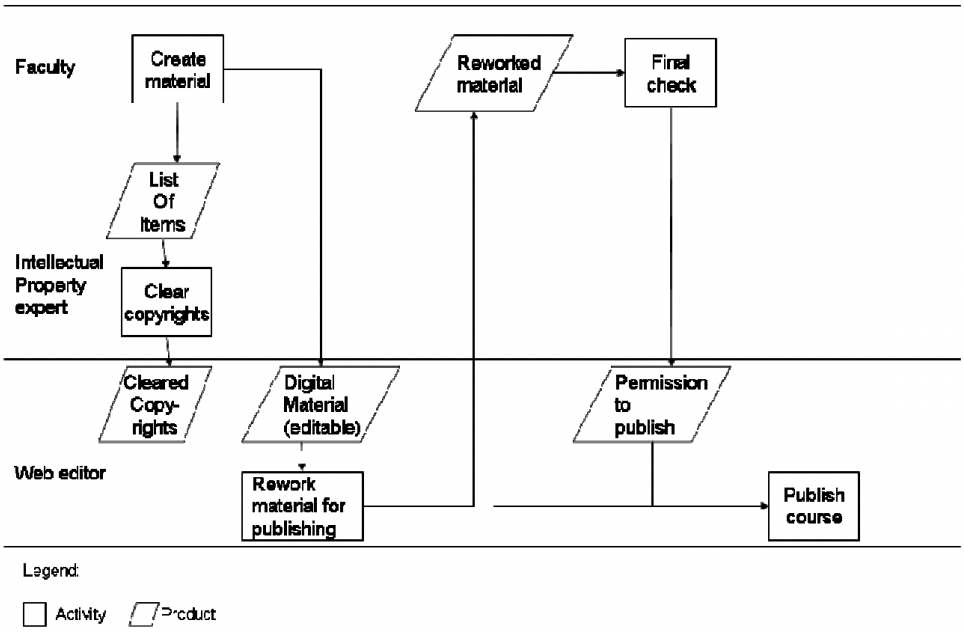

Figure 1: Overview of production process OER at process the Open Universiteit (Netherlands).

Notes: From "A comparison of production processes for OER," by R. Schuwer, A. Lane, A. Counotte-Potman, and M. Wilson, 2011, *Open Courseware Consortium Global Meeting.* Copyright 2019 by Open Courseware Consortium Global

The development team followed the process outlined on Figure 1, however, the team either created most of the content from scratch or used open source material this there was no need to clear copyright issues. The team just needed to follow the Creative Commons licence requirements for any additional material.

Synopsis of Dagbani Language

Dagbani is one of the Gur/Mabia languages spoken in northern Ghana by the Dagomba people (Abubakari & Issah, 2023). It uses a variety of consonants and vowels, and is tonal, with high, low, and falling tones used to distinguish meaning. Singular and plural nouns in Dagbani are indicated by suffixes or tonal changes, whereas verbs in Dagbani are largely marked by prefixes and suffixes attached to the parent verb. The language typically follows a Subject-Verb-Object (SVO) word order, and sentences can be formed with various particles and auxiliary verbs to indicate the mood, aspect, or tenses. Words in Dagbani can have different meanings depending on the context, and tone can have a significant impact on meaning (Olawsky, 2002). Deeply rooted in the culture and traditions of the Dagbani speaking people is the use of proverbs and idiomatic expressions in their day to day communication. Dagbani uses the Latin alphabet, with additional characters for specific sounds in its orthography. It includes native vocabulary and a variety of "borrowed words," largely from Arabic, Hausa and English. It is used in daily life, education, and the media in a sociolinguistic sense. Although there are dialect differences in Dagbani, mutual intelligibility is high (Inusah, 2020). Migrations, trade, and interactions with other ethnic groups in the region have all had an impact on the evolution of the language over the centuries.

Methodology

The study used a qualitative research design with the use of self- study as the research methodology in the form of personal experience. A researcher "conducting self-study takes a dual role as the researcher and also the subject of the research being studied" (Alan, 2019). The paper is composed of personal experience of both authors.

Discussion of Findings

The Dagbani Literacy Made Easy OER is developed based on the Ghanian Language Curriculum (National Council for Curriculum and Assessment [NaCCA], 2019; NaCCA, 2020). The team used the available curriculum to come up with the content for each "lesson" bearing in mind that the standard Ghanian curriculum for language learning includes other element such as culture. "The language and culture-learning curriculum is informed by two main philosophical ideas, namely the Developmental Theory and the Social Constructivism" (NaCCA, 2019). The development team began with Basic 4 and will work to create content all the way to Basic 10- one level at a time. The levels are then broken into strands and sub-strands just as they are within the Ghanian language curriculum.

The development team then drew up a table which pulls all the standard learning outcomes and created an elaborate expansion for each which featured;

- Title – a catchy title which is simple for the audience it is intended for. Two titles were issued; one for the OER content on the website and another for social media.
- Lesson – a lesson was planned for the learning outcome. The lessons were drawn using Bloom's Taxonomy to come up with SMART objectives.
- Video – a brief about content that can be used to support the text explanation. This was as elaborate as possible. Since it is hoped that the video would be hosted on a platform such as YouTube, additional content was added in terms what the ask the viewer so as to promote discussions within the platform.
- Podcast – a brief about the content which could be featured in a podcast. With audio, a lot more options were discussed due to its easy way to produce.
- Blog – The website features a blogging section which would be used to expand on interesting areas of each topic.
- Facebook Content – content planned around the Facebook page was outlined with ideas on what to post on this platform.
- Instagram Content – content planned for the Instagram account was outlined with ideas on what to post on this platform.
- X (Twitter) Content – content planned around the X account was outlined with ideas on what to post on this platform.
- Additional Comments – any additional information was collected here. This included cases were a poll could be used for social media, where a learning outcome could be turned into an assessment, or when a learning outcome was too far out to be included into the OER for now.

It must be noted that not every lesson would be promoted on all social media platforms. Due to the small team, priority would be given to the platform most frequented by the participants. The idea is to develop a video for the lesson which would then be pulled into shorts for social media accounts. Some graphics and simple animations would also be created from the same visuals to be used as thumbnails or additional graphics on the social media platforms. The development team wishes to use Canva and PosterMyWorld to create the visual content.

In the end, the development team had to polish up skills on how to develop; stand-alone courses from a national curriculum; an interactive online course, instructional design for OER, video for different audiences, re-purposed visual content, blog content, and skills on time management. This was in addition to the course that both developers took on the use of Creative Commons license content.

Conclusions

The development team following the process as outlined by Schuwer, Lane, Counotte-Potman, & Wilson (2011). The Team started off with an elaborate curriculum which was designed for ease of use by all in the education sector in Ghana. This made it easy for the team to pull out what is needed for the development of OERs. The extraction process, pulling out what is needed from the curriculum and redesigning it for an online OER, took some time and efforts and the team had to look into a number of issues from writing learning objectives to design a social media post. The use of visual production tools also needed some training and getting used to before the team could get the hang of things. It must be noted that the team, due to lack of funds, use the free accounts on both platforms which leads to some limitations. Since the OE4BW programme has a specific delivery deadlines

which must be adhered to, the team worked to meet them. The initially produced OER, which is designed to meet the deadlines, could be reproduced in the near future to improve the quality of visual materials as there was learning while on production.

Future plans include; applying for an OER development grant, increasing the team number to reduce workload, structuring a focused social media market campaign for the OER, developing a podcast, and developing MOOCs from the available content that is produced.

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A Review of Digital Techniques and Technologies for Designing Effective Blended Teaching and Learning of Science Subjects in Malawian Secondary Schools

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Abstract

The COVID-19 outbreak paralyzed the education system not only in Malawi but globally. The situation was worsened in developing countries, where instruction is usually done in person. COVID-19 prompted schools to close for several months, impeding this mode of instruction delivery. In this context, the current study was carried out to assess some of the digital strategies and technologies utilized in the creation of efficient blended science lessons in Malawi's secondary schools. The qualitative method was used in the study. The usage of the JSTOR and Google Scholar search engines at https://www.jstor.org/ and https://scholar.google.com/, respectively, aided in the acquisition of data. The data was qualitatively analysed utilizing patterns and thematic deduction. The study discovered that teachers continue to lack the requisite digital approaches and technology skills for effectively planning and delivering science lectures via online platforms. Face-to-face teaching has thus become the standard. This is true despite the Ministry of Education's increasing promotion of modern science teaching and learning approaches through the Equity and Quality Learning at Secondary (EQUALS) project. The study concludes that introducing ICT applications into face-to-face science classes can result in an effective blended learning strategy. The report suggests that the Ministry of Education begin securing funds for the procurement of ICT tools such as smartphones, PCs, and smart tablets, which should be distributed in secondary schools throughout Malawi. The report also advises modifying education policies that forbid students from bringing their own ICT gadgets to school.

Keywords: blended learning, digital techniques and technologies, ICT tools, online learning, science teaching and learning

Introduction

In the twenty-first century, ICT is quickly becoming a required component of traditional classrooms. This study aims to provide a critical review of ICT tools that can be successfully integrated into science teaching and learning in Malawi's secondary schools. The findings serve as a wake-up call to the Ministry of Education (MoE) together with development partners to develop education policies that promote the use of ICT tools in secondary schools.

Blended learning is an education program (formal or informal) that combines online digital media with traditional (face-to-face) classroom methods (Turek, n.d.). Online learning, on the other hand, is defined as a method of studying without having to attend classes on campus through the use of ICT tools (Florian & Zimmerman, 2015). According to these definitions, online learning is a subset of blended learning. Anderson (2004) argues that blended learning has many advantages, including the ability to provide a variety of online interactions, being an innovative strategy for teaching and learning (learner-centered), and being knowledge and assessment-focused. Although blended learning simplifies teaching and learning by utilizing technological devices such as computers, laptops, smart tablets, and smartphones, its improper implementation and challenges associated with it, can compromise instruction delivery.

The use of technology in teaching and learning has proven to be a novel method of instruction delivery, particularly in developed countries. According to Azizan's (2010) study, the adoption and implementation of ICT solutions, such as electronic learning, is a source for flexible teaching and learning processes in and out of the classroom. This is referred to as technology-enhanced learning (TEL) by Azizan (2010). However, it should be noted that traditional classrooms provide a variety of benefits to both the teacher and the students. It is the location where the teacher can interact, discuss, demonstrate, and communicate with students face-to-face. The teacher distributes all hands-on, assignments, and exercises to the students in this mode of teaching and learning. As a result, traditional classrooms are thought to provide ample opportunity for interaction between the teacher and students, as well as between students. However, traditional classrooms are associated with many challenges, including a lack of classrooms due to an increasing number of students, a high teacher-student population ratio, particularly in developing countries, and a lack of equipment in the classroom, which may not support effective teaching and learning. However, some studies have found that incorporating ICT into teaching and learning has changed the way curriculum is designed, as well as the way people learn and communicate (Siew-Eng & Muuk, 2015). Online learning, also known as e-learning or virtual classroom learning, aims to eliminate the difficulties and limitations that traditional classroom learning imposes. Thus, incorporating ICT into traditional classrooms provides a variety of benefits such as enabling a variety of resource avenues, enabling global networking for resources, and providing information sharing for educational communities (Hubackov & Semradova, 2016). Online learning, on the other hand, has its drawbacks, which include requiring more discipline from students, being boring at times, communication between teacher and students, resulting in lower attendance, and difficulty in tracking whether students complete the course or not. Such constraints and limitations reduce the efficiency of teaching and learning. Because both traditional and online learning have unique strengths and limitations, it is preferable to combine the strengths of face-to-face and online learning into a new delivery method known as blended learning.

Malawi's educational system

Malawi's education system includes Early Childhood Education (ECE), primary, secondary, technical, and vocational training, and college and university education (JICA, 2012). Primary education, ECE, and literacy education are all part of basic education. Primary school lasts eight years (from Standard 1 to Standard 8) and students take the Primary School Leaving Certificate Examination (PSLCE) in Standard 8. Only the top-scoring students are admitted to CSS, while the rest are assigned to CDSS. This means that there is a disparity in pupil selection at PSLCE, with those who performed exceptionally well being selected for CSS and those who performed poorly being selected for CDSS. Despite this disparity, the use of technology in instruction delivery from primary to secondary school is barely noticeable. However, in comparison to technical and vocational training centers, higher education institutions such as universities have made little effort to implement blended learning. This necessitates the investigation of new digital techniques and technologies that can be successfully integrated into traditional classrooms, especially at the secondary school level.

Quality of secondary school education

Secondary education lasts four years (from Form 1 to Form 4), with the first two years serving as lower secondary education and the latter two serving as upper secondary education (MoSET, 2009). Students take the Junior Certificate of Education (JCE) at the end of Form 2 and the Malawi School Certificate of Education (MSCE) at the end of Form 4. However, there is always a difference in the performance of students enrolled in CSS and CDSS at both JCE and MSCE. CSS is more often than not associated with good student performance than CDSS. Such

differences are attributed to differences in the government's provision and accessibility of teaching and learning resources between CSS and CDSS. CSSs have an advantage in terms of access to facilities such as computer labs. These computer laboratories, however, are not utilised to improve digital literacy among secondary school students.

CDSSs face poor quality of education when compared with CSSs. Exam results, as one of the standard measures of quality, show that overall student performance is poor (Wesley Snyder, Kamanga, Tate, and McLaughlin, 2010). Various studies have also revealed that underqualified teachers lack digital skills. In 2011, there were 10, 258 secondary school teachers (1,958 or 19% female) (MDPC, 2012). Approximately 67 percent of these teachers were not qualified to teach secondary school, lowering the quality of education provided. However, in the vast majority of CDSSs, the curriculum is delivered by unqualified teachers who also lack the necessary digital teaching skills. Based on this discussion, it is clear that the implementation of blended learning in Malawi may require in-service training of teachers to learn digital skills before entrusting them with the responsibility of delivering instructions using digital techniques. Hence, the goal of this review paper is to suggest possible approaches to integrating blended learning despite the numerous challenges that Malawi's education system faces.

Access to teaching and learning materials in secondary education

Despite the Government of Malawi's (GoM) emphasis on ensuring equal distribution and accessibility to teaching and learning materials among CSSs and CDSSs, secondary schools have an inadequate supply of ICT teaching and learning materials (Wesley Snyder, Kamanga, Tate & McLaughlin, 2010). The majority of secondary school students, for example, have never used a computer mouse. This is a worrying development for Malawi's education system. Similarly, a lack of sufficient classrooms, science-teaching facilities, and libraries has harmed the quality of secondary school teaching and learning. Furthermore, the state of science classrooms and laboratories (if they exist at all) does not provide a conducive environment for the practical teaching and learning of science subjects. This suggests that new digital techniques and technologies can provide much more practical teaching and learning of science subjects than is currently the case.

The technological epoch

It should be noted that the world has become a global village. This is due to the interconnectedness that exists between countries due to the use of Internet connections (UNESCO, 2007). However, there is a significant gap in technological advancement between developed and developing countries. In comparison to a developing country like Malawi; Japan, the United Kingdom, and the United States of America are regarded as technological powerhouses for automobiles, consumer electronics, laptops, computers, portable gaming devices, and, more recently, healing animal robots (Aoki, 2010). This gives the impression that blended learning in developed countries is cutting-edge and innovative (Naito & Hausman, 2005). Although the use of technological devices is increasing at an alarming rate in developing countries, governments in those countries are making little effort to ensure that ICT tools are integrated into traditional secondary school classroom lessons. As a result, the purpose of this study is to investigate the need for integrating ICT tools, specifically in the teaching and learning of science subjects in Malawi's traditional secondary school classrooms.

ICT-the 21st-century teaching and learning tool

ICT tools in the classroom can be used to accomplish three goals: technology for instructional preparation, technology for instructional delivery, and technology as a learning tool (Wang & Woo, 2007). As a learning tool, students use word processing, PowerPoint presentations, databases, spreadsheets, web 2.0 tools, R statistics, IBM Statistics, QGIS, ArcMap, concept

mapping, Google Classroom, Moodle, Google Meet, Zoom, Telegram, Microsoft Teams, Google Hangouts, WebEx, Go to Meeting, Skype, Live-storm, Ding Ding/Ding Talk, Blue Jeans, Voov, and Chime, among others. These software applications are built into technological devices like computers, laptops, smart tablets, and smartphones. This facilitates the digital preparation and delivery of instructions. However, blended learning cannot take place unless these ICT software applications are properly installed. Thus, ICT tools should aid in the preparation of lessons. As a result, this research focuses on all three core objectives of using ICT tools in science teaching and learning in Malawian secondary schools.

Technology for instructional preparation, delivery, and learning tool

Malawi's secondary school is divided into four levels known as Forms 1 through 4. When primary school students complete their PSLCE, they advance to secondary school. Those who complete the MSCE at secondary school, have the opportunity to continue their education at a higher level. Malawi's secondary school is also divided into three subject areas: languages, humanities, and sciences. Physics, Chemistry, Biology, Mathematics, and Computer Studies, are examples of science subjects. Although these subjects require practical work, they have traditionally been taught as theoretical subjects. The present study intends to review of the role of digital techniques and technologies in implementation of blended learning of science teaching and learning.

Although Malawi has portrayed a high use of technological devices such as computers, laptops, and smartphones in recent years, the actual use of technology in Malawi's secondary schools remains comparatively low. Furthermore, ICT is not prioritized in national education policy (JICA, Malawi Office, 2021). Not only that, but Malawi's new secondary school education curriculum appears to be designed for fact-based and exam-oriented learning, with a strong emphasis on facilitating the hierarchical flow of information from 'knowers' to 'non-knowers' (Tella & Tella, 2007) in the name of improving educational efficiency. This has resulted in a disparity between the subjects taught in school and the activities of everyday life in a technological age. Nonetheless, there is little or no room for a teacher to customise the curriculum. This means that teachers have always been caught off guard by technological changes, particularly in secondary schools. This is demonstrated by the majority of secondary school teachers in Malawi who are unable to use computers (JICA, Malawi Office, 2021). However, little effort has been made in Malawi to incorporate technology into education policies. For example, the MoE is working hard to train teachers in computer skills and to enable them to use computers when teaching their subjects. One could argue that this is one way to ensure the smooth integration of digital techniques and technologies in traditional classrooms.

Furthermore, the MoE launched and encouraged the teaching of Computer Studies in all Malawian secondary schools, but the majority of secondary schools lack computers and, in some cases, electricity. As a result, many secondary schools consider Computer Studies to be an elective subject that is undervalued. However, it is through the teaching and learning of Computer Studies that students are taught basic computer concepts such as Microsoft Word, Excel, and PowerPoint, as well as how to connect their computer to the internet to retrieve educational information about their studies (O'Toole & Absalom, 2003). However, unlike CDSSs, Convention Secondary Schools (CSSs) make little effort in this area. It should be noted that CDSSs do not have such technological devices. As a result, there is a significant gap in access to technological devices such as computers between CSSs and CDSSs. Furthermore, CDSSs are linked to a scarcity of good teaching and learning resources, including technological devices. Although some CSSs have technological devices such as computers, they are not properly used for instructional preparation, delivery, and learning tools in their traditional

classrooms. Nonetheless, recent studies show that technology adoption has shifted from fixed, desktop personal computers to more portable, hand-held devices used for instructional preparation, delivery, and learning tools (Kipsoi, Chang'ach & Sang, 2012). Malawi, on the other hand, insists on face-to-face instruction with the use of archaic pedagogy in secondary schools. This is due to the country's economic difficulties, which prevent it from shifting from traditional classrooms to blended learning by acquiring technological devices. As a result, it is unclear whether or not ICT tools can be integrated into traditional classrooms in Malawi. Hence, a critical examination of digital techniques and technologies for designing effective teaching and learning, particularly in science subjects, is required in Malawi's secondary schools.

Problem statement

Malawi is one of the least developed countries that continues to rely on traditional modes of instruction. Despite the efforts of the MoE and development partners such as the World Bank, UNICEF, and the European Union to develop blended learning, most of Malawi's secondary schools are experiencing difficulties in incorporating ICT tools into traditional classrooms (Government of the Republic of Malawi, 2016). This is even though some secondary schools have access to electricity and the internet, which can be used to power technological devices. Digital devices such as smartphones and smart tablets, do not require much power to operate. These devices can make use of a variety of software applications that are essential for teaching and learning. Few studies highlight the role of integrating ICT tools for teaching and learning in traditional Malawian classrooms. There has been little progress in the implementation of blended learning in the majority of Malawian secondary schools. Moreover, there is little information available to teachers, students, and other education stakeholders about whether the use of digital techniques and technologies can provide a viable solution for designing effective blended teaching and learning, particularly in Malawi’s secondary schools. The study seeks to review the role of digital techniques and technologies in designing effective blended science teaching and learning in Malawi’s secondary schools.

Methodology

Research design

This is a desk research project that was carried out using established external and internal secondary data sources. This type of research is cost-effective, has no interviewee bias, has readily available reliable data, and is convenient in nature. It is a study in which no fieldwork or surveys were conducted. It was, therefore, a research project that entailed gathering the necessary information to address the research problem from published journals, articles, research reports, and peer reviews, among other sources.

This desk study used qualitative methods. The ultimate goal of employing a qualitative approach was to investigate the role of digital techniques and technologies in designing effective blended science teaching and learning in Malawi's secondary schools. This goal was met by reviewing both external and internal sources. External sources included reports and publications from various agencies, whereas internal sources included policy, plans, and strategy documents available at the MoE, such as the National Educational Policy (NEP), National Education Sector Investment Plan (NESIP) 2020-2030, and National Education Standards (NES).

Sampling procedures

This study gathered information from published educational research materials. Books, journals, articles, reviews, and research reports were downloaded, and some were read using the JSTOR search engine at https://www.jstor.org/ and the Google Scholar search engine at https://scholar.google.com/. The keywords used to access the required literature review were education, blended learning, ICT, science teaching and learning, digital techniques and technologies.

Scholarly articles with keywords like digital techniques and technologies, blended learning, and ICT in teaching and learning were chosen using the most stringent criteria. The publication date was also taken into account. The majority of the scholarly articles chosen were published between the early 2000s and the present. The twenty-first century is also regarded as a technological epoch in which the use of ICT in various institutions has become a priority. The majority of the published studies reviewed were conducted as primary research, while others were conducted as desk research. Nonetheless, the most important criterion considered was whether the study contained relevant information that would be used in data collection for the current study. In the reference section, the names of the journals, articles, reviews, and research articles, as well as the authors' names, have been duly acknowledged.

More importantly, Malawi's educational policies, plans, and strategy documents were purposefully sampled. This was done to ascertain Malawi's government's current position on the smooth integration of ICT in secondary schools. The emphasis was also on assessing the extent to which digital techniques and technologies were being integrated into science teaching and learning in Malawi's secondary schools via these policies, plans, strategies, and projects.

Data collection

The data for the desk research was gathered from peer-reviewed articles and journals. These are educational articles and journals discussing the use of ICT in traditional classrooms. Articles about science teaching and learning in Malawi were also reviewed. This was carried out by the review of the NEP, NESIP 2020-2030, and NES. The education policy document, plans, and strategy were used to gather information about Malawi's government's interest in promoting science teaching and learning. Furthermore, the Equity with Quality and Learning at Secondary (EQUALS) project, which aimed to promote science in Malawi's secondary schools, was evaluated. The overarching goal of these policies, plans, and strategies was to determine whether the Malawian government had invested in digital techniques and technologies for science teaching and learning in Malawi's secondary schools.

Data analysis

Data collected and reviewed were qualitatively analysed. For this desk research, qualitative analysis was heavily involved in deducing themes and patterns from the reviewed literature. The analysed data was later presented in paragraph-length texts.

Ethical considerations

Although this is a desk study, the literature review used for data collection was from previous studies, and their ethical issues were taken into account. The study sought ethical approval before conducting desk research from the School of Education, Early Years and Social Work, Faculty of Life Sciences and Education, University of South Wales.

Ethical issues around methodology, analysis, and reporting data

If the research methods used may cause harm, the researcher must consider whether it can be justified or mitigated (Hammersley & Traianou, 2012). There were however no potential harms

identified in this study that were likely to affect data collection, analysis, and presentation. The study used appropriate research methods that were informed by the literature.

The researcher was the primary instrument in this desk research, collecting data from published articles and journals. As a result, the researcher would determine what was required and which elements should be prioritized while collecting and analyzing data (Merrian & Tisdell, 2016). This may appear to be an ethical issue because there is a possibility of data exclusion, i.e., data that contradicts the researcher's views. However, in this desk research, the topic being investigated is viewed through the researcher's worldview and beliefs (Hughes, 2020). According to Merriam and Tisdell (2016), "qualitative research is based on different assumptions and a different worldview than traditional research," which is consistent with the constructivist paradigm used in this desktop study. Creswell (2002) defines social constructivism as the development of subjective meanings and understandings of one's personal experiences regarding specific topics based on one's social and historical background. Although reading various published articles and journals is important in desk research to understand the phenomenon being studied, the researcher's personal opinions and judgments also play a role.

According to Creswell (2002), while much ethical debate focuses on data collection and analysis, reporting the study's findings is an equally important component of ethical research procedure. It has been argued that when conducting research, the researcher must properly credit any works cited from other sources. This practice prevents the researcher from plagiarizing the work of others (Creswell, 2002). The author's name and the year of publication must be included in the in-text citation. The reference section must also include a list of references. Aside from that, the findings should be fairly reported, with no changes made to suit the researcher's or other parties' interests or assumptions (Creswell, 2002). Despite findings that contradict accepted standards, the findings should be published and disseminated. This desk research has duly followed these ethical issues concerning data reporting.

Results

Teachers' use of ICT-based learning systems in science lessons

The review indicated little progress in providing teachers with the necessary skills for designing and delivering lessons in science subjects using ICT-based learning systems. Teachers continue to use traditional science teaching and learning methods, citing the high cost and time commitment associated with incorporating ICT tools into a lesson.

The study also examined NES, which establishes educational quality expectations in key areas of school education in Malawi (Ministry of Education, Science and Technology, 2015, May). The following NES were reviewed, NES 1: Learning in lessons, NES 10: Well-planned lessons, and NES 11: Teaching for effective learning. These are the primary NES that are directly related to the use of various teaching and learning methods. According to the findings, none of these explicitly mention the use of ICT tools in teaching and learning. This could explain why teachers are unfamiliar with ICT tools. These findings imply that teachers do not regard ICT-based learning systems as a necessary practice that can help them deliver their lessons more effectively. Similarly, the findings showed that there is little evidence of teachers using ICT tools in science lessons in Malawian secondary schools.

ICT resources to support blended science education

The findings showed that ICT tools can be classified as hardware, software, or network communication (Shaharanee, Jamil & Rodzi, 2016, August). Desktop and laptop computers,

projectors, digital cameras, printers, photocopiers, smart tablets, Popplet, iPod, iPad, scanners, interactive whiteboards, flash discs, and DVDs or CDs are examples of ICT hardware. However, the study established that SNE students can use specific ICT tools, such as text magnifiers, keyboards for cerebral Percy, Braille, tying aids, large prints, and audiobooks. Google Classroom, Trello, Microsoft Teams, Can Figure It Geometry, Cue Think, and virtual laboratories are examples of ICT software. However, both ICT hardware and software rely on network connectivity.

Teaching Physics, Chemistry, Biology, and Mathematics using digital techniques and technologies

The study revealed that Google Classroom and Google Meet are two of the most convenient and cost-effective software that can be integrated into face-to-face classrooms. The present research recommends that teachers in Malawian secondary schools learn how to use Google Classroom and Google Meet applications in teaching and learning.

The study also revealed that virtual laboratories can be created using Google Classroom. This is where teachers can upload YouTube videos that demonstrate how to conduct a specific experiment or solve a mathematical problem. However, Iftikhar (2016) argued that software must be taught to teachers, as the majority of them do not know how to use it.

Furthermore, whether it is Physics, Chemistry, Biology, or Mathematics, there are numerous YouTube videos on various topics that can be easily integrated into face-to-face classrooms. This can be accomplished through the use of Google Classroom, Google Meet, Microsoft Teams, and Zoom, among other tools. Similarly, PowerPoint slides can contain important teaching and learning material for these subjects. For example, SlideShare software contains a wealth of scientific content that can be easily projected or delivered via online platforms such as Google Meet, Google Classroom, and Zoom.

Trello is yet another tool for science teaching and learning. According to Kaur (2018), it is a collaborative tool widely used by IT companies with large teams, but it has several applications for educators. Trello can be used by students for project-based learning. It includes digital boards that can be used to create various boards for assignments, test papers, and cards, among other things. A card, for example, can be used to discuss a specific topic. Students can use this section to post comments, questions, and images or videos. Students can also track the progress of their projects online. Trello improves students' learning experiences.

The impact of ICT-based learning systems on science pedagogical skills

The study established that ICT tools are used in a face-to-face classroom for a variety of reasons, including affordability (they can be accessed by the school), genericity (they are available and commonly used by both students and teachers), students' ability to control technology, and students' ICT capability and literacy enhancement (Okmawati, 2020). The use of digital platforms such as Google Classroom, Trello, and virtual laboratories can improve inquiry-based learning. This is where students can be given a better understanding of science concepts and processes. Inquiry-based learning, according to HarlEn (2013), integrates a variety of skills and scientific processes. This is where students ask questions, observe, plan, conduct experiments, collect and analyze data.

Discussion

The study found that a lack of interest among teachers in using ICT tools in science lessons. This is also contrary to the main goal of the NEP and NESIP, which is to accelerate actions that will catalyse the education and skills revolution, as well as to actively promote science,

technology, research, and innovation to build knowledge, human capital, capabilities, and skills, as emphasized by the African Union Agenda 2063 (Ministry of Education, 2020, August).

Shaharanee, Jamil, and Rodzi (2016) discovered that the Internet plays a critical role in facilitating the use of these ICT tools for online teaching and learning. Similarly, this study's literature review and findings revealed that ICT hardware and software rely on an internet connection for effective science instruction delivery. As a result, blended learning occurs when these ICT tools are used concurrently with face-to-face teaching and learning. It can assist teachers in organizing extra classes while students are at their various residences.

This study's literature review highlighted some of the most important 21st-century teaching and learning tools. The current findings support the use of online platforms such as Google Classroom, Google Meet, Trello, Microsoft Teams, Slide Share and YouTube are the most convenient for delivering science instruction. However, Sudarsana, Putra, Astawa, and Yogantara (2019) discovered that Google Meet, for example, can handle live teaching and learning where each student switches between laptops and smartphones to join the lesson. Nonetheless, the Internet is the overall tool that enables online learning, and blended learning becomes a reality when it is well integrated into face-to-face classrooms.

Conclusions

The purpose of the desk research was to provide a critical review of the role of digital techniques and technologies in designing effective blended science teaching and learning in Malawi's secondary schools. The following objectives were met by this study: to assess teachers' use of ICT-based learning systems in science lessons; to identify and evaluate appropriate ICT tools for promoting blended science teaching and learning; and to determine how ICT-based learning systems can improve science pedagogical skills. The study employed a qualitative approach. This aided in the collection of data from published educational journals, articles, reviews, and research reports, among others, through the use of the JSTOR and Google Scholar search engines at https://www.jstor.org/ and https://scholar.google.com/ respectively. Education, blended learning, ICT, science teaching and learning, digital techniques, and technologies were some of the keywords used. Ethical issues were also taken into account and the data was then qualitatively analysed using patterns and thematic deduction.

According to the current study, teachers continue to lack the necessary digital techniques and technological skills for effectively designing and delivering science lessons using online platforms such as Google Classroom, Google Meet, Microsoft Teams, Zoom, and Trello, among others. As a result, face-to-face instruction is the norm in Malawian secondary schools. This is despite the Ministry of Education's increased promotion of new teaching and learning methods in science subjects through the EQUALS project.

With the outbreak of the COVID-19 pandemic, almost all Malawian secondary schools were closed, indicating a lack of alternatives to students congregating in a face-to-face classroom. The current study discovered that if the GoM, through the MoE, is serious enough, they should begin securing funds for the purchase of ICT tools such as smartphones, iPads, computers, and smart tablets. These ICT tools support the installation of ICT software such as Google Classroom, Google Meet, Zoom, Trello, and Microsoft Teams, among others, which can improve the integration of online learning into face-to-face classrooms. The result will be an effective design of blended learning that will involve the use of digital techniques and technologies, specifically in Malawian secondary school science education.

The integration of ICT tools into traditional classrooms is concerned with the theoretical underpinnings of ICT's transformational aspects. This is particularly concerned with Internet-based ICT, various methodological aspects related to ICT's transformational potential, and their development and implementation both in and out of the classroom (Mooij, 2006, June 1).

The current review study concludes that secondary school students should be provided with digital techniques and technologies because it increases their motivation, achievement levels, and involvement in subject learning. If successfully integrated into face-to-face classrooms, ICT is expected to aid in the transformation of education, better fitting the learning of different types of students. SNE students, for example, can use text magnifiers, keyboards for cerebral Percy, Braille, tying aids, large prints, and audiobooks. The incorporation of ICT tools into face-to-face classrooms is thus more inclusive. This suggests that digital techniques and technologies can help prevent school demotivation and dropout. Because students can learn both in and out of school, it is assumed that ICT will aid in improving the learning process and removing barriers to accessing lessons.

The current study suggests that the MoE initiate a project proposal in which they can secure some smartphones and smart tablets or iPads and distribute them to students, particularly those in Form 4 and 2 who are preparing for national examinations. When they finish their exams, they should return such gadgets to teachers so that the next class can use them. Allow students to buy their smartphones or iPads, and teach them how to install Google Meet, Microsoft Teams, Zoom, and Google Classroom on their devices. The MoE is also asked to secure donor funds for the installation of internet connections in all Malawian secondary schools.

The current study also found that digital techniques and technologies allow learners to learn through inquiry-based learning. This is a rare pedagogical skill found in Malawian secondary schools. Face-to-face learning considers the teacher to be the knower and the learners to be un-knowers. It encourages passive learning, whereas inquiry-based learning encourages active learning. As a result, digital platforms like Google Classroom and virtual laboratories help students ask questions, make observations, plan and carry out projects and experiments, collect and analyze data, use critical thinking, develop explanations, conclusions, and predictions, and communicate their findings to their peers. This study recommends that the MoE review the policy that prohibits secondary school students from using personal ICT tools such as smartphones, iPads, smart tablets, and laptops in a face-to-face classroom.

Because this was desk research, the same theme should be replicated through a primary survey in some of Malawi's selected secondary schools. Furthermore, the current study has identified gaps in which additional research is required to assess teachers' levels of ICT use in science teaching and learning. Furthermore, cohort studies can be designed in which the MoE provides ICT tools to a small number of schools and compares the results with other schools considered to be controlled. This should be monitored for a minimum of five years. As a result, this will aid in determining whether ICT tools have any impact on teaching and learning, as well as determining how they can effectively lead to the design of digital techniques and technologies for blended learning.

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Online Mindfulness-Enhanced Language Teaching Practices for EFL Classes

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Abstract

The incorporation of mindfulness into English as a Foreign Language (EFL) teaching has experienced a significant rise, indicating a recognition of its capacity to enhance the learning atmosphere. In an era of novel technological advancements, the scarcity of accessible digital resources and scientific guidance for language teachers regarding the integration of mindfulness brings about a necessity for comprehensive materials and programs, which paved the way for the Mindfulness-Enhanced Language Teaching (MELT) Program. The MELT Program, an online mindfulness training program tailored exclusively for language teachers, furnishes teachers with a 5-week training with foci on the fundamentals of mindfulness, connection of mindfulness to SLA theories, guidance on integrating mindfulness into teaching contexts, and sample MELT practices. The MELT program was delivered online, and various materials (e.g. breathing exercises and meditation cards) and activities designed to foster language skills and areas via mindfulness-based practices were provided on MELT official website, mindfulnessinelt.com. This study presents MELT as a new instructional approach for EFL classes and aims to investigate the integration of digital MELT practices into actual teaching contexts. EFL teachers enrolled in the MELT Program used the website and digital tools to implement the MELT practices for 5 weeks in their lessons and reflected on how they integrated mindfulness practices for language teaching purposes. Participants' reflections showed that the teachers in general incorporated MELT techniques into different parts of their lessons, and they expressed favorable effects of mindfulness to enhance language learning atmosphere. Additionally, the responses from their students underscored the overall positive reception of the mindfulness practices in EFL classrooms. This study emphasizes the significance of integrating digital mindfulness practices into language study and provides valuable suggestions for language teachers, educators, and language practitioners, highlighting the benefits of mindfulness to improve the effectiveness of language teaching and learning.

Keywords: Mindfulness-enhanced language teaching, Technology and mindfulness in English language teaching, Mindfulness-based teaching practices.

Introduction

Mindfulness, in its general terms, refers to a unique form of attention focused on the present moment, marked by feelings of wonder, clarity, and harmony, as well as the ability to regulate one's concentration on the observed experience (Bishop et al., 2004). Recently, this term has gained significant attention in the field of education, particularly in language teaching. Practices related to mindfulness that enhance well-being are being incorporated into foreign language (FL) classes, leading to the observation of certain advantages such as improvement in resilience, an increase in motivation, and a decrease in stress and anxiety (Öz, 2017; Charoensukmongkol, 2019). Several studies have explored integrating mindfulness practices into English as a Foreign Language (EFL) teaching with promising results (e.g. Fallah, 2016; Wang and Liu, 2016; Moghadam et al., 2021). In this aspect, Sheikhzadeh and Khatami (2017) showed that mindfulness improved reading comprehension and overall performance among Iranian EFL learners, highlighting its role in enhancing cognitive functions essential for language acquisition. Additionally, Mortimore (2017) revealed that mindfulness techniques created a calmer classroom environment, improved focus, and facilitated language learning in a bilingual classroom in a Spanish EFL context.

With respect to language skills and areas, Azizi and Kralik (2020) demonstrated that incorporating mindfulness into EFL literature courses significantly enhanced students' critical reading abilities, while Tung et al. (2021) found that mindfulness meditation positively impacted vocabulary retention and learning efficiency among Vietnamese students. More recently, Zeilhofer and Sasao (2022) found a positive correlation between mindfulness and short-term vocabulary retention among Japanese students learning German. These findings collectively underscore the multifaceted benefits of mindfulness in enhancing language education.

Despite the benefits of mindfulness in language teaching, there is a scarcity of materials, sources, and pieces of training for language teachers to effectively integrate mindfulness (Kuru Gönen, 2022) into FL contexts. Due to this scarcity, Mindfulness-Enhanced Language Teaching (MELT) was introduced, which refers to "integrating the ideas of mindfulness into foreign/second language teaching contexts in a holistic way through mindfulness-based

practices and a mindful attitude aligned with the findings of second language acquisition (SLA) research" (Kuru Gönen, 2023). To address the paucity of training for language instructors, the MELT Program, an online mindfulness training program designed particularly for language teachers, has been developed. In this regard, the goal of this research is to investigate the integration of digital MELT practices into language teaching contexts through online MELT Training for FL teachers.

Methodology

Participants

The participants of the study encompass 55 EFL teachers working at various private and public K12 schools, as well as universities throughout Türkiye. Participants were selected on a voluntary basis, adhering to a convenient sampling strategy as outlined by Creswell (2012). The participants were given online consent forms, ensuring their voluntary participation and their right to withdraw from the study at any time. To maintain anonymity, participants were named as T1, T2, T3, and so forth. Concerning mindfulness, more than half of the teachers stated that they lacked knowledge on mindfulness and how to incorporate mindfulness into educational settings. None of them received any training regarding the integration of mindfulness practices into FL contexts prior to the study.

Instruments

For data collection, a background questionnaire was utilized to gather demographic information about the teachers (e.g., gender, educational background, and familiarity with mindfulness) prior to the training. Additionally, to collect data on teachers' opinions regarding the use of the MELT website (mindfulnessinelt.com) and the integration of MELT practices into language teaching, the participants wrote a total of five reflective logs on their experiences. These logs were collected digitally via Google Forms documents weekly. The reflection questions that guided the participants in their reflective logs were:

1. Name the activity (and/or materials etc.) you integrate using the website.
2. When and how did you use it? (Which part of the lesson, in which language topic/unit, etc.) Please give details.
3. How did you feel and think about this experience in the language classroom?
4. How did your students react to this/these activities, materials, etc.?

Procedure and Data Analysis

The study spanned ten weeks and consisted of two phases: (1) The creation of a website for mindfulness in English Language Teaching; (2) online training for language teachers to integrate various mindfulness practices in their actual teaching contexts and use the website effectively in their classes.

To achieve the aims of the study, researchers chose the WIX platform to easily design the website through its templates and reputation for being highly user-friendly (Cheng, 2022). Upon registering on wix.com, the domain was chosen. The domain name "mindfulnessinelt.com" was selected because it was the fundamental phrase to facilitate language teachers' accessibility to the website. Once the domain was taken, the primary categories of "Home", "About Mindfulness", "How to Start", "MELT for Kids", "MELT for Teens", "Blog", "About Us", and "Contact" were developed in a stepwise fashion based on the relevant literature on mindfulness and pedagogical needs of the FL learners and teachers. The following screenshot from the website displays how it looks like.

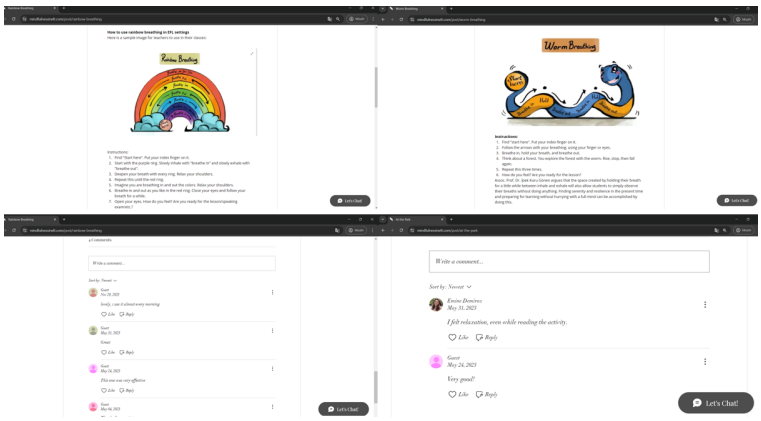

Figure 1. *Screenshot from the MELT website (mindfulnessinelt.com)*

On the website, each category includes components that provide the teachers with the necessary information and materials related to the category itself. To begin with, in the “Home” section, definitions of MELT and MELT are presented in order to provide the teachers with information about the purpose and objective of the website. Following the definitions, there are the most recent blog articles to ensure that instructors are informed about the most up-to-date resources, events, and assistance from the community. Additionally, this area encompasses videos that provide support. Furthermore, the "About Mindfulness" section is a collection of commonly asked questions on mindfulness. These questions adhere to the fundamental aspects of mindfulness, including its definition and the scientific background it is built upon. Furthermore, in the section under "How to Start," teachers are given explicit instructions before incorporating mindfulness into their educational environments. The following sub-sections included here are *The Nine Attitudes of Mindfulness and Their Implications on EFL and ESL Classrooms*, *Things to Consider While Integrating Mindfulness in ELT*, and *Tips for a More Mindful Class*. The other two main sections on the website are “MELT for Kids” and “MELT for Adults”. Here, the teachers can find various practices that blend mindfulness into language learning. These mindfulness-enhanced activities are designed according to the themes/units (e.g. sports, friendship, and history) commonly found in coursebooks and aim to improve the language learning outcomes with necessary comprehensible input and follow-up activities. There are various language MELT practices offered to practitioners tailored specifically to the needs of young learners and teenagers/young adults. In these sections, it was ensured that each activity has a *like* feature and a *comment* section to enable teachers to display that they confirm the usage of the activity and share their experiences with others. The section titled "Blog" contains all the content provided on the website, including information about the popularity of the practices based on the number of likes and comments they have obtained. Moreover, the "About Us" section contains detailed information on the researchers' backgrounds. Finally, under the title of "Contact", visitors have the option of filling out a form to submit their inquiries, needs, concerns, and other messages to the researchers. By providing their email addresses, they can receive immediate replies. In addition to these segments, a *chat box* was set up in the bottom right corner of the page to enable quicker discussions. Simultaneously, the Turkish edition of the website was created to offer language assistance to people with low proficiency in English. Lastly, the mobile edition was built in both English and Turkish to enhance the website's user-friendliness.

The developmental phase of the website lasted for five months, and each feature of the website was designed meticulously by having the opinions of experts from the fields of English language teaching, system programming, web design, and computer sciences. Following the development of the website, there occurred the need for an online training that systematically teaches the teachers how to use the website to integrate mindfulness into language teaching effectively. For this purpose, official accounts on different social media platforms were created. On these accounts, several posters were shared to call for enrollment in the MELT online training program for teachers from K12 and higher education FL contexts. For volunteers to take part in the training, a participation form that seeks to gather their contact information was placed on the posters in the form of QR codes, and necessary links were provided in the posts. Online consent forms and links to the training were sent to the applicants’ e-mail addresses. In the training, which lasted for a consecutive five weeks, the teachers were guided on what mindfulness is and its link to second language acquisition theories, as well as various MELT practices and how they can be integrated into FL lessons. Moreover, the practices were discussed together with the teachers after they used the practices with their students. After each training, the participant teachers were given reflective logs through Google Forms. Following the integration of the MELT practices into their lessons, they were asked to complete the logs in accordance with the questions provided.

Teachers' reflections on integrating MELT techniques into English classrooms were examined quantitatively. The reflective logs provided responses from various perspectives, including perceived benefits, challenges, and student reactions. The descriptive analysis involved categorizing the responses and calculating the frequency of specific themes for each participant teacher. That is, the frequency of the responses in the reflective logs was carefully calculated to ensure a comprehensive understanding of teachers' experiences. By doing so, the study captured a clear overview of both common and unique experiences among the participants. This approach facilitated the identification of significant patterns and insights into the effectiveness of MELT techniques in enhancing EFL teaching.

Results

This study aimed to examine the integration of digital MELT practices into actual teaching contexts and introduce MELT as a novel instructional approach for EFL classes. The frequency of the teachers’ responses was categorized according to data obtained in the reflective logs in terms of the lesson phases of MELT integration, teachers’ views, and students’ reactions toward various MELT practices employed by the teachers. Data were stored for future content analysis, and in this paper, only the frequencies of teachers’ responses were given to present the overall

picture of MELT integration into actual FL contexts. Table 1 below displays the focus points and related categories under each point of focus.

Table 1. Distribution of the frequencies according to main focus points and related categories

Focus Points	**Categories**		***f****
Lesson Phases of MELT Integration	*In a lesson, MELT practices were useful in the…*		
	Beginning and warm-up phase		39
	Middle of language practices		10
	End and follow-up phase		6
		Total	*55*
Teachers' Views	*Teachers had views on MELT practices regarding their…*		
	benefits		53
	drawbacks		2
		Total	*55*
Students' Reactions	*Towards MELT practices, students had…*		
	positive views		53
	negative views		2
		Total	55
		Main Total	165

***f**: frequency of teachers' responses

Table 1 demonstrated that the teachers preferred to employ MELT practices at different phases of a language lesson, and they generally had positive perceptions regarding the numerous benefits of these practices. What is more, there were positive reactions of the students towards MELT practices albeit a few negative views were expressed. All in all, the overall views of both teachers and students highlighted predominantly satisfactory responses.

Integration of MELT into the Lesson Phases

The participant teachers stated that MELT practices were useful in their English teaching at various stages of a lesson. The teachers' most common lesson phase was the start of their lessons. That is, they discovered that beginning their lessons with mindfulness activities helped to establish a calm and focused tone throughout the session. One of the teachers remarked:

> *"I used the worm breathing activity at the beginning of the lesson to enhance learning by using a big printed visual on colored cardboard (the ss were already curious at first sight) and enthusiastically explaining to students that we will do a quick breathing exercise through the nose and see how it will make us feel. I gave the directions first then I stopped talking and they followed the worm, then they continued their eyes closed. (The lesson unit was My Town/Giving Directions. " (T43)*

Echoed by the teacher above, the teachers started with a MELT practice, and the students were positively impacted indicating a useful warm-up effect of such practice. Furthermore, the teachers also used the activity in the middle of their language practices. One of the teachers reflected as:

> *"I use MELT activities in the middle of the reading lessons. Our lessons last 80 minutes, which is sometimes difficult to maintain mindfully. When I integrated the rainbow technique in the middle of the lesson, it helped the students focus on the lesson again. They said that they felt refreshed. So did I." (T39)*

As can be understood from this response, incorporating mindfulness practices, such as rainbow breathing at strategic points during the lesson can significantly enhance students' concentration. This suggests that mindfulness activities can serve as effective tools for managing the challenges of long lesson durations, ensuring that both teachers and students remain present and attentive throughout. Teachers' views put forward that they occasionally employed the MELT practices as a means of concluding a lesson and for relaxation, as stated by the teacher below:

> *"At the end of the lesson, we covered the unit about tales, and the structures present perfect and past simple. It was tiring for my students; so, I opened the website. Then we tried the rainbow exercise." (T1)*

The extract above shows that teachers use mindfulness activities at the end of lessons help students unwind after intensive study sessions. It is seen from the responses that the participant teachers utilized MELT techniques from mindfulnessinelt.com at various stages of their lessons, primarily at the beginning, to establish a calm and focused environment. These practices, such as worm breathing and the rainbow technique, were also effectively used in the middle and end of lessons to maintain mindfulness, refresh students' focus, and help them unwind.

Teachers' Views on the MELT Integration

The participant teachers expressed numerous positive feelings about incorporating MELT techniques from mindfulnessinelt.com into their English lessons, such as increased student engagement, enhanced classroom atmosphere, and improved teacher well-being. One teacher noted:

> *"It provided me with the break I needed and the students needed. As well as students, I felt refreshed. I managed not to lose my willingness and attention to the lesson. MELT practices are practical and easy to apply to the lessons during the class. It helps the teacher to find short, more flexible, calming, and unique activities to use in their classes". (T39)*

The extract above implies that MELT practices not only benefited the students but also rejuvenated the teachers, helping them maintain their focus and enthusiasm throughout the lesson. One negative comment regarding the MELT practices was about the teacher's confidence in implementing them. A teacher stated:

> *"I was a bit nervous because I didn't feel so confident about applying the technique properly. I tried to give clear instructions. But I had difficulty in giving a meaningful purpose why we were doing this." (T35)*

It is indicated that while MELT practices have many benefits, some teachers may struggle with confidence and clarity in delivering these techniques effectively. Ensuring that teachers feel well-prepared and understand the purpose behind mindfulness activities is crucial for their successful implementation.

Students' Reactions about the MELT Practices

The teachers also mentioned about their students' reactions towards various MELT practices. Regarding the students' reactions, the participant teachers generally shared positive feedback about the MELT practices. One teacher mentioned:

> *"I asked them about their experiences and they mainly shared how relaxed, comfortable, and calmed down they felt. One of my students stated that he found himself smiling as he did the MELT practice." (T6)*

This indicates that the MELT practices were effective in creating a positive emotional response among students, fostering a sense of relaxation and well-being. Overall, the students' positive experiences reflect the significant impact of MELT practices on their emotional and cognitive states, contributing to a more conducive learning environment. Regarding the negative reactions of the students, one teacher mentioned:

> *"They did not really participate much. They measured their friends' reactions and there were exaggerated breathing sounds and laughter." (T9)*

The extract above demonstrates that certain students may not approach the mindfulness activities with the necessary level of seriousness and may become diverted by the responses of their classmates, which underscores the significance of creating a respectful and attentive classroom atmosphere while using new methodologies to ensure their efficacy. All in all, the descriptive findings generally pinpointed positive effects of MELT practices when they were integrated into FL lessons and the teachers asserted numerous benefits of such practices albeit a few negative aspects that needs to be taken into account for future practices.

Conclusions

The findings of the data analysis revealed primarily positive perceptions of the integration of MELT procedures. Teachers in general highlighted the usefulness of the MELT practices and deemed them effective thanks to the increased motivation and decreased anxiety in their actual teaching contexts. Teachers emphasized the soothing aspect of mindfulness which is consistent with the advantages reported by Geng (2021) and Reilly (2021), showing that mindfulness activities may contribute to a calmer classroom environment. Future studies may include longer training sessions in order to explore a more extensive analysis of MELT practices. It is seen that incorporating mindfulness throughout the lesson phases and using a mindful approach in language instruction

may benefit both students and teachers. Thus, it is suggested that language teachers and curriculum developers might recognize the potential of mindfulness to improve language learning and foster supportive, engaging, and motivating classroom environments.

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Online Teaching During Covid Crisis – Students' Perspective

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Abstract

The COVID-19 pandemic necessitated an abrupt transition to online learning, presenting a unique opportunity to investigate students' perspectives on this educational paradigm shift. This study aimed to explore the experiences and perceptions of primary school students regarding online teaching during the crisis. Two hundred students participated in the survey which was conducted by computer science teachers in the period from April to May 2023.

Findings revealed a multifaceted array of experiences characterized by both challenges and opportunities. Students expressed initial enthusiasm for the flexibility and convenience offered by online learning, highlighting the ability to manage their own schedules and access a wide range of digital resources. However, the absence of face-to-face interaction emerged as a prominent challenge, with many participants lamenting the loss of social connection and engagement with peers and instructors.

Moreover, the digital divide emerged as a significant barrier, disproportionately affecting students from socioeconomically disadvantaged backgrounds. Limited access to technology and reliable internet connectivity hindered their ability to fully engage in online classes, exacerbating existing educational inequalities.

Despite these challenges, students identified moments of growth and adaptation throughout their online learning journey. They described developing newfound skills in self-discipline, time management, and digital literacy, which they perceived as valuable assets for navigating the demands of the 21st century.

In conclusion, this study provides valuable insights into the complex landscape of online teaching during the COVID-19 crisis from the perspective of students. The findings underscore the importance of addressing digital inequities and designing online learning environments that prioritize social interaction and student engagement. As educational institutions continue to navigate the uncertainties of the post-pandemic era, these insights can inform the development of effective strategies to support student learning and well-being in an increasingly digital world.

Keywords: online teaching; ICT; COVID-19; primary education; students

Introduction

The COVID-19 pandemic necessitated an unprecedented shift to online teaching, profoundly affecting primary education worldwide. This transition presented significant challenges and opportunities for educators, students, and parents. Research indicates that while online education enabled continuity of learning during school closures, it also exacerbated existing inequalities (Dong et al., 2020). Many students faced barriers due to inadequate access to digital devices and reliable internet connections, highlighting the digital divide (König et al., 2020).

Educators in primary schools had to rapidly adapt their teaching methods and curricula to fit online formats, often without sufficient training or resources (Hodges et al., 2020). This situation underscored the importance of professional development in digital pedagogy. Effective online teaching in primary education required innovative approaches to maintain student engagement and participation. Interactive tools and platforms, such as video conferencing and digital whiteboards, played crucial roles in facilitating this engagement (Gudmundsdottir & Hathaway, 2020).

Parents' involvement became more critical as they supported their children's learning at home, often juggling work and caregiving responsibilities (Garbe et al., 2020). The pandemic highlighted the importance of a supportive home learning environment and the need for schools to provide guidance and resources to families.

Despite these challenges, the shift to online teaching during COVID-19 also fostered the development of new educational practices and tools that could have lasting benefits. It accelerated the integration of technology in education, promoting digital literacy among students and teachers alike. The experience emphasized the need for

robust infrastructure, ongoing professional development, and equitable access to technology to support effective online education in primary schools (Kundu & Bej, 2021).

Methodology

This study aimed to explore the experiences and perceptions of primary school students regarding different aspects of online teaching during the crisis. Survey was conducted by computer science teachers in the period from April to May 2023 on 199 primary school students.

Results

Students had to express their agreement with 19 statements about distance learning during COVID-19 crisis on a scale from 1 (completely disagree) to 5 (completely agree).

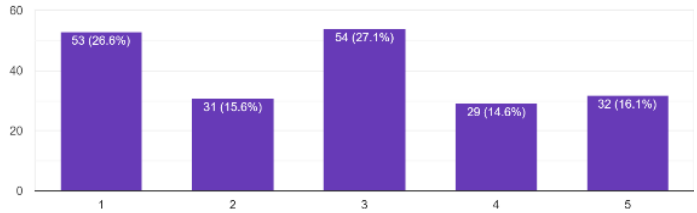

Figure 1. I think that the classes I attended during distance learning were well organized

The survey results in Figure 1. indicate a mixed perception among students about the organization of distance learning classes. While 31.7% of students responded positively, a notable 42.2% responded negatively, highlighting areas where improvements are necessary. The neutral stance of 27.1% of the students suggests varied experiences or indifference towards the organization.

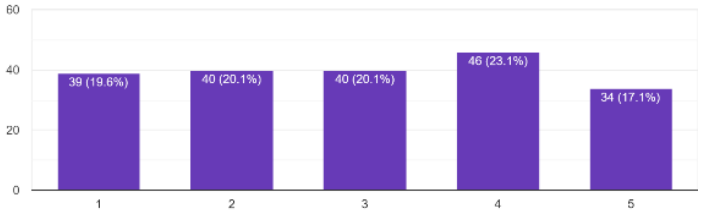

Figure 2. It was easy to master school material during distance learning

Results in Figure 2. present mixed perceptions among students regarding the ease of mastering school material during distance learning. While 40.2% of students responded positively, a notable 39.7% responded negatively, highlighting significant challenges faced by students. The neutral stance of 20.1% of the students suggests variability in individual experiences or a lack of strong opinions on the matter.

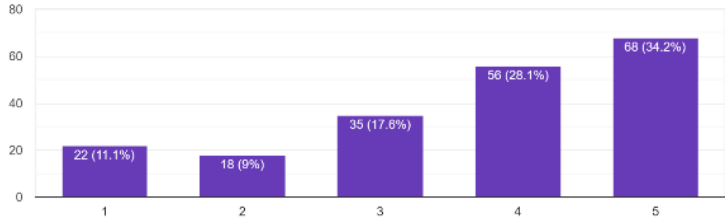

Figure 3. I carefully followed the lessons that the teachers gave via video call

Overall, the majority of respondents (124 out of 199, or 62.3%) either agreed or strongly agreed that they carefully followed the lessons provided by teachers via video call. However, there were still a significant number of respondents who either disagreed, were neutral, or strongly disagreed, indicating that maintaining attention and engagement during video call lessons was not universal among all participants. This suggests the importance of considering various factors such as lesson structure, content delivery methods, and participant interaction to enhance engagement and effectiveness in virtual learning environments.

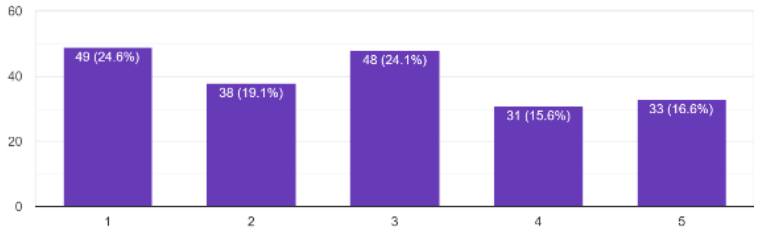

Figure 4. I often lost concentration during video calls

The data in Figure 4. reveals that a significant portion of respondents (32.2%) agreed or strongly agreed that they frequently lost concentration during video calls. However, a larger number of respondents (43.7%) either disagreed or strongly disagreed with this assertion. This suggests that while concentration issues were common for a notable minority, the majority of participants did not experience frequent distractions during virtual sessions. Further exploration into the factors affecting concentration during online meetings could offer valuable insights into enhancing engagement and minimizing distractions for all participants.

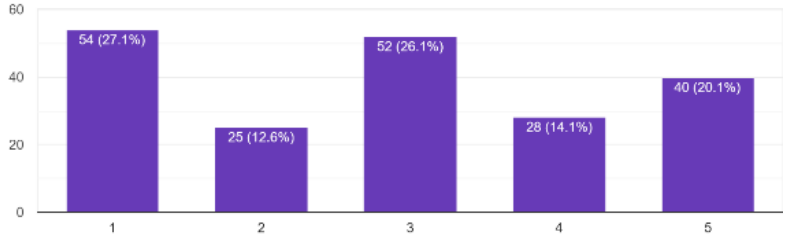

Figure 5. I spent more time on schoolwork during distance learning than now

Considerable number of respondents (39.7%) either disagreed or strongly disagreed that they spent more time on schoolwork during distance learning compared to the present. Conversely, a smaller proportion (34.2%) agreed or strongly agreed with this statement. These results suggest that for many participants, the amount of time dedicated to schoolwork may not have significantly differed between distance learning and the classroom teaching.

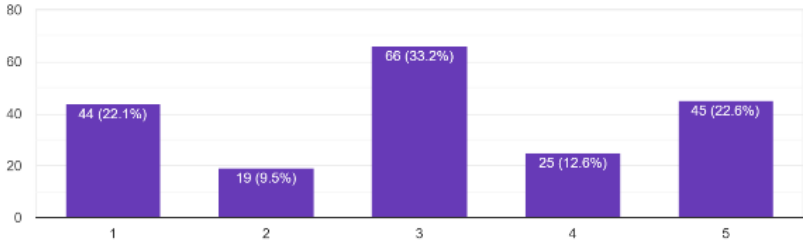

Figure 6. I had better grades during distance learning than now

A significant proportion of respondents (35.2%) agreed or strongly agreed that their academic performance was better during distance learning compared to the present. However, an equally substantial number of respondents (31.6%) disagreed or strongly disagreed with this statement. These findings highlight a diverse range of experiences among participants regarding their academic achievement in different learning environments.

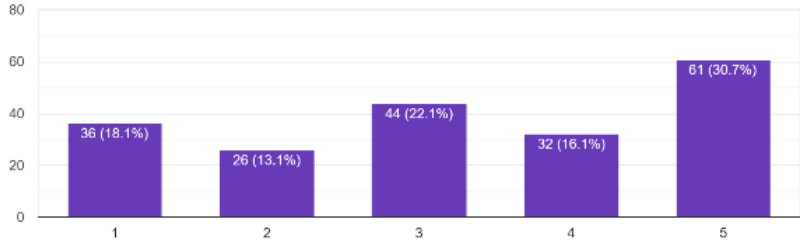

Figure 7. Distance learning was fun

Results in Figure 7. indicate that a significant portion of respondents (46.7%) either agreed or strongly agreed that distance learning was enjoyable. However, a notable number of respondents (31.2%) either disagreed or strongly disagreed with this statement. These results suggest a mixed experience among participants regarding the enjoyment of distance learning. Further investigation into the factors influencing perceptions of enjoyment during remote education could provide insights for enhancing engagement and satisfaction in distance learning.

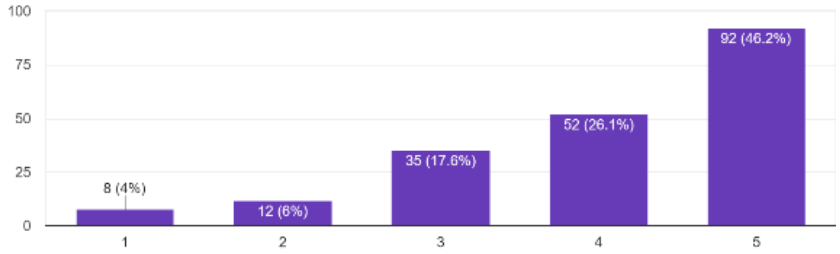

Figure 8. I completed the assigned tasks on time

The majority of respondents (72.3%) indicated either agreement or strong agreement with completing assigned tasks on schedule. However, a portion (10.05%) expressed disagreement or strong disagreement with this assertion. These findings suggest that while many participants managed to meet deadlines, some encountered difficulties in doing so.

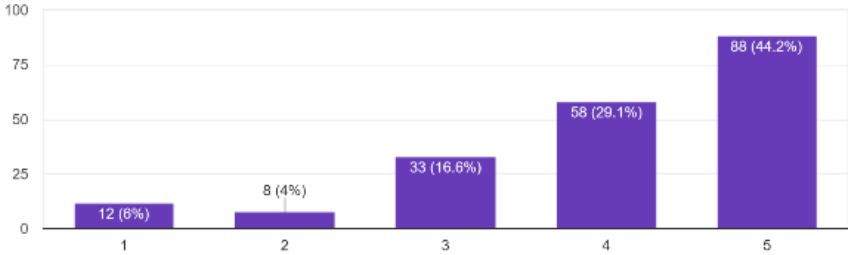

Figure 9. I completed tasks independently

Significant majority of respondents (73.3%) either agreed or strongly agreed with completing tasks independently. However, there were still some respondents (10.05%) who disagreed or strongly disagreed with this statement. These findings suggest varying levels of autonomy among participants in task completion.

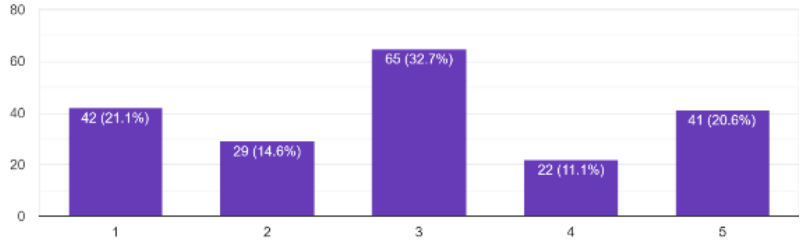

Figure 10. I was easily motivated to study during distance learning

Data in Figure 10. suggests that a significant portion of respondents (31.7%) either agreed or strongly agreed that they were easily motivated to study during distance learning. However, a notable number of respondents (35.7%) either disagreed or strongly disagreed with this statement. These results indicate a mixed experiences among participants regarding motivation for studying during remote education.

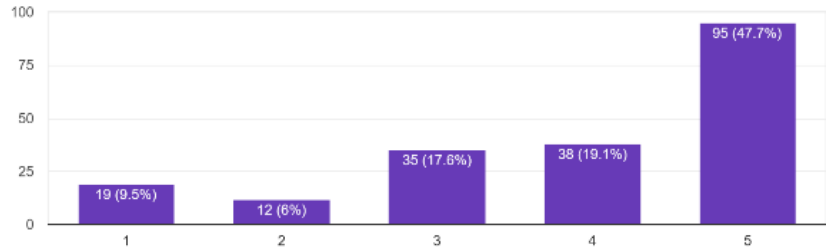

Figure 11. During distance learning, I really missed hanging out with my friends from class and school

The majority of participants (66.8%) either agreed or strongly agreed that they experienced a notable absence in socializing with classmates and school friends during distance learning. However, a portion of respondents (15.5%) expressed differing perspectives on this issue. These results highlight the importance of social interactions in the educational context, particularly in remote learning environments.

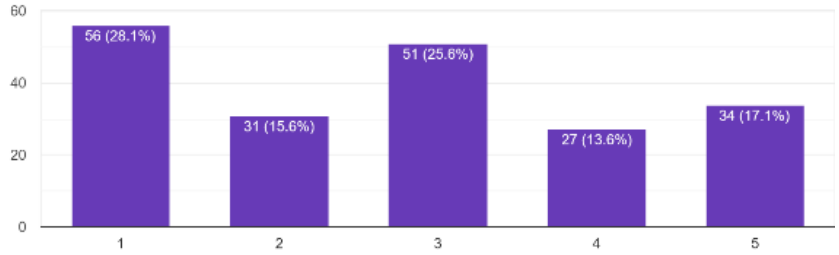

Figure 12. Distance learning had more advantages than disadvantages

Significant portion of respondents (30.7%) either agreed or strongly agreed that distance learning had more advantages than disadvantages. However, a notable number of respondents (43.7%) either disagreed or strongly disagreed with this statement. These results indicate a divided opinion among participants regarding the balance of benefits and drawbacks associated with distance learning.

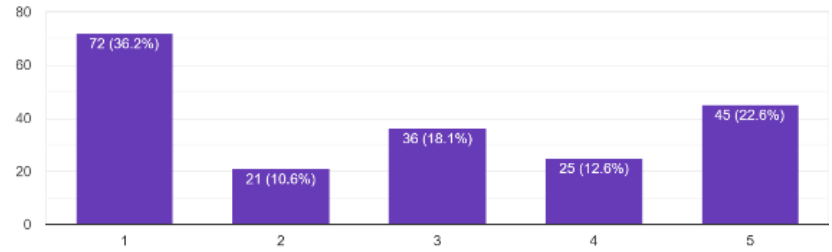

Figure 13. I would also like to attend distance learning classes now

Results in Figure 13. suggests that a majority of respondents (46.8%) either strongly disagreed or disagreed with the statement indicating their interest in attending distance learning classes now. However, a significant proportion (35.2%) expressed agreement or strong agreement with this sentiment. These results indicate a varied inclination among participants regarding the desire to continue with distance learning classes in the current context.

Conclusions

In the situation of forced teaching at a distance, information and communication technology has made it possible for students and teachers to stay in touch and continue the teaching process. Such teaching could not achieve the usual quality it can achieve, but we can learn a lot from it. New digital media are an indispensable part of our students' lives, they are interesting to them and make their lives easier and they are motivated to use them as supplement to classroom teaching.

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The Impact of Work-based Learning on Engineering Education in Response to COVID-19: A Case Study of the Iron Range Engineering Program

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Abstract

The COVID-19 pandemic necessitated rapid adaptations in higher education, compelling institutions worldwide to swiftly transition to remote teaching methods. This transition was particularly challenging in STEM (Science, Technology, Engineering, and Mathematics) disciplines, where hands-on learning and laboratory work are integral curriculum components. In response to this challenge, a Work-Based Learning (WBL) model emerged in Minnesota as a promising approach to remote education.

Iron Range Engineering (IRE), situated in Minnesota, has gained recognition for its innovative approach to engineering education, notably its successful integration of WBL into its curriculum. This integration has enabled students to gain practical, real-world experiences, even in a remote learning environment. The effectiveness of IRE's WBL adaptation played a pivotal role in establishing the Minnesota Polytechnic and Applied Learning Institute (MinnPoly), which seeks to enhance the adaptability and accessibility of higher education. Minnesota State University, Mankato's MinnPoly was established to extend the successful WBL model into other disciplines and interdisciplinary fields of STEM to support the dynamic and constantly evolving technological landscape in a global economy.

This paper draws upon the insights from the Collaborative Engineering Education in the Digital Age (CEEDA) Case Study to evaluate IRE's response to the challenges posed by the COVID-19 pandemic by transitioning to online learning with the WBL approach. The study analyzes the implementation process of WBL and assesses its outcomes to ascertain its efficacy in engineering education. Furthermore, it sheds light on how the successful use of the WBL model in engineering education at IRE has inspired MinnPoly to use the WBL model to develop new integrated STEM degrees, which aim to provide flexible and adaptable learning experiences not only to effectively respond to rapid changes and uncertainties that we saw during the pandemic but also to meet the evolving needs of the industry and workforce, thereby creating skilled employees.

Keywords: Work-Based Learning, STEM Education, Distant Education, COVID-19 Pandemic, Engineering Education, Higher Education Transformation, Technology, Learning Theory

Introduction

The progress of technology has led not only to globalization but also to the integration of societies worldwide (Khan & Abid, 2021). This advancement significantly impacted employment trends. Consequently, new educational methods have emerged to meet the demand for skilled individuals (Peta & Chirgwin, 2021). This study discusses one of those methods, work-based learning (WBL), and its response to the pandemic as it is mainly a distant educational model. Minnesota Department of Education defines WBL as a "structured academic program where students engage in real-world activities with instruction occurring both at school and at a community-based setting with an employer" (education.mn.gov). As a non-traditional method, WBL occurs in the workplace instead of in an educational institution. Chirgwin (2021) states that WBL enables learners to learn new technology by using it. This model allows workplaces to function as learning sites in collaboration with learning institutions, through which students learn and receive recognition simultaneously.

Among the various learning theories explain the functioning and effectiveness of work-based learning, situated cognition and cognitive apprenticeship advocate for learning to occur in practice (Mann, 2011) with the embedded

context in its use (Woolley & Jarvis, 2007). These theories are part of a broader conceptual framework known as situativity theory, which emphasizes how the environment influences knowledge, thinking, and learning (Durning & Artino, 2011). Together, these theories emphasize two fundamental principles: first, learning in an environment similar to the eventual practice setting generates transferable knowledge (Yeh & Barsalou, 2006), partly due to the associative nature of memory. Secondly, learners undergo a process of professional socialization, acquiring the norms, attitudes, and values of the profession as they transition from a peripheral (novice) to a central (expert) role through interactions with peers (Chou et al., 2014; Pimmer et al., 2013).

By leveraging the confluence of technological and educational advancements, the challenges presented by crises such as pandemics can be effectively tackled, with work-based learning emerging as a particularly promising strategy. Building on this premise, this paper aims to underscore the efficacy of work-based learning in engineering education as a response to the COVID-19 pandemic. The study delves into the CEEDA research, comprising six case studies conducted at various universities, to elucidate the pandemic's impact on engineering education. Specifically, this paper examines the Iron Range Engineering (IRE) program at Minnesota State University, Mankato, and its influence on establishing MinnPoly, a statewide initiative to develop additional STEM degrees with a comparable structure. MinnPoly aims to enhance accessibility to education by replicating the successful model of IRE across the state.

Iron Range Engineering

Iron Range Engineering (IRE) is a degree completion program for students with a two-year engineering degree (CEEDA, 2022). The decision to initiate the IRE program was driven by regional economic factors and the founders' dissatisfaction with the existing state of engineering education (Ulseth, 2016). Some of the goals of the new model are improving the performance of engineering graduates, increasing diversity in the engineering field, integrating effective learning techniques from the IRE model, and providing a highly affordable education for students through tuition offset by 24 months of cooperative employment (Ulseth, Johnson, & Kennedy, 2021). As Figure 1 shows, the progress for a student from first year to graduation respectively includes a two-year degree from a community college, one academy semester, and a two-year paid internship (anywhere around the world), which can be completed in 4.5 years.

Figure 1. Progress and timeline of the IRE program

This program is primarily offered online, allowing students from all over the United States to participate while engaging in work-based learning experiences (CEEDA, 2022). Its curriculum has three major areas: Technical, design, and professional. See Figure 2 for the curricular structure.

Figure 2: IRE Curricular structure

During the last two years of their education in IRE, students work on projects through co-op employment in industry (Ulseth et al., 2021). During this time, students are supported by their professors, facilitators, and peers by utilizing technology and digital communication. By positioning students in industry, the IRE model promotes effective learning through experience and consequently invites a more diverse student body (with 35% non-white and 22% women) into engineering education. Another way IRE contributes to diversity in engineering is by lowering tuition through 24-month-long employment.

Methodology

The CEEDA study was conducted to evaluate the effects of emergency teaching on the engineering education sector as a response to COVID-19. This study comprised two main components. The first component is the 'Crisis and Catalyst' report, which examines feedback from the global engineering education community regarding their experiences with emergency teaching and its potential long-term impacts on the sector. The second component consists of detailed case studies investigating how six universities in different countries responded to the challenges of emergency teaching. Among these six institutions, this paper focuses on the Iron Range Engineering (IRE) program at Minnesota State University, Mankato, USA, due to its implementation of the WBL model.

The IRE case study was based on individual interviews with 16 participants. These participants included the directors of the IRE, two industry representatives IRE partnered for design projects, one alumnus, one facilitator, four instructors, and six students. The case study was structured into two main parts:

Part A: Best Practice Activity focuses on showcasing a specific activity or method that was considered highly effective in the realm of online collaborative learning. This part highlights what was done exceptionally well during the emergency teaching period, serving as a model for others to follow.

Part B, Institutional Context, looks at the broader institutional response to the emergency teaching situation. It examines how the institution as a whole handled the challenges posed by the emergency, and it discusses the potential long-term impacts and changes in approach to engineering education as a result of the experience, particularly in light of the COVID-19 pandemic.

Results

This section discusses the findings emerged from the interviews with 16 individuals during the CEEDA Case Study for Iron Range Engineering (CEEDA, 2022). It discusses the findings in two sections. The first one is the adaptation of the emergency teaching and the second is the challenges occurred with the implementation of the emergency teaching and how IRE program addressed those challenges.

Preparation for Adopting Emergency Teaching

In March 2020, the Minnesota State government set some rules to be followed in educational institutions due to COVID-19. The efforts for transitioning to emergency teaching included the following actions:

-IRE program hybrid model switched to fully online.

-The department postponed the enrollment until August 2020 and had three weeks to prepare.

- The instructors in the program were already equipped after two years of development on experiential online learning. Therefore, during this three-week preparation, they shared their experiences with their colleagues from other institutions within the network via workshops.

-IRE provided the essential educational tools required for remote education. These tools included Apple Pencil, iPad, and lab kits for students to be able to conduct some experiments remotely.

-Google Classrooms were formed through which students could access the course learning and submit course required materials online.

-The curriculum was modified to decrease the number of required tasks for students.

Findings from the interviews included one faculty member's description of support IRE provided, "*give them some rungs on the ladder to hang on to as they tried to climb that wall,*" (GEEDA, 2022, p. 19). Interviews with students and instructors also revealed that online learning promoted more engagement with the industry partners and alumni and also benefited student learning with more flexibility.

Confronting the Negative Outcomes of Emergency Teaching

Interviews revealed complications in three areas as outcomes of emergency teaching.

-Decline in enrollment: Cancellation of the face-to-face student recruitment events lowered the student enrollment in IRE. Some students had an assumption due to their previous negative experience about online education. The interviews also stated that the enrollment for the Fall 2021 was back to the annual application number of 150.

- Low level of engagement: After switching to fully online model, instructors noticed the lack of engagement. According to one interview with an instructor, *"we had students not coming to class, which in IRE and Bell just doesn't happen, and many of them would have their cameras turned off."* To address their concerns, the instructors designed a pre-enrolment orientation course and set ten minutes morning meetings to encourage engagement. One instructor interviewee shared the purpose of the meetings as to "*engage them, pump them up, run through the day and frame how these activities bring value to their career*." One participant stated that *"by setting a higher bar of expectation at the beginning and then having these regular meetings, we completely solved the engagement problem that COVID put on our doorsteps."*

-Mental health and social isolation: The third major challenge the interviews unveiled is the impact of isolation on students' mental health. Instructors' effort to support their students *included "creating familiarity, showing compassion, and having that be a part of everyday… using zoom to create that social connection that used to come from the unscheduled contact on campus "*in addition to organizing various remote social activities to stay connected in the community. One participant shared that *"everybody would turn their cameras on, and we'd go on a walk, and talk through Zoom".*

Conclusion

Findings of the interviews unveiled the impact of emergency teaching on the IRE program. One instructor reported*, "we learned a bunch of new things [from emergency teaching] and we're going to do things differently as a result of this. There's no question in my mind, it's a game-changer."* Since the contribution of the morning meetings and social activities on well-being is evident, the director of the IRE stated, *"we hadn't talked about self-compassion prior to emergency teaching, but it's so important, not just during a pandemic, but in any part of engineering education and in practicing being an engineer... We're going to keep doing those workshops."* The director of the program confirmed the positive impact of emergency teaching, *"you can have a very intense life-changing event from your bedroom… We've found a way to use technology to create social contact which is so important for [student] motivation.*" IRE also decided to offer both online and face-to-face options for the Academy Semester so the students could select whichever works for them.

The interviews feedback provided valuable insights into the impact of emergency teaching on the Iron Range Engineering (IRE) program. It was evident from the instructors' perspectives that the experience led to significant learning and adaptations in their teaching practices. This sentiment was captured by one instructor who expressed a clear intention to implement changes based on the lessons learned during the emergency teaching period. Additionally, the emphasis on well-being, particularly through activities like morning meetings and workshops on self-compassion, underscored the program's commitment to supporting students beyond academic success.

IRE's success in implementing work-based learning (WBL) was a key factor in the establishment of Minnesota Polytechnic and Applied Learning Institute (MinnPoly) with the aim of creating more majors in STEM with a similar structure. By offering practical, real-world experiences through WBL, IRE demonstrated the effectiveness of this approach in preparing students for the demands of the industry. This success not only inspired the creation of MinnPoly but also laid the foundation for its programs to provide accessible education in STEM fields. The decision to offer both online and face-to-face options for the Academy Semester further exemplifies IRE's commitment to accommodating diverse student needs and preferences.

Central to this exploration is the quest for approaches that not only bolster accessibility to higher education but also prioritize diversity, equity, and the fulfillment of students' varied needs, particularly within the STEM domains. By

facilitating learning through practical application and real-world experiences, work-based learning not only enhances accessibility to higher education but also promotes learning by doing, aligning with the evolving needs and expectations of a diverse student population.

Recommendations

To further enhance the application of work-based learning in STEM education, future research should focus on developing robust frameworks for integrating WBL into curricula. This includes identifying best practices for designing and implementing WBL experiences that cater to diverse student needs. Additionally, research could explore the effectiveness of different assessment methods in evaluating WBL outcomes, ensuring that they align with the goals of STEM education. Finally, collaboration between academia and industry could be emphasized, facilitating the design of WBL experiences that not only enhance students' skills but also meet the evolving demands of the STEM workforce. One way of doing this is to explore the implementation of new entities, such as MinnPoly, to addresses the needs of education and workforce to offer effective degrees to help promote skilled employees in collaboration with industry.

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Is ChatGPT Good in Enhancing Assessment? A Preliminary Study

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Abstract

This study investigates the use of ChatGPT in evaluation, specifically for short essay writing. This study aims to determine whether ChatGPT can accurately analyze student responses while shortening assessment time compared to human teachers. The Cambridge test papers were evaluated, and short essay writing was graded using the standards indicated in the mark scheme. Human teachers' ratings of these papers were compared to those of ChatGPT by using prompts. The analysis focuses on two critical aspects: assessment accuracy and assessment time. The findings demonstrate that ChatGPT outperforms people and takes less time to assess short essay writings.

Keywords: AI, ChatGPT, Prompt Designs, Assessment.

Introduction

There are several challenges faced by human teachers, during the assessment of essay-based answers teachers take a lot of time to assess which further increases the time of issuing results especially when higher number of students in class. Teachers also face difficulties in grading different types of answers when they have to follow the specific grading criteria of answers. Assessing coherence and content relevancy is also a very big challenge for teachers. Current essay assessment methods have various obstacles, including time-consuming human evaluation, a lack of reliability, and difficulty assessing all aspects such as content relevance and coherence (Ramesh & Sanampudi, 2021). Many human factors also hinder effective essay assessment. Firstly, the teacher's limitations, which include the teacher's attitude and beliefs about grading. Secondly, some teachers may not be able to capture all the writing nuances during assessment. Furthermore, major highlighted problems included teachers' attitudes and beliefs, a lack of time and resources, a gap in assessment training, and a big class size. Finally, the researchers advise that teachers use alternative types of assessment rather than traditional assessment methods (Terefe & Asmamaw, 2018).

AI in Essay Assessment

Nowadays automated essay scoring systems are introduced and these systems use Artificial Intelligence (AI) to grade student's essays automatically. These AI-powered assessments are growing interest due to their potential to improve the accuracy and efficiency of measuring student answers for grading and assessment. Artificial intelligence-based educational assessments are becoming increasingly popular as a means of boosting assessment efficacy and validity (Gardner et al., 2021). Concerns have been raised about the lack of pedagogical reflection in AI-based evaluation, as well as the necessity for teacher training in this area (González-Calatayud et al., 2021). It tells us that current AI assessment systems might not consider the pedagogy (teaching methods) that are used in class. This could further lead to an inaccurate assessment that does not reflect what students have learned. It also suggests that teachers may need additional training to use AI-based assessments effectively. Without the training, teachers might struggle to integrate AI assessment tools into their teaching practices, especially in assessment. Traditional assessment in the educational profession has been challenged by the development of artificial intelligence since AI's ability to generate assignments and answers without requiring students to read, write, or study makes it difficult to ensure actual knowledge and skill gain (Cobos & Cherres, 2023). It suggests that traditional assessments like essays might not detect effectively if the students are simply using AI to generate and write their answers or essays or if students are using their own words and knowledge in writing answers.

ChatGPT in Assessment

Our experimental results show that, although being several orders of magnitude smaller than ChatGPT, the fine-tuned language model performs better in student answer scoring. Furthermore, it produces more thorough and understandable results than typical text classification approaches (Li et al., 2023). It tells us that ChatGPT achieves better results in scoring the answers of students. The fine-tuned model, ChatGPT not only scores grades but can also generate more detailed and understandable feedback compared to traditional text classification methods of human graders, which might just categorize answers as right or wrong. The results revealed a moderate association between ChatGPT and human-assigned proficiency scores. ChatGPT scores and proficiency scores showed a moderate correlation (Obata et al., 2023). It shows a connection between ChatGPT scores and human

graders scores, ChatGPT scores and human graders scores were moderately correlated but there were also some discrepancies in both scorers.

The current version of ChatGPT (3.5) is not yet ready to entirely substitute human raters for essay scoring. However, after fine-tuning, the model showed a large level of agreement with human raters and a high degree of consistency (G, 2023). It suggests that it might miss some nuances human graders can catch. But if it is fine-tuned for the specific task of essay scoring, the model showed a significant level of agreement with human scorers which further exhibit consistency in its scoring and reliability. Furthermore, it demonstrates that ChatGPT model 4's accuracy is nearly 50% higher than model 3. ChatGPT demonstrates high efficiency in the automated grading process (Altamimi, 2023). It shows that ChatGPT 4 is more accurate as compared to its previous versions, it mentions "almost 50% accuracy" which likely refers to a relative improvement as compared to its previous versions. This improvement in accuracy will further play a greater role in the efficiency of the automated grading process. Now ChatGPT4, a newer version can score essays with greater accuracy as compared to the previous versions.

Our findings clearly show that machines such as ChatGPT outperform people in writing argumentative essays. Educators must act quickly because the technology is easily accessible to anyone. We must reinvent homework and create teaching concepts that employ AI models in the same manner that math used calculators: first, teach the fundamental concepts, and then use AI tools to free up time for additional learning purposes (Herbold et al., 2023). This study shows that ChatGPT can outperform humans in generating essays, so it can also outperform in the assessment of essays and grading them. It also suggests that these AI models should be used in the same way as students and teachers use calculators for math. It is similar to calculators, as calculators free up our time for broader math concepts, in the same ways AI writing tools could also save time for teachers in the assessment of essay-based answers.

The methodology discussed in this study opens up new options for leveraging Chatbots to provide automated assessment while also encouraging student interaction (Ndukwe et al., 2019). It explores how chatbots can provide automated assessments of student's answers and could restructure the process for teachers and offer students immediate feedback on their answers. It also highlights how chatbots can promote student engagement which could be through interactive assessments and personalized feedback, that could be done by using chatbots like ChatGPT.

Problem Statement

The current workload of human essay graders is significant, leading to potential inconsistencies and inefficiencies. These difficulties are worsened by the subjective character of essay scoring, which can lead to variations in judgment (Moradi & Didehban, 2015). Traditional methods are not ideal for accurate assessment of essay scoring because of their subjective nature. We can see many inconsistencies in assessment because of different interpretations of teachers according to their preferences and experiences that do not reflect the student's abilities. It can also create many other problems for example giving high grades to some students and low grades to some students based on the teacher's own experience and preferences.

AI-powered tools like ChatGPT hold promise for revolutionizing educational assessment but their effectiveness in evaluating complex tasks like essay writing remains unclear. Many scholars have been working on automated essay grading and short response scoring for several decades, but analyzing an essay by taking into account all factors such as the relevance of the content to the prompt, development of ideas, cohesion, and coherence remains a significant difficulty (Ramesh & Sanampudi, 2021). Automated essay grading and short answer grading also face challenges when it has to assess students' answers in terms of all parameters that are set by examiners. firstly, the relevancy of the essay, whether the essay is relevant to the topic or not. Secondly, the development of ideas, whether students are developing their own ideas and creative in their writing. Thirdly, cohesion, is whether students are clear in making connections of their ideas to the topic. Lastly, coherence, is whether students are developing the logical flow of their answers.

Research Gap

Current AI essay assessment tools, primarily focus on evaluating surface-level features of writing, such as spelling and grammar. This approach neglects the crucial aspects of essay quality especially the development of ideas by students during essay writing. The gap exists because existing AI models struggle to understand the nuanced aspects of human language in essay writing that contribute to the development of ideas. This gap should be filled because if AI tools cannot effectively assess these areas, their usefulness in educational assessment remains limited.

This research can bridge this gap by directly comparing how ChatGPT assessment can perform in evaluating these qualities against human assessment. This research will fill out the gap by comparing ChatGPT's assessment accuracy with human teacher assessment and it will also analyze the time efficiency of ChatGPT's assessment

with human teacher assessment. This study will evaluate whether AI like ChatGPT can effectively assess complex essay qualities like idea development (e.g., depth, originality, reasoning, etc.).

Research Questions

Q1: To what extent does ChatGPT accurately assess student answers in essay writing compared to human grading methods, as measured by alignment with established mark schemes and guidelines?

Q2: How does the time required for the assessment of student essays using ChatGPT compare to the time required for assessment by human teachers?

Significance

This research is important for educators, researchers, and developers of AI assessment tools. Using ChatGPT in grading can reduce grading time and workloads for educators who are manually doing assessments. It is helpful for researchers and developers of AI assessment tools to explore the correct prompt designs in improving the accuracy of ChatGPT's assessments. The findings can inform researchers and developers on areas for improvement, such as prompt design optimization for short essay assessment tasks.

Methodology

This research uses a case-control design with comparative analysis. Case-control studies are collectively referred to as observational studies and these studies compare groups retrospectively. They seek to identify possible predictors of outcomes (Mann, 2003). The answers of students from the Cambridge exam act as the "cases" to evaluate. The human grader's assessment using the mark scheme serves as the "control" group. The "outcomes," i.e., scores, accuracy, feedback, and time of ChatGPT assessment with the "outcomes" of human grading for the same answers are compared using the same mark scheme rules. The sample for this study consists of students' answers papers from the Cambridge exams in short essay writing in Islamiyat2058 subject. Student papers were assessed according to the guidelines provided in the mark scheme for the Cambridge exams in short essay writing. The use of pre-existing Cambridge exams with a defined marking scheme helps ensure consistency in the assessment criteria for both ChatGPT and human graders.

Assessments were taken independently by both human teachers and ChatGPT, utilizing prompt designs tailored to elicit relevant responses. Assessment scores and feedback taken by both methods (i.e., human graders and ChatGPT) were taken for analysis. A comparative analysis approach allows for the direct comparison between the assessment outcomes generated by ChatGPT and those conducted by human teachers. The analysis focused on two key aspects: the accuracy of assessment and the time required for evaluation.

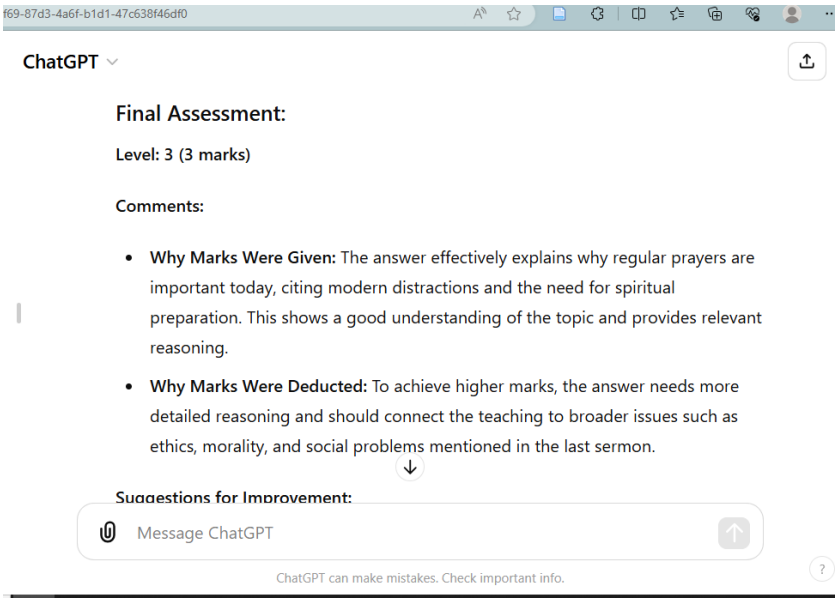

Figure 1. ChatGPT4 Assessment (OpenAI, 2024).

Figure 1. shows the marks and comments (feedback) given by ChatGPT 4 after generating quality prompts.

Table 1. Comparative Analysis.

	Human Teacher Assessment	**ChatGPT 4 Assessment**
Marks	3 out of 4	3 out of 4
Feedback	Add a brief quotation of the command to establish regular prayer from the Prophet's (pbuh) last sermon to begin this response. The candidate could further improve the answer by adding a measure of comparison with other teachings in the last sermon, to explain why offering regular prayer, this candidate's chosen teaching, is the most important in their opinion.	**Why Marks Were Given:** The answer effectively explains why regular prayers are important today, citing modern distractions and the need for spiritual preparation. This shows a good understanding of the topic and provides relevant reasoning. **Why Marks Were Deducted:** To achieve higher marks, the answer needs more detailed reasoning and should connect the teaching to broader issues such as ethics, morality, and social problems mentioned in the last sermon.
Time Duration	More than 60 seconds	Less than 10 seconds

Results

This preliminary study looked into ChatGPT 4's skills for judging short essay writing compared to human teachers. ChatGPT 4 provides faster evaluation (less than 10 seconds vs. more than 60 seconds for human graders), potentially lowering teacher effort. ChatGPT 4 scored a similar mark (3 out of 4) but took significantly less time (less than 10 seconds compared to approximately 60 seconds for human graders). It shows ChatGPT takes less time in grading answers as compared to human graders and also ChatGPT grading is the same as human grading and shows 100 percent accuracy if we use the quality prompts for assessment. Both strategies emphasized the essay's primary qualities, while ChatGPT 4 offered a potentially more open feedback system. ChatGPT 4 might provide a clearer explanation for its evaluation by defining specific grounds for assigning marks (relevance to modern context, justification for the necessity of prayer) and deducting marks (lack of broader links). However, human teachers may provide more extensive feedback in areas such as analogy suggestions and reasoning elaboration.

Conclusions

This preliminary study looked into ChatGPT 4's potential for a short essay assessment compared to human teachers. The findings imply that AI-powered assessments can reduce time, improve accuracy, and provide more specific feedback. ChatGPT 4 dramatically reduced assessment time when compared to human graders (less than 10 seconds vs. more than 60 seconds), potentially reducing instructor workload and allowing for faster student responses. While speedier, ChatGPT 4 has comparable grading accuracy (both received three out of four points). This shows that AI assessments can meet quality criteria. Notably, ChatGPT 4's feedback mechanism might be clearer and more straightforward, with specific explanations for assigning and deducting marks. This could assist students in realizing their abilities and limitations.

However, this was a limited-sample study. Further research is needed to confirm these findings with a larger data set. Human teachers provide more complex feedback, especially when drawing analogies and expanding on logic. The human factor is critical for student learning.

Future research could explore techniques for combining the benefits of both approaches. This could require combining ChatGPT 4's speed and transparency with human expertise. A system in which ChatGPT 4 gives preliminary feedback with explicit reasons, followed by human assessment and more nuanced assistance, shows promise. Another option is to optimize prompts for ChatGPT 4 evaluations to stimulate the study of broader essay elements in addition to its current strengths. We may be able to construct a more thorough and successful essay-writing assessment system by combining AI efficiency with human experience.

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Students' Assignments and Research Papers Generated by AI: Arab Instructors' Views

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Abstract

This study explores Arab university faculty's views on fully AI-generated assignments/research papers submitted by students, what reasons they give for their stance and how they react in this case. Surveys with a sample of 45 Arab instructors revealed that 98% do not accept AI-generated assignments/research papers from students at all. They gave numerous reasons for their position. If students submit AI-generated assignments/research papers, they would ask them to re-write them. The study recommends raising students' awareness of university policies regarding AI-generated content and introducing faculty and students to AI plagiarism detection tools. Faculty views and recommendations are reported in detail.

Keywords: Artificial Intelligence, AI-generated research, generative AI, college students' research, AI Assistants,

Introduction

Latest advancements in artificial intelligence (AI) have resulted in significant strides in AI assistants, AI tools and AI chatbots' capabilities and what they can perform in the different domains such as healthcare, automated vehicles, game playing, generating art, music and poetry, fraud detection, analyzing user preferences of products, music, and videos, Natural Language Processing, language translation, summarization and paraphrase. In addition, AI models can generate written content, including research papers using sophisticated algorithms to produce text based on input prompts. AI can find relevant literature using semantic search and can conduct a literature review. Examples of AI Tools and AI writing assistants used in research and writing are ChatGPT (an AI-powered Generative language model); PDFgear Copilot (PDF editor with AI), Zotero (Well-rounded AI assistant), SciTE (Smart citation tool), Consensus (AI-powered search engine), SciSpace (AI-based concept simplifier), Wordvice AI (AI-powered writing assistant), Research Rabbit (Spotify for papers), Rytr (for grammar-checking, rewriting content, and creating multiple versions of a text), Word Tune (for paraphrasing documents and summarizing content), Numerous AI (a Google Sheets plugin for automating repetitive tasks, visualizing data, generating formulas), Rationale (for multi-criteria and SWOT analysis) and others.

In this day and age, some college students resort to AI to fully write their assignments and research papers for several reasons such as having difficulty selecting a research topic, searching for and locating relevant references, designing the research instrument, selecting the sample, analyzing the data collected, writing and discussing the results, inadequate academic and research writing skills, low foreign language proficiency, lack of guidance from their instructor, and others (Al-Jarf, 2022; Al-Jarf, 2003a; Al-Jarf, 2003b; Al-Jarf, 1991).

While AI-generated content can be helpful to students, it raises ethical questions as academic integrity requires students to engage with the course material, conduct research, practice research and writing skills and contribute their own thoughts, insights, and experiences. A literature review showed that research on the use of AI in students' research and assignments, and the issue of acceptability, integrity, and responsibility of AI-generated content has not received much attention from researchers around the world. Many studies have investigated issues related to the use of AI in academia such as instructors' perceptions of AI code generation tools (Sheard, Denny, Hellas, Leinonen, Malmi & Simon, 2024); the harms of AI-generated inauthentic content (Menczer, Crandall, Ahn & Kapadia, 2023); opportunities, concerns, and solutions related to the use of generative AI in education and research; critical aspects of implementing AI in education to advance educational goals, ethical considerations in scientific publications, and the attribution of credit for AI-driven discoveries (Alasadi & Baiz, 2023); current capabilities and shortcomings of AI-generated content (Wu, Gan, Chen, Wan & Lin, 2023) and so on.

Moreover, many studies in the literature focused on ChatGPT, in particular, and its utilization in education such as use of ChatGPT at universities (Willems, 2023); scholars and students' perceptions of ChatGPT and what it means for universities (Firat, 2023); the educational impact of ChatGPT (Malinka, Perešíni, Firc, Hujňák, & Januš, 2023); challenges of ChatGPT-generated content and solutions (Wang, Pan, Yan, Su & Luan, 2023); opportunities and challenges of using ChatGPT for research and publication (Xames & Shefa, 2023); a comparative analysis of human and AI-generated learning resources (Denny, Khosravi, Hellas, Leinonen & Sarsa, 2023); confronting the coming tsunami of AI-generated educational research and writing (Tate, Doroudi, Ritchie, Xu & Warschauer,

2023); ethical implications of using artificial intelligence in education (Van der Meijden, Kirschner & Kester, 2021); combining academic judgement and software to identify generative AI tool misuse for detecting GPT-4 generated text in higher education (Perkins, Roe, Postma, McGaughran & Hickerson, 2024) and others.

The literature review revealed lack of studies in Saudi Arabia and other Arab countries on how university faculty view AI-generated assignments and research submitted by students. Therefore, this study aims to fill a gap in this area by exploring how Arab university instructors view the submission of fully generated assignments/research papers by AI tools and AI assistants such as GhatGPT by college students, what reasons they give for their acceptance or rejection of AI-generated assignments/research paper and how they react to the submission of AI-generated text. It also aims to answer some questions such as: Which AI-generated content is acceptable to them? How do they detect AI-generated content? Are there significant difference attitudes and reactions towards AI-generated content submitted by the students between male and female faculty, faculty working in different Arab countries and are different Arab universities and teaching different areas of specialization.

This study is significant as it will introduce faculty who are and those who are not to the use of AI-generated content submitted by the students, and how their colleagues view it, react to it.

Since AI-generated content is leading a paradigm shift in content creation and knowledge representation, some researchers highlighted the need for addressing its ethical, privacy, security, and legal challenges (Wang, Pan, Yan, Su & Luan, 2023). ChatGPT and similar AI content-generation tools, in particular, raise numerous questions for researchers, educational practitioners and policymakers (Tate, Doroudi, Ritchie, Xu & Warschauer, 2023). Exploration of the ethical implications of AI for education, the development of strategies for managing privacy concerns, and the investigation of how educational institutions can best prepare for the integration of AI technologies are urgently needed. Meyer, Urbanowicz, Martin, O'Connor, Li, Peng and Moore (2023) added that we must find ways for using Language Learning Models and chatbots in academia effectively, and the possibility that they may produce plagiarized text, that we must quantify their bias and that users must be cautious of their poor accuracy. To maximize the benefits of AI in education, it is crucial to address the challenges posed by AI in assessment, digital literacy, and ethical considerations and develop strategies for ensuring responsible and equitable implementation.

It is important to understand the potential, opportunities and challenges associated with AI in higher education and the need for continued research in this area. Future research should continue to explore the potential applications and impacts of AI in education, and the development of effective frameworks for integrating AI in curricula, instruction and assessments (Firat, 2023).

Definition of Chatbots, AI Tools, and AI Assistants

Chatbots[1] perform tasks like providing user support, answering customer questions, and resolving technical issues. They automate repetitive processes and interactions in a workflow. Example of Chatbots used in education are course inquiries, student support, student engagement and student feedback chatbots.

AI tools are software programs or applications that utilize AI techniques to perform specific tasks, such as natural language processing, data analysis and image recognition. Examples of AI tools used in education are admission management platforms, enrollment management and forecasting tools, emotional support, dropout prediction tools, and resource planning systems.

AI Assistants[2] are interactive software agents that perform tasks or services for users based on commands, text and voice. They are more sophisticated than AI tools as they can engage in two-way communication, understand context, and provide personalized answers. Examples of AI Assistants used in education are personalized learning assistants, automated lesson planning, automated grading, and predictive analytics.

Methodology

A sample of 45 Arab college instructors working at different universities (King Saud University, King Fahad University, Prince Sultan University, Prince Sattam University, King Abdul-Aziz University, Dar Al-Hikma University in Jeddah, Ain Shams University, Qatar University, University of Technology and Applied Sciences in Ibri, Palestine Ahliya University, College of Letters and Humanities of Sfax and Noukchott University), in Saudi Arabia, Qatar, Egypt, Palestine, Tunisia, Oman, and Mauritania participated in the study. 43% of the participants were female and 57% were male. The participants hold a Ph.D. in different areas of specialties as computer science

[1] https://www.upwork.com/resources/ai-chatbot-vs-virtual assistant#:~:text=In%20summary%2C%20AI%20virtual%20assistants,to%20provide%20answers%20to%20users

[2] 20 Popular AI Assistants | Built In

and computer engineering, linguistics, translation, and physics. Instructors who are not familiar with AI or the use of AI in education were excluded.

The participants were contacted via WhatsApp and Facebook Messenger and were asked to respond to the following open-ended questions:

> *Would you accept an assignment or research paper that was fully generated by AI from a student? Yes, or No? Give at least three reasons to justify your position. How would you react if a student submits an assignment or research paper that was fully generated by AI? In which tasks can students use AI and what do you consider acceptable AI-generated content?*

Responses to the questions were sorted out and categorized and percentages of similar responses and those related to the same question were computed. Responses are reported quantitatively and qualitatively.

Results

Instructors' Attitudes Towards AI-generated Content

Results of the AI-generated content surveys showed that 98% of Arab college faculty in the sample do not approve of and do not accept the submission of AI-generated assignments or research papers by the students at all. Only one instructor in the sample accepts AI-generated assignments and research papers from her students provided that they have revised the content, corrected errors and weaknesses, checked the validity of the references and made sure each reference does exist because AI provides false information and fake references. She added that she discusses the assignment and/or research paper with each student to make sure she understands the content and can defend it. Other than that, she does not accept AI-generated content. She encourages her students to use AI but does not accept copying and pasting.

No significant differences were found between male and female instructors in the different Arab countries, different Arab universities and those teaching different areas of specialization in their attitude towards AI-generated texts submitted by their graduate and/or undergraduate students. Most of them reject such submissions for reasons reported in the next section.

Instructors' Reasons for Rejecting AI-generated Content

Participating instructors gave numerous reasons for rejecting AI-generated assignments and/or research papers submitted by graduate and undergraduate students as they consider this plagiarism, cheating, and dishonesty, and consider such assignments as just copy-paste. Being AI generated, the submitted assignment/research paper does not reflect the student's actual ability, skills, ideas and views. They added that graduate and undergraduate students are in the process of acquiring writing and research skill and that the aim of an assignment or research paper is to make sure that the students are learning, thinking, and practicing those skills and that autonomous learning is emphasized. If students copy and paste an AI-generated text, this means that they did not learn anything and did not achieve the learning goals. When they use AI, they do not try and do not exert any effort. They do not read, analyze, or connect ideas. They do not practice any thinking skills. They become cognitively "lazy". Evaluations of students who have submitted AI-generated text, and those who have not, will not be fair. Due to lack of expertise, skills and competence, the students cannot verify, and cannot validate or detect false information, and mistranslations rendered by AI. They added that is hard to depend on AI as it sometime gives fake references that do not exist. Some instructors wrote:

- *I explain to the students how to do an assignment. I am available and give feedback. If the student performs all the tasks required by the assignment, she deserves the grade even if she makes some mistakes. But in the case of have AI write the assignment or research for her, this means that she has not gone through the learning process and this way she loses the whole mark assigned to the assignment or research paper.*
- *The aim of the assignment is to reinforce what the students have learnt.*
- *The performance of AI is not yet reliable, valid and trustworthy.*
- *Cloned thoughts aren't academic.*

The false information mentioned by the instructors in this study is consistent with Menczer, Crandall, Ahn andKapadia's (2023) views which indicated that we currently have little awareness of the volume of inauthentic behaviour supported by AI. They added that Generative AI tools such as ChatGPT make it easier to create large volumes of false (but convincing) social media profiles and content. An inauthentic influence campaign can tailor narratives to a particular community. For example, through health misinformation, a foreign adversary can make a whole population in a particular region more vulnerable to a future pandemic. Xames and Shefa (2023) revealed

the challenges and concerns exposed by ChatGPT that require immediate attention such as AI authorship, nonexistent references, threats of international inequalities and unintentional plagiarism.

Moreover, Firat (2023) emphasized that the use of AI in education raises ethical and social concerns about access, privacy, and the potential for increased reliance on technology, which may lead to reduced cognitive capacities among the students.

What Students Can Use AI For

Some participating faculty in the current study indicated that they do not ban the use of AI in research or learning altogether. They allow the students to use AI for summarizing a research paper, book, or text, which saves them time and effort, and re-wording or re-phrasing sentences and paragraphs. Others allow their students to use AI in translation, revising, editing, comparing AI translation with their own and producing the work in a better way in terms of formatting and editing, in improving and polishing the language of their written text, in drafting and correcting errors, i.e. proofreading. They allow the students to incorporate paragraphs from AI in their research paper or assignment, provided that they are documented, i.e., the students mention the AI Tool or AI Assistant used, date, and time. Others allow the students to use AI in searching for and verifying information, in understanding an unfamiliar topic and exploring ideas related to it; in analyzing data, finding the research gap in a particular area, understanding the meaning of technical terms, getting answers to complex questions, and solving problems. If an assignment or research paper is intended for discussion and the students are required to defend a specific idea, then there is nothing wrong with AI-generated articles and there is no need for students' original idea, assignment, or article. Those who supervise the graduation project (B.A. thesis) allow their students to use the review command in WORD, provided that they mention the tool they have used.

A computer science instructor stated that the students can use AI as a search engine to search for information provided that the students filter the information, check it and verify it.

In a study by Malinka, Peresíni, Firc, Hujnák, and Janus (2023), ChatGPT was used for completing exams, programming assignments, and term papers and evaluated multiple levels of the AI tool misuse, ranging from simply copying its outputs to utilizing it as a consultant. They concluded that ChatGPT can be easily used to cheat and that it can be used in discussing problems encountered while doing a homework-assignment or in speeding up the learning process. In Parker, Carter, Karakas, Loper and Sokkar's (2023) study, undergraduate students quickly integrated ChatGPT and 65% utilized it for academic tasks, whereas 48% used it for non-academic purposes. All the students reported experiencing moderate academic improvements in various courses.

How Instructors Detect AI-generated Content

To detect AI-generated content, some instructors in the sample use Blackboard's SafeAssign and give marks according to the type and amount of plagiarism. Some use aiphrasefinder,com to spot ChatGPT words and phrases. Others use AI-plagiarism detectors such as ChatGPT Zero, Originality AI, Semrush, Copyleaks, Duplichecker, Quillbot, and Scribbr. A computer science instructor detects AI-generated texts by spotting typos, absence of personal experiences or emotions, inaccurate citations, references that do not exist, repetitive use of words or phrases, and the overuse of words and complex sentences. She uses aiphrasefinder.com for detecting ChatGPT words and phrases.

Moreover, a linguistics instructor designed a scoring rubric for evaluating students' assignments and research papers in her Research Methodology course. In the rubric, marks are allocated to each task.

Nevertheless, some instructors indicated that AI Plagiarism Checkers should be used with caution as they are not 100% reliable. In some cases, the students submit an authentic human text, and the AI plagiarism detector claims that it is AI-generated. In this case and if the student is accused of AI-plagiarism, she would complain to the administration.

The lack of reliability of AI plagiarism checkers mentioned by some participants in the current study is supported by findings of a study by Perkins, Roe, Postma, McGaughran and Hickerson (2024) in which the researchers used the Turnitin AI tool to detect GPT-4-generated text in students' submissions. They found that the AI detection tool identified 91% of the experimental submissions as containing AI-generated content, but only 54.8% of the content was identified as AI-generated by the instructors, underscoring the challenges of detecting AI content when advanced prompting techniques were used. When instructors marked the experimental submissions, only 54.5% were reported as an academic misconduct. Results of the study highlight the need for greater awareness of how the results of AI plagiarism detectors may be interpreted.

Action Taken by Instructors in Case of AI-Generated Assignments

Data analysis showed that if a student submits AI-generated assignments or research papers, 75% of the faculty in the sample require him/her to re-write the assignment. Few require that students to declare if they have used AI in their submitted assignment or research papers, in what and where. Few explain to the student how AI can be used in research in order to avoid plagiarism. One instructor asks her students to paraphrase the AI-generated content in their own words. Examples of instructors' responses are:

- *At the beginning of the semester, I explain to the student what is acceptable and is unacceptable about AI-generated content. If the student persists, he/she will get a zero.*
- *I give the students time to revise their work and do something drastic about the AI-generated parts.*

On the other hand, 25% give a zero (no grade), 15% and 25% of the grade for submitting the assignment even if it was generated by AI. They explain to the student why they failed, with evidence of the AI-generated content such as having CHATGPT Zero, SafeAssign or another AI plagiarism detection tool highlight all AI content. An instructors declared:

- *I give the student a zero and report him to the department head. In some cases, the student might be expelled from the university.*

Few instructors indicated that it depends on the grading policy of the course, which depends on the nature of the course. If there is no clear policy that bans the submission of AI-generated content, the instructor would guide the student and ask him/her to re-write and re-submit the assignment. But if the university has an announced policy that bans the use of AI-generated content, the student would get a zero with a warning.

Regarding students' awareness of the ethics of using AI in assignments, Parker, Carter, Karakas, Loper and Sokkar (2023) reported diverse ethical perspectives among undergraduate students in their study. Some students considered the use of AI in education ethically acceptable, while others expressed reservations. Students who actively used ChatGPT showed a greater ethical acceptance of its educational use compared to those who did not.

Recommendations and Conclusion

AI-generated content is a relatively recent phenomenon. Due to its novelty, this study recommends raising students' awareness of their instructors, college and university policies regarding the submission of AI-generated assignments and research papers through workshops. If a university or department does not have a policy regarding AI-generated content, participants in the current study recommended that instructors alert the students at the beginning of the semester that AI-generated content is an act of plagiarizing, that the instructor can detect AI-plagiarized content with their plagiarism detection software and that this will consequently lead to cancelling the assignment grade or even failing the course.

Academic institutions need to establish clear policies and frameworks for the ethical and fair use and inherent bias of AI tools in education and incorporate them into their decision-making processes. Comprehensive training of students, faculty, administrators, and stakeholders should be provided to make sure that they understand the ethical considerations and implications of AI use in education and to make sure that academic integrity is preserved (Paschal & Melly, 2023; Perkins, Roe, Postma, McGaughran & Hickerson, 2024).

Instructors, departments, and universities can raise students' awareness of what is allowed and what is not allowed when using AI tools and AI assistants for academic purposes through memos, course descriptions and instruction manuals. Students should be asked to declare which parts of an assignment or research paper were written by AI. Students should understand the significance and necessity of acquiring certain writing and research skills, and the significance of academic integrity.

It is necessary for graduate and undergraduate students to perform all kinds of tasks required by their assignments or research papers from A to Z as they are not experts yet and are not well-trained in writing and research skills. They need to perform all kinds of tasks themselves such as summarization, paraphrasing, translation, proof-reading, checking grammar, spelling and style, searching for references in Google Scholar and specialized electronic databases, designing their research instrument, collecting and anlayzing their data and applying appropriate statistical techniques, as they are still in the learning process and have not fully acquired the skills and knowledge needed. They may resort to AI to get information about general-knowledge questions, definition of terms, getting a recipe, an itinerary, and similar daily life issues.

Furthermore, exploration of the ethical implications of the use of AI in education, the development of strategies for managing privacy concerns, and the investigation of how educational institutions can best prepare for the integration of AI technologies in education need to be researched further in Saudi Arabia and other Arab countries. Researchers and educators need to understand the potential, opportunities and challenges associated with AI in higher education and the need for continued research in this area. The perceptions of journal editors and promotion

committee members of AI-generated research articles submitted by university faculty to journals and for promotion and whether journals and publishers are having policies regarding the publication of AI-generated research articles is still open for further investigation by future research.

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Orchestrating Quality in Open and Distance Learning

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Abstract

The development of higher education has been significantly impacted by the rise of open and distance learning (ODL) practices, underscoring the critical need to ensure the provision of high-caliber education. As the demand for ODL continues to grow, ensuring the quality of such educational experiences becomes paramount. This systematic literature review synthesizes existing research on how quality is assessed in ODL environments. By systematically analyzing a wide range of scholarly articles, this review aims to provide insights into the methodologies, frameworks, and criteria utilized in assessing the quality of ODL. The review encompasses various dimensions of quality assessment, including instructional design, learner satisfaction, pedagogical effectiveness, technological infrastructure, and accreditation standards. Additionally, it examines the evolving trends, challenges, and best practices in quality assurance within the context of ODL. The anticipated outcomes include a comprehensive overview of quality management practices in ODL, encompassing quality indicators, conceptual frameworks, methodologies, outcomes, and associated challenges. The review will highlight both the strengths and limitations of current practice and frameworks, focusing on their adaptability and effectiveness in diverse ODL settings. By shedding light on the present state quality management practices in ODL, this review aims to promote improvements in the quality, accessibility, and relevance of open and distance higher education in an ever-changing global landscape.

Keywords: Quality management, quality assurance, open and distance learning, ODL, systematic review

Introduction

The anticipated worldwide need for higher education in 2025 may surge to 263 million students, which marks a substantial rise from just under 100 million students in 2000 (Karaim, 2011,). Additionally, it's worth noting that a significant majority of these students are expected to engage in education through open and distance learning methods. The increase in the number of students and the growing demand for open and distance learning highlights the heightened significance of ensuring quality of open and distance education programs. Implementing effective quality assurance processes is the key to ensure the credibility and success of open and distance education programs (Chua & Lam, 2007). Besides the increasing demand for open and distance education, there is also an image problem that perceives open and distance education is inferior to face to face education (Jung, 2022) and this necessitates stronger measures to ensure that open and distance education achieves parity with traditional face-to-face instruction. Furthermore, with the rising emphasis on quality education, there is an increasing need for quality assurance (QA) in open and distance education especially amidst heightened mobility of students, faculty, programs, and institutions within global networks. Quality assurance has the potential to propel institutions towards excellence in higher education (Ryan, 2011). Given these reasons, this study aims to delve into the multifaceted nature of quality in open and distance education by conducting a comprehensive examination of the existing literature. By synthesizing various perspectives and definitions of quality, the study aims to elucidate the nuanced understanding of quality in this context, particularly in comparison to the conventional perceptions associated with face-to-face education. Moreover, it seeks to identify the specific quality indicators that are pertinent to open and distance learning environments, exploring how they diverge from traditional metrics used in face-to-face classrooms. In addition, the research aims to shed light on the standards and frameworks to assess and ensure the quality of open and distance education programs and institutions. Through these multifaceted inquiries,

this research aims to offer comprehensive insights into the conceptualization of quality in distance and online education, thus contributing to the ongoing discourse and efforts to advance educational quality in the digital age.

Methodology

A systematic review of literature is defined as using systematic and transparent methods to identify, select, and critically evaluate primary research related to the topic of interest (Pati & Lorusso, 2018). Systematic reviews provide a comprehensive understanding of the current state of the field, as well as making significant contributions to both the theoretical and methodological context of the studied area and subject (Newman & Gough, 2020). The systematic review of literature method is employed in this research for a thorough and comprehensive examination of the multifaceted nature of quality in open and distance education. This study aims to synthesize various perspectives and definitions of quality, to develop a deeper understanding of quality in comparison to traditional face-to-face education, to identify specific quality indicators relevant to open and distance learning environments, and to scrutinize global standards and frameworks established to assess and ensure the quality of open and distance education programs and institutions. This study was designed in accordance with Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines prepared by Liberati et al. (2009) and systematic literature review steps recommended by Newman and Gough (2020). After outlining the theoretical framework of the research and formulating the research questions, searches were conducted on a collective search database "Anadolu University Summon" using the search string composed of the following keywords: ("quality management" OR "quality assurance") AND (distance OR open OR online) AND (education OR learning OR teaching). The initial search using the search string yielded 9,687 results and then refined to include only academic and peer-reviewed sources, resulting in 5,620 results. Further refinement limited the search to scholarly journal articles in the field of education educational research, leaving 495 results. The results then sorted according to relevance and 77 articles passed the initial screening process. These articles underwent a final screening for eligibility, resulting in 24 articles meeting the inclusion criteria and they were analyzed.The data obtained indicated a predominant reliance on qualitative data in this study, with the utilization of descriptive content analysis method for data examination, which enabled comprehensive exploration and organization of both quantitative and qualitative studies conducted on the subject matter (Ültay et al., 2021).

Results

Definition of Quality in ODL Context

The definition of quality in open and distance learning has four main themes including effective and engaging educational experiences, the quality of content, demands of the various stakeholders and continuous improvement.

Figure 1. Definition of Quality in ODL

Effective and Engaging Learning Experiences: The quality concept in open and distance learning (ODL) emphasizes the importance of delivering educational experiences that are not only effective but also engaging for learners (Ireland et al., 2009; Masoumi & Lindström, 2012; Blieck et al., 2020). Quality in ODL is beyond content delivery as it encompasses leveraging technology to captivate learners and guaranteeing (Masoumi & Lindström, 2012). As highlighted by Simunich et al. (2022), the objective is to provide students with teaching and learning experiences that are as enriching and impactful as those in a traditional classroom setting, despite the physical distance. To achieve these objectives, ODL requires learning experiences that ensure that the educational material is not only informative but also directly contributes to achieve the learning outcomes (Ireland et al., 2009). Moreover, these programs employ clear and organized instructional design principles to facilitate seamless learning experiences for students, regardless of their physical location (Ireland et al., 2009). High-quality ODL programs actively foster engagement among students, instructors, and course materials through various means, including interactive activities, discussions, and collaborative projects (Ireland et al., 2009).

Content Quality: In ODL, content quality signifies more than just the presence of information; it embodies the essence of ensuring that online course content is not only accurate and up-to-date but also relevant, clear, and closely aligned with predefined learning objectives. As emphasized by Andrade et al. (2020) and Barker (2024),

maintaining high standards of content quality is crucial for the efficacy of online learning experiences. Marciniak (2018) suggests that relevance of content, learner engagement, effectiveness of teaching methods, accessibility of resources, support mechanisms for learners, and assessment of learning outcomes collectively contribute to the determination of quality.

Meeting the Needs of Various Stakeholders: Quality in open and distance learning (ODL) revolves around meeting the diverse needs and expectations of various stakeholders involved in the educational ecosystem. Barker (2024) underscores this by highlighting that quality is about addressing the requirements of these stakeholders, which encompass students, teachers, government bodies, and institutional partners. The concept of quality in ODL is multifaceted and contextual, as noted by Jung & Latchem (2007) and shaped by the unique goals, contexts, and stakeholders of each educational setting. Institutions striving for quality must navigate varied perspectives and criteria to ensure that their programsnot only meet but exceed standards of excellence and effectiveness(Abdous, 2009).

Continuous Improvement: Quality in ODL is synonymous with continuous improvement, denoting an ongoing process of assessment, enhancement, and alignment with the evolving needs of stakeholders (Shraim, 2020). This is the natural result of the dynamic nature of quality assurance in open and distance learning (ODL), as articulated by Jung & Latchem (2007). Quality initiatives in ODL must be adaptable and responsive to the diverse contexts, goals, and stakeholders involved in the educational process.

Quality Indicators in ODL

Quality indicators in Open and Distance Learning shows a diverse variety in factors for assessing and enhancing the quality of education. These indicators serve to the unique characteristics and delivery methods of ODL as benchmarks for evaluating effectiveness, relevance, and impact. Several studies shed light on the specific quality indicators in ODL and how they differ from traditional face-to-face (F2F) education. While some indicators overlap with the ones in F2F education, there are specific aspects of ODL environments. These indicators reflect the unique challenges and opportunities of open and distance learning and underscore the importance of continuous improvement in ODL programs. In summary, quality indicators in ODL encompass a wide range of factors and the studies focus on the following 7 points that can be considered significant for assessing quality in ODL:

- Learner-Centeredness: In ODL, the emphasis is on personalized learning experiences, self-paced learning options, and opportunities for student autonomy and self-regulation (Ireland et al., 2009; Marciniak, 2018; Barker, 2024).
- Technology Integration: It is important to evaluate the usability of online platforms, multimedia resources, and interactive tools enhancing student engagement and learning outcomes (Jung & Latchem, 2007; Ireland et al., 2009; Masoumi & Lindström,2012; Blieck et al.,2020; Simunich et al.,2022). Integration of appropriate technologies and digital tools is of great importance to enhance the learning experience, facilitate communication, and support interactive learning activities (Shraim, 2020).
- Interaction and Collaboration: Fostering interaction and collaboration among students, instructors, and course materials through effective communication channels, discussion forums, and group activities is another key to quality in ODL (Jung & Latchem, 2007; Ireland et al., 2009; Masoumi & Lindström,2012). Active participation, collaboration, and interaction among distance learners should be encouraged through online discussions, group projects, and collaborative activities (Jung & Latchem, 2007; Shraim, 2020).
- Assessment and Feedback: The assessments in ODL should be aligned with learning objectives, provision of timely and constructive feedback, and diverse assessment methods should be used to evaluate student learning (Ireland et al., 2009). Implementation of fair and valid assessment methods, academic integrity in online assessments, and timely feedback mechanisms should be provided (Abdous, 2009).
- Support Services: Comprehensive support services for students, including academic advising, technical support, library resources, and counseling services should be available (Ireland et al., 2009; Masoumi & Lindström, 2012; Blieck et al.,2020; Shraim, 2020). Adequate institutional support in terms of vision, planning, and infrastructure to facilitate effective delivery of ODL programs (Shraim, 2020).
- Quality of Online Resources: Resources supporting diverse learning styles and preferences should be relevant and accessible in ODL (Ireland et al., 2009). ODL is to provide well-structured and engaging course materials that align with learning objectives and cater to the needs of diverse learners (Marciniak, 2018; Shraim, 2020).
- Accessibility and Inclusivity: Ensuring ODL programs are accessible to all learners, including those with disabilities, and promoting inclusivity through diverse learning materials and resources (Masoumi & Lindström; Shraim, 2020; Simunich et al.,2022).

Quality Standards In ODL

Quality standards and frameworks are crucial for ensuring and assessing the quality of Online Distance Learning (ODL) programs. Institutions worldwide rely on these standards to maintain excellence in their online educational offerings. One of the prominent quality assurance organizations in the field of ODL is Quality Matters (QM). QM provides a research-based set of standards and a peer review process to evaluate the design and delivery of online and blended courses (Blieck et al., 2020). Similarly, the European Association of Distance Teaching Universities (EADTU) offers the E-xcellence Quality Assurance in E-learning Certification, focusing on assessing the quality of online and blended learning programs in higher education institutions across Europe (Blieck et al., 2020). Besides EADTU, the diversity of quality standards extends beyond national borders, with organizations like the European Foundation for Quality in E-Learning (EFQUEL) providing certification and quality assurance frameworks for institutions to assess and improve the quality of their e-learning initiatives (Ossiannilsson & Landgren, 2012). In the United States, the United States Distance Learning Association (USDLA) plays a significant role in accrediting and certifying distance learning providers, emphasizing quality assurance, best practices, and innovation in online education (Blieck et al., 2020). Additionally, the International Organization for Standardization (ISO) has developed standards such as ISO 29990 for learning services for non-formal education and training, which can be applied to ODL programs to ensure quality and effectiveness (Blieck et al., 2020). Furthermore, national quality assurance agencies like the Quality Assurance Agency for Higher Education (QAA) in the UK provide guidelines and frameworks for assuring the quality and standards of higher education, including online and distance learning provisions (Blieck et al., 2020). Such standards may vary in scope, spanning from local to national, regional and international domains (Jung, 2022). Certain countries delineate distinct benchmarks tailored specifically for Open and Distance Learning (ODL), whereas others adopt uniform standards applicable to both face-to-face and open and distance higher education contexts. These frameworks and standards cover various aspects such as course design, delivery, assessment, student support, and overall program effectiveness, aligning with international benchmarks and best practices in distance education and they offer extensive directives for formulating, implementing, and assessing online educational initiatives, thereby guaranteeing the provision of superior learning encounters for learners.

Conclusion

In the rapidly evolving landscape of Open and Distance Learning (ODL), the imperative of ensuring quality education is paramount. As Open Distance Learning gains more recognition for widening access to higher education worldwide, it is crucial to establish and uphold quality assurance procedures, which will ensure that ODL remains relevant and effective within evolving educational landscapes (Pitsoe & Maila, 2014). While discussing quality in ODL, important to recognize that it caters to a wide spectrum of educational methods beyond the conventional classroom model, providing flexibility and accessibility to learners from diverse backgrounds and circumstances (Sultan & Tarafder, 2007).Conventional quality standards and frameworks frequently encounter challenges in keeping abreast of the dynamic nature inherent in ODL. However, the proposition of devising globally oriented yet locally adaptive QA standards or frameworks holds promise in addressing these challenges while meticulously considering the intricacies of the ODL context (Jung, 2022). It is crucial that quality assurance and associated practices in ODL adopt an all-stakeholders oriented approach, prioritizing the involvement of a diverse array of stakeholders encompassing learners, educators, administrators, solution partners and policymakers. In the realm of ODL, it is also significant to consider the pedagogical dimension at the center of quality assurance practices. Acknowledging the pivotal role of effective teaching and learning in ODL, quality frameworks should accord primacy to pedagogical practices. This entails not only the evaluation of conventional metrics such as course content and delivery methodologies but also entails a nuanced consideration of elements such as learner engagement, interaction dynamics, and support mechanisms (Barker, 2024). Furthermore, the QA approach within ODL should espouse an "outputs before inputs" ethos (Jung, 2022). Rather than exclusively directing attention towards inputs such as infrastructure and resource allocation, an emphasis should be placed on the evaluation of actual outcomes and the ensuing impact of educational endeavors. Additionally, cultivating a culture of quality is another imperative that may stop an overreliance on control mechanisms typified by top-down regulations and audit procedures. Within a framework promoting creating a culture can empower all stakeholder to assume the ownership of quality assurance and the overall quality of ODL practice. Therefore, it is necessary to

nurture an environment characterized by a relentless pursuit of continuous improvement, innovation, and collaborative engagement.

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Assessing the Impact of Technology Use on Digital Competence and Technology Acceptance of Mental Health Professionals in Post-Disaster Psychosocial Support

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Abstract

This study examines the impact of digital technology use on the digital competence and technology acceptance among mental health professionals involved in post-disaster psychosocial support. Following the February 6, 2023 earthquakes in Turkey, the Inonu University in Malatya launched the Post-Disaster Psychosocial Support Intervention Action Plan (ASOPMEP). This research focuses on how technology integration within ASOPMEP affects mental health professionals' skills and attitudes. Through semi-structured interviews and content analysis, the study explores the role of voluntary participation and intrinsic motivation in digital skill development and technology adoption. Findings reveal that voluntary participation significantly enhances digital competence and positive attitudes towards technology, facilitated by a collaborative team environment. The study highlights the potential of digital technologies in improving the efficiency and reach of psychosocial support services, offering insights for future disaster response strategies.

Keywords: Digital competence, technology acceptance, mental health professionals, post-disaster psychosocial support

Introduction

On February 6, 2023, a series of devastating earthquakes struck Turkiye, causing widespread destruction and loss of life. The earthquakes, with magnitudes of 7.7 and 7.6, severely affected several provinces in the southeastern region of the country, including Kahramanmaraş, Hatay, Adıyaman, and Malatya. The catastrophic event resulted in the collapse of countless buildings, leaving thousands of people trapped under the rubble and tens of thousands displaced from their homes. The death toll surpassed 50,000, making it one of the deadliest natural disasters in Turkiye's history (AFAD, 2023).

In response to this catastrophic event, the Inonu University in Malatya initiated the Post-Disaster Psychosocial Support Intervention Action Plan (ASOPMEP) to provide crucial support to its staff and their families affected by the earthquakes. This study is an integral part of ASOPMEP, focusing on the role of technology in delivering effective psychosocial support services in the aftermath of the disaster. By investigating the impact of technology use on the digital competencies and attitudes of mental health professionals involved in ASOPMEP, this study aims to contribute to the optimization of post-disaster psychosocial support strategies.

Digital competence, defined as the confident, critical, and creative use of ICT to achieve goals related to work, employability, learning, leisure, inclusion and/or participation in society (Artacho et al., 2020; López-Meneses et al., 2020), has become increasingly important in mental healthcare settings (Jarva et al., 2022; Mudiyanselage, 2024; Roth et al., 2021). The rapid advancement of digital technologies has transformed the way mental health services are delivered, requiring professionals to adapt and develop new skills to effectively harness these tools (Bucci et al., 2019). In the context of post-disaster psychosocial support, digital competence is particularly crucial, as it enables professionals to reach and support affected individuals and communities remotely, overcoming geographical and logistical barriers (Augusterfer et al., 2018; Plasse, 2021).

Extraordinary situations, such as the COVID-19 pandemic and the devastating earthquakes in Turkiye, have further highlighted the significance of digital competence in mental healthcare as digital health interventions play a crucial role in massive disaster scenarios (Akbasli & Serin, 2024; Li, 2023). These crises have disrupted traditional face-to-face service delivery models and necessitated a rapid shift towards remote and digital interventions. Mental health professionals have been challenged to quickly adapt to new technologies and modes of service delivery, often with limited prior training or experience. In this context, understanding how extraordinary situations impact the digital competencies and attitudes of mental health professionals toward digital technology use is crucial for developing effective strategies to support their adaptation and ensure the continuity and quality of psychosocial support services.

Aim of the Study

This study aims to investigate how the use of digital tools and platforms within the ASOPMEP affects the digital competencies and attitudes towards technology adoption among the mental health professionals involved in providing post-disaster psychosocial support services. A particular focus of this research is to examine whether voluntary and intrinsically motivated participation in the project makes a difference in the development of technology competencies among these professionals. By exploring the experiences, perceptions, and attitudes of these voluntarily involved mental health professionals regarding technology use within ASOPMEP, this study aims to shed light on the factors that facilitate the effective adoption and integration of digital technologies in post-disaster psychosocial support services. The findings are expected to contribute to the development of strategies and interventions that support mental health professionals in leveraging digital technologies for efficient and effective service delivery in the aftermath of disasters, while taking into account the role of voluntary participation and intrinsic motivation in shaping their digital competencies and attitudes.

Methodology

Research Questions

1. How does voluntary participation and intrinsic motivation influence the digital competencies and attitudes towards technology among mental health professionals in the ASOPMEP project?
2. What transformations in digital competencies and attitudes occur among mental health professionals during their involvement in the ASOPMEP project?
3. In what ways does the integration of digital tools enhance the effectiveness of psychological support services provided by mental health professionals in the ASOPMEP project?
4. How does collaborative learning and peer support within the ASOPMEP project facilitate digital adaptation and skill acquisition among mental health professionals?
5. What challenges do mental health professionals face in mastering new digital technologies during their participation in the ASOPMEP project, and what strategies are effective in overcoming these challenges?
6. What are the implications of voluntary participation and intrinsic motivation for the delivery of post-disaster psychosocial support services, particularly in enhancing the digital competencies of mental health professionals?

Data Collection

Semi-structured interviews with professionals to gain in-depth insights into their experiences with digital tools, perceived impact on digital skills, attitudes towards technology, benefits, challenges and suggestions for improvement.

Data Analysis

In the data analysis phase of this research, a step-by-step content analysis approach was employed to systematically examine the qualitative data collected through semi-structured interviews with mental health professionals involved in the ASOPMEP. The process began with thorough familiarization with the interview transcripts, involving multiple readings and initial note-taking on recurring themes, concepts, and key points. Next, the data was coded using a framework based on the research questions, categorizing sections of text related to current digital competence, technology acceptance, frequency and methods of digital tool use, impact on digital competencies, attitudes towards technology, benefits and challenges of technology use, and suggestions for improvement. These codes were then grouped into broader themes that comprehensively addressed the research questions, followed by a review and refinement process to ensure accurate representation of the data. Each theme was clearly defined and named, focusing on distinct aspects that contributed to answering the research questions. Finally, a detailed report was written, providing an in-depth analysis of each theme supported by quotes from the transcripts, relating the findings back to the research questions and the overall study aim.

Results

Voluntary Participation and Intrinsic Motivation

The participants in the ASOPMEP project emphasized the significance of their voluntary involvement and intrinsic motivation in shaping their experience with digital technologies. Participant 1 stated, "I chose to participate in this project because I genuinely wanted to help those affected by the earthquake. This internal drive pushed me to learn and adapt to new technologies quickly." Similarly, Participant 3 mentioned, "Knowing that my efforts could make a difference in someone's life during this crisis was a powerful motivator. It made me more open to embracing new digital tools."

The voluntary nature of their participation also influenced their attitudes towards technology adoption. Participant 2 explained, "Since I willingly joined this project, I felt more committed to making the most out of the digital resources available to us. I was determined to overcome any technological challenges for the sake of providing effective support." Participant 5 added, "Being a volunteer in this project gave me a sense of ownership and responsibility. I was more proactive in seeking out ways to enhance my digital skills to better serve those in need."

Digital Competency Development and Transformation

The participants in the ASOPMEP project underwent a noticeable transformation in their digital competencies and attitudes over the course of their involvement. Many reported starting with a basic familiarity with common tools, but varied in their comfort levels. Participant 2 noted, "I was using digital technologies in a limited way, not very actively." However, the demands of the project necessitated a rapid upskilling. Participant 1 observed, "After joining the team, the frequency and variety of technology I used definitely increased."

This increased usage led to improvements in specific skills. Participant 3 shared, "I can now use WhatsApp and email much more effectively for file sharing and communication." Participant 4 added, "I found myself applying these skills in my other professional work as well." Beyond specific skills, there was a general boost in confidence and willingness to learn. "Initially I was apprehensive, but gradually I became more comfortable experimenting with new tools," recounted Participant 2.

Attitudes shifted from viewing technology as a burden to seeing it as an enabler. "Before, I used technology because I had to. Now, I appreciate how much it facilitates my work," remarked Participant 1. Participant 4 added, "I realized that technological proficiency is inevitable and essential in today's world."

The participants reported that their voluntary participation and intrinsic motivation positively impacted their digital competencies. Participant 4 shared, "My strong desire to contribute meaningfully to this project drove me to explore and master new digital tools rapidly. I surprised myself with how quickly I adapted and grew comfortable with previously unfamiliar technologies." Participant 2 noted, "The sense of purpose I felt as a volunteer fueled my willingness to invest time and effort into developing my digital skills. I actively sought out learning opportunities and resources to enhance my competencies."

Moreover, the collaborative and supportive team environment within ASOPMEP further facilitated the development of digital competencies. Participant 1 mentioned, "The shared commitment and motivation among the team members created a positive learning atmosphere. We openly shared knowledge, tips, and resources, which accelerated our digital skill acquisition." Participant 3 added, "The collaborative spirit within the team made it easier to ask for help and guidance when facing technological challenges. We lifted each other up and grew together."

Technology as an Enabler for Effective Psychological Support

The integration of digital tools was consistently reported as enhancing the effectiveness of the psychological support services provided. Participant 2 explained, "Using platforms like Google Forms and Drive made data collection and management much more efficient." Participant 1 added, "Online meeting tools allowed us to reach people remotely, expanding our impact."

The benefits extended to service recipients as well. "Some of my clients appreciated the flexibility and accessibility of online sessions," shared Participant 4. Participant 3 noted, "Collaborating digitally as a team helped us provide more coordinated and consistent support."

Collaborative Learning and Adaptation within the Team

Peer learning and support emerged as crucial factors in the team's digital adaptation. "Whenever I struggled with a new tool, I reached out to my more tech-savvy colleagues for help," shared Participant 2. Participant 1 added, "We developed a culture of sharing tips and troubleshooting together."

This collaborative ethos was seen as key to the team's overall success in upskilling. "By learning from each other, we were able to adapt more quickly than if we were working in isolation," observed Participant 4.

Challenges and Strategies for Digital Upskilling

Despite the overall positive trajectory, participants also faced challenges in mastering new technologies. "The initial learning curve was steep, and I sometimes felt overwhelmed," admitted Participant 2. Technical difficulties were another common hurdle. "Occasional issues with connectivity or software glitches could be frustrating," noted Participant 3.

To combat these challenges, participants emphasized the importance of dedicated technical support. "Having a team member, we could turn to for technical assistance was crucial," stated Participant 1. Structured training was another suggested strategy. Participant 4 recommended, "More formal training programs, tailored to our specific needs, would be really beneficial."

Leveraging in-team expertise was also seen as a valuable approach. "We have a wealth of knowledge within the team itself. We should systematically harness that for peer-to-peer learning," suggested Participant 3.

Implications for Post-Disaster Psychosocial Support

The participants reflected on the implications of their voluntary participation and intrinsic motivation for the delivery of post-disaster psychosocial support services. Participant 5 stated, "Our genuine commitment to this cause drove us to leverage digital technologies in innovative ways to reach and support affected individuals effectively. It showcased the potential of volunteerism in enhancing the digital capacity of mental health professionals during crises." Participant 4 added, "The experience highlighted the importance of fostering intrinsic motivation and providing opportunities for voluntary involvement in post-disaster psychosocial support initiatives. It can lead to a more engaged, adaptable, and digitally competent workforce."

The results indicate that voluntary participation and intrinsic motivation significantly enhanced the digital competencies and positive attitudes towards technology among mental health professionals in the ASOPMEP project, facilitated by a collaborative team environment, while also highlighting specific challenges and strategies for digital upskilling (see Table 1 for detailed coding themes).

Table 1. Coding Themes

Themes	Codes
Voluntary Participation and Intrinsic Motivation	- Genuine desire to help - Internal drive to learn and adapt - Commitment to effective support - Sense of ownership and responsibility
Digital Competency Development and Transformation	- Initial competence and comfort levels - Increased usage and skill development - Shift in attitudes towards technology - Rapid adaptation and mastery of digital tools - Proactive learning and skill development - Collaborative and supportive team environment - Knowledge sharing and mutual growth
Technology as an Enabler for Effective Psychological Support	- Efficiency in data management - Expanded reach and accessibility - Enhanced coordination and consistency
Collaborative Learning and Adaptation within the Team	- Peer learning and support - Troubleshooting together - Collaborative ethos
Challenges and Strategies for Digital Upskilling	- Initial learning curve - Technical difficulties - Need for dedicated support and structured training - Leveraging in-team expertise
Implications for Post-Disaster Psychosocial Support	- Innovative use of digital technologies - Potential of volunteerism in enhancing digital capacity - Importance of fostering intrinsic motivation - Engaged, adaptable, and digitally competent workforce

Discussion & Conclusions

The findings of this study provide valuable insights into the impact of technology use on the digital competencies and attitudes of mental health professionals involved in the ASOPMEP project. The content analysis reveals a significant transformation in mental health professionals' digital competencies and attitudes, largely driven by their voluntary participation and intrinsic motivation to support individuals affected by the devastating earthquakes in Turkiye. The participants' genuine desire to help and their commitment to providing effective support served as powerful motivators for embracing new technologies and developing their digital skills. This intrinsic motivation, coupled with the demands of the project, fostered a proactive learning environment where participants actively sought opportunities to enhance their competencies and adapt to the challenges posed by the post-disaster context. This might emphasize the role of situational factors effecting the technology use of individuals (Martin, 2015; Seifert et al., 2021)

The collaborative and supportive team environment within ASOPMEP emerged as a crucial factor in facilitating the development of digital competencies. Peer learning, knowledge sharing, and mutual support created a positive learning atmosphere that accelerated the acquisition of digital skills and encouraged experimentation with new tools. This collaborative ethos not only contributed to individual growth but also strengthened the team's overall capacity to leverage technology effectively. According to Chen et al. (2024), fostering a collaborative and supportive team environment is crucial for the development of digital competence, particularly in online teaching settings.

The integration of digital tools, such as Google Drive, Forms, meeting platforms, and WhatsApp groups, proved to be a game-changer in enhancing the efficiency and effectiveness of psychological support services. These tools enabled remote collaboration, streamlined data management, and expanded the reach of support to affected individuals and communities. The benefits extended beyond the service providers, as recipients also appreciated the flexibility and accessibility offered by online sessions.

H owever, the journey towards digital competency was not without challenges. Participants faced initial learning curves and technical difficulties, which were compounded by occasional feelings of being overwhelmed. These challenges highlight the importance of dedicated technical support and structured training programs tailored to the specific needs of mental health professionals. Studies have shown that structured e-learning and continuous support significantly improve digital competencies and help mitigate the psychological impacts associated with adapting to new technologies (Blake et al., 2020; Collins-Pisano et al., 2021). Leveraging in-team expertise through peer-to-peer learning also emerged as a valuable strategy for overcoming obstacles and fostering continuous improvement. Programs that incorporate peer coaching and peer support systems have demonstrated the effectiveness of mutual learning environments in enhancing digital skills and providing ongoing support (Cohen et al., 2014; Rosenberg et al., 2022).

The findings of this study have significant implications for the delivery of post-disaster psychosocial support services. The experiences of the ASOPMEP team demonstrate the potential of volunteerism and intrinsic motivation in driving the digital transformation of mental health professionals. By fostering a supportive and collaborative environment that encourages learning and innovation, organizations can cultivate a more engaged, adaptable, and digitally competent workforce.

Moreover, the study highlights the importance of leveraging digital technologies to enhance the efficiency, reach, and impact of psychosocial support services in the aftermath of disasters. The effective adoption and integration of digital tools can enable mental health professionals to overcome geographical and logistical barriers, provide more coordinated and consistent support, and ultimately better serve the needs of affected individuals and communities.

Looking forward, the findings suggest several avenues for future research and practice. Further exploration of the factors that contribute to the successful digital upskilling of mental health professionals, such as training approaches, support mechanisms, and organizational culture, could provide valuable insights for designing effective capacity-building initiatives. Additionally, longitudinal studies could shed light on the long-term impact of digital competencies on the quality and sustainability of psychosocial support services.

In conclusion, this study highlights the transformative potential of technology in enhancing the digital competencies of mental health professionals in post-disaster support. The ASOPMEP project shows how voluntary participation, intrinsic motivation, and collaborative learning can effectively leverage digital technologies to support mental health work. These insights can guide strategies that empower professionals to deliver efficient and compassionate care to disaster-affected individuals.

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Using the Book Creator platform in education

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Abstract

This work presents ways of using the Book Creator platform in education, specifically how to create interactive digital content through the Book Creator platform. The purpose of this work is to present the Book Creator platform that provides the teacher with useful tools in the didactic design, but also in the actual activity, in the classroom, in the interaction with the students. The objectives of the article are: (1) to present Book Creator platform that can be used in the didactic process, both in the real environment and in the virtual environment and (2) to describe the way of creating didactic resources (3) to complete the digital library Tools for creating Open Educational Resources in STEM education with Open Educational Resources that can be used to education, in pre-university education. The use of the Book Creator platform has some benefits, such as: customization of educational content by teachers for their class level, an engaging learning environment; access to various sites with interactive labs, development of student creativity, addresses different learning styles; makes possible learning at one's own pace. The use of such digital resources facilitates the creation of personalized learning experiences for students.

Keywords: Book Creator, education, virtual environment, digital resources, teaching, creativity.

Introduction

In the light of recent years, the development of educational content has overcome the barriers of paper and print, being increasingly present in the virtual environment, thanks to the Internet and new technologies. Many education providers have made strides towards the digital environment and are implementing a range of distance teaching, learning and assessment approaches.

Open Educational Resources (OER) are tools used in the teaching-learning-evaluation process, available in an accessible format and under a free license (Creative Commons). Some of the benefits of using OER can be listed as follows: accessibility for teachers, students, or anyone who wants to learn about a certain subject, freely, without costs or financial possibilities; flexibility for anyone who wants to modify the content, without fearing legislative consequences; they enhance the knowledge, creativity, and innovation of those who develop these resources; they can be adapted to any age level or requirements of those who learn.

An important objective of current educational policies is the integration of open educational resources (OER) in the didactic process. Open education, through OER, aims to widen access to quality education, makes learning accessible and customizable, offering more ways of teaching and learning, building, and sharing knowledge.

Thus, the United Nations recommendation on open educational resources (OER) states that information and communication technology (ICT) offers a huge potential for free, effective, equitable and inclusive access to OER, as well as their use, adaptation, and redistribution. These educational resources are accessible anytime and anywhere for everyone, including people with disabilities or people from marginalized or disadvantaged groups. They can help meet the individual needs of learners and stimulate innovative pedagogical, didactic, and methodological approaches.

Also, the European Commission recommends and supports the creation of digital resources for education. The Action Plan for Digital Education (2021-2027), adopted on 30 September 2020, is an initiative of the European Union on a common vision of high-quality digital education, aiming to support and adapt education systems on the continent to the era digital. European policy on the use of Open Educational Resources (OER) is diverse, as each EU member state has its own approach. However, there is a consensus that the use of RED is an important factor in achieving Sustainable Development Goal no. 4 (SDG4) of UNESCO, which aims to ensure quality, inclusive and equitable education and promote lifelong learning opportunities for all. European policy on the use of RED is constantly evolving, with a focus on promoting access to quality education for all, regardless of location or circumstances. The implementation of Open Educational Resources (OER) in Europe faces several challenges, such as those related to connectivity, the need for investment, monitoring and supervision of resources, or the adoption of digital technologies.

In Romania the pre-university education law (Romanian Ministry of Education, 2023) provides for the development and use of educational resources by teachers.

Book Creator is a digital tool/online platform that allows users to create interactive digital books. It was created in 2011 and can be used in many ways in the teaching process, for creating digital content, carrying out collaborative projects, digital portfolios, teaching resources, or use in both formative and summative assessment. In this regard, students can create their own digital books, adding text, images, audio, and video. This encourages creativity and the development of writing skills. Also, Book Creator allows multiple users to work together on the same book, thus promoting collaboration and teamwork. Students can use Book Creator to create projects and digital portfolios of their work, reflecting on their progress over time. Teachers can create digital books as teaching resources, such as interactive lessons or storybooks. And finally, Book Creator can be used for formative and summative assessment, allowing students to demonstrate understanding and application of knowledge in a creative format. Formative assessment refers to finding out how students have developed discipline-specific competencies, what misconceptions they have, so that the teacher can plan future instruction to meet student needs. With Book Creator, teachers can listen to the voices of students, capture their thinking, and have a shareable product that analyzes their development.

Book Creator can be used effectively for STEM subjects, including physics. Here are some ways it can be used:

- Experiments and prototypes: Students can be encouraged to create and test hypotheses or designs under real conditions. For example, in physics, students can design experiments to understand the laws of motion or the principles of thermodynamics.
- Evaluating and generating evidence: STEM learning involves the ability to generate and evaluate evidence, a crucial aspect of the principles of science and engineering. Students can use Book Creator to document and present the results of their experiments.
- Integrating Scientific Models: Book Creator can be used to integrate scientific models, such as force diagrams or atomic models, into books created by students.
- Learning Resources: Book Creator provides several resources that can help effectively implement each phase of the 5E scientific model, engineering process or design thinking. The 5E model (Engage, Explore, Explain, Elaborate, Evaluate) refers to an inquiry-focused method that provides students with a way to connect scientific ideas to their experiences and apply their learning.
- Simulations: In physics lessons, Book Creator can be used to explore various phenomena and understand concepts such as force or motion through simulations.

These are just a few examples of how Book Creator can be used to enhance STEM learning. It is a versatile tool that can be adapted to suit the specific needs of each class or individual student.

Book Creator can be integrated into interdisciplinary projects in many creative and effective ways, such as:

- Collaborative Projects: Book Creator enables real-time collaboration so students can work together on the same book. For example, one could have a project where each student contributes a page to present their understanding of a concept learned in class.
- Group Projects: Book Creator is a great tool for group presentations. Students can use the many multimedia tools available to present their work. All group presentations can be combined at the end to form a collaborative book.
- Digital portfolios: A digital portfolio can be kept for the entire class, capturing each student's favorite journal entries throughout the year.
- Resource libraries/ learning outcomes: You can choose a topic and each student writes his own poem. One can combine all the poems at the end and have a collaborative book that can be shared with students and families.
- Cultural dialogue: Book Creator can facilitate cultural dialogue and build empathy by giving students a space to collect conversations and reflect on their findings.

These are just a few examples of how Book Creator can be used to enhance interdisciplinary learning. It is a versatile tool that can be adapted to suit the specific needs of each class or individual student.

In STEM disciplines and especially in Physical discipline, Book Creator can be used for:

- Documenting Experiments: Students can use Book Creator to document and present the results of their physics experiments. For example, they can perform an experiment to understand the laws of motion and use Book Creator to document the process and results.
- Creating interactive physics books: Teachers can create interactive physics books that include text, images, audio, and video to explain complex concepts.

- Presenting research projects: Students can use Book Creator to present their physics research projects. They may include the results of the research, the methods used and their conclusions.
- Creating tutorials: Teachers can create video or audio tutorials to explain physics concepts.

These are just a few examples of how Book Creator can be used in physics. It is a versatile tool that can be adapted to suit the specific needs of each class or individual student.

Book Creator can support the development of critical thinking and creativity skills in several ways:

- Critical Thinking: Book Creator can help develop critical thinking by facilitating the processes of problem solving, analysis, synthesis and evaluation1. For example, students can use Book Creator to document and present the results of their experiments, analyzing and evaluating the results to draw conclusions.
- Creativity: Book Creator offers a range of multimedia tools that allow students to express their creativity. For example, students can create interactive books that include text, images, audio, and video to explain complex concepts.
- Thinking Routines: Researchers at Harvard's Project Zero have created a series of thinking routines visible as structures or scaffolds to help develop critical and creative thinking1. Book Creator can be used in conjunction with these thinking routines to structure and support students' mental processing.
- Technology and problem solving: Book Creator can be used to support student thinking and problem solving1. For example, students can use Book Creator to explore and solve problems as well as make decisions.

By using Book Creator, students can have unlimited opportunities to articulate their thinking, which can help develop their critical thinking skills and creativity.

Methodology

The purpose of this work is to present Book Creator platform that provides the teacher with useful tools in the didactic design, but also in the actual activity, in the classroom, in the interaction with the students.

The objectives of the article are:

(1) to present Book Creator platform that can be used in the didactic process, both in the real environment and in the virtual environment and
(2) to describe the way of creating didactic resources
(3) to complete the digital library *Tools for creating Open Educational Resources in STEM education* with Open Educational Resources that can be used to education, in pre-university education.

Book Creator for Teacher - Open Educational Resources in STEM education

Book Creator is a tool that allows teachers or students to create books, comics, and more with text, images, audio, and video. It’s used for various subjects in the classroom or at home for all disciplines, including literacy, STEM, and arts (Book Creator).

Here are some of its key features:

- Create, read, and publish - it offers a multimedia toolset that is easy to use and accessible.
- Literacy - with Book Creator, literacy comes alive. It supports reading, writing, speaking, and listening.
- Resources - it provides templates, lesson plans, case studies, webinars, and more.
- Community -there is the opportunity to join a community of passionate educators and unlock the full potential of students.

It can be used in classrooms around the world to demonstrate knowledge acquisition, learning and to express creativity. Teachers and students alike love it for its simplicity, versatility, and inclusiveness.

In the Book creator account, the teacher/student can create and edit books, libraries, view other libraries, resources or share various own products with others. It is a great tool to improve learning and engagement in the classroom. Book creator contains facilities for teachers, students, and schools (Figure 1).

To be able to work with this platform, a teacher or student account must first be created, depending on the user's profile, by accessing the button „Create a FREE account”. If the account is created, then the user logs in as a teacher, or as a student, by pressing „Log In”. (Figure 1).

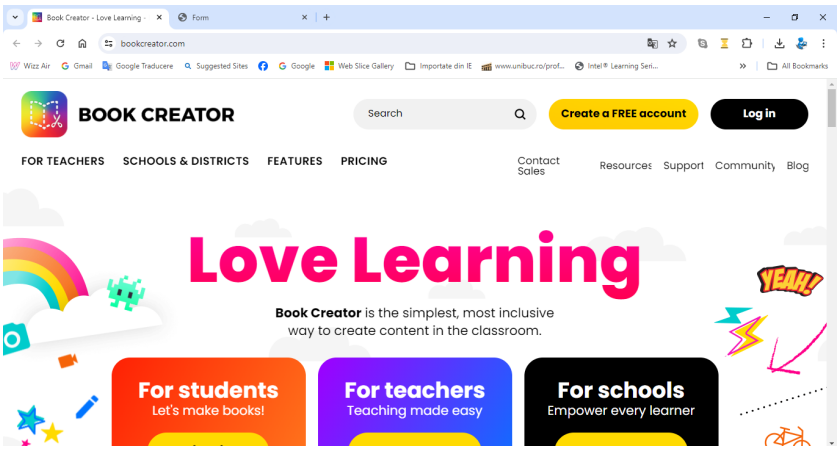

Figure 1

After the account has been created on the platform, it can be accessed in Teacher or Student mode. (Figure 2)

Figure 2

On the home screen, there is a library of books called “My Libraries”, with a pre-set library named “My Books”. There is also the possibility to create new libraries. In the Free version, there is the possibility to create up to 40 digital books. The platform also has a virtual assistant. (Figure 3.a). For example, a library can be created for each class, which contains lessons/learning units for each chapter. Some permissions can be granted to students, as can be seen in figure 3.b.

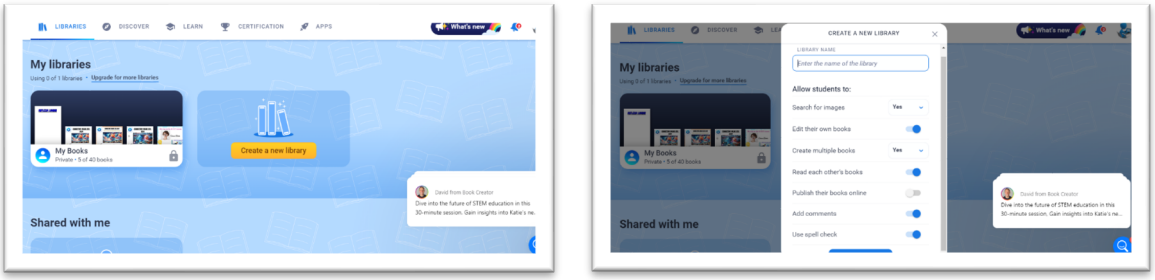

Figure 3. a); b)

To create a book, access the „New Book” button. Choose a template for the new book - the *Choose a book shape* button, or you can import a pdf document.

If a pdf document is uploaded, the platform asks which pages are included in the book. After the selection has been made, press the Add button and choose the desired format - Book shape. The platform creates a book, which the user can enrich with other information, video messages, text, or image. The uploaded pages are in the form of images that can be processed.

If one wishes to create a book without uploading a PDF document, the option 'Choose a book shape' is selected. Choose a template, then add various elements (Figure 4) using the button on the top right. With "Embed content in your book", various content such as a YouTube video, a link to a web page, a Google Form, a Flip, and much more can be uploaded. An avatar was created on the front page with Voki, to present the lesson. The text or other elements in the book can be formed using the button on the top right . (Figure 5). Scrolling through the books is done with the Play button . Navigation between pages is done using the left/right arrows. Adding pages is done by pressing +, which appears instead of the arrow on the right.

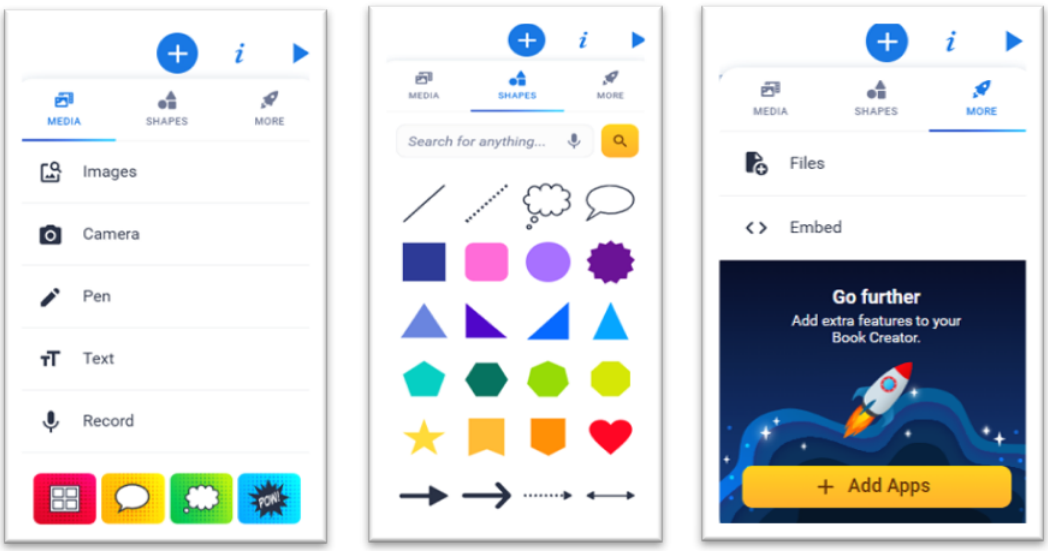

Figure 4. a); b); c)

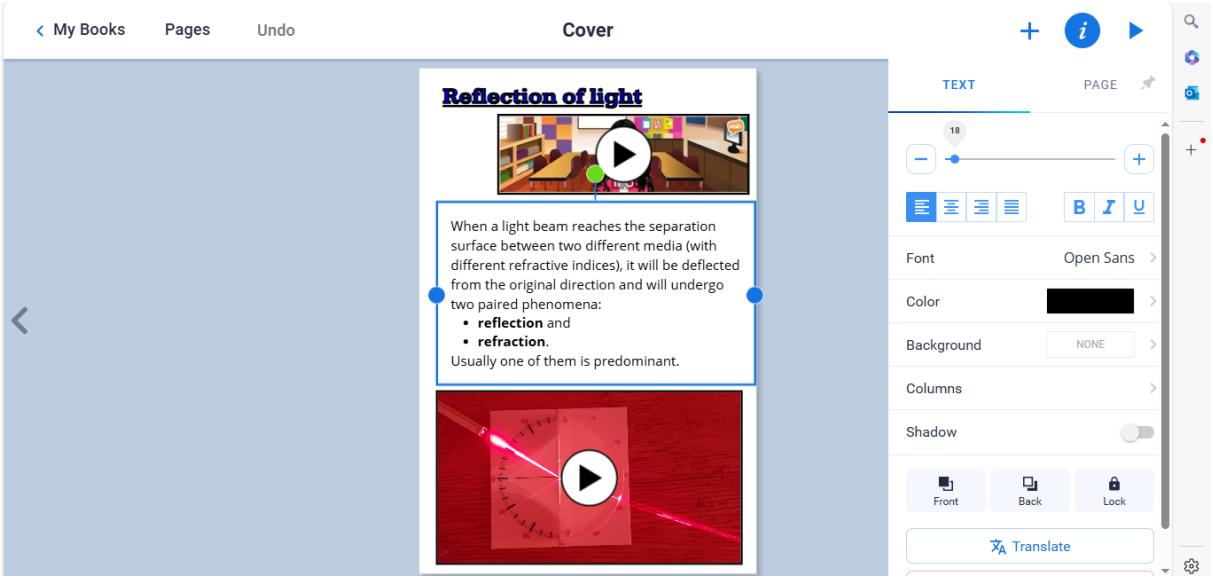

Figure 5

Results.

The result is a digital physics book for the lesson Reflection and Refraction of Light, intended for secondary school students, from the 6th grade (12-year-old students) (Bostan&All, 2023).

This is available at https://read.bookcreator.com/MZ77LPXuXYe9mcxDFbckU6SyxzE2/TCkuGrsGQQ-evq-0zGN9zw .

The digital library Tools for creating Open Educational Resources in STEM education has also been updated with this Open Educational Resource - Book Creator, which can be used in education, in pre-university education.

Conclusions

The Book Creator platform offers the teacher useful tools in the didactic design, but also in the actual activity, in the classroom, in the interaction with the students.

The Book Creator platform can be used in the teaching process, both in the real environment and in the virtual environment. Students can see the lesson in an attractive way and learn at their own pace. Also, students can create projects for various lessons, which they can share with the teacher and classmates. Also, group projects can be created, students can collaborate in making an educational product based on which they can be evaluated.

This article described how to create didactic resources, presenting the steps that must be followed in the process of developing the digital book.

Finally, the digital library Tools for the creation of Open Educational Resources in STEM education was completed.

Using the Book Creator platform has some benefits, such as: customization of educational content by teachers for their class level, an engaging learning environment; access to various sites with interactive labs, development of student creativity, addresses different learning styles; makes possible learning at one's own pace. These benefits can be exemplified as follows:

- Question generation: Book Creator can generate questions for any YouTube video in seconds.
- Creating dialogues, stories, letters, or articles, on any topic and for any level.
- Create assessment tests with various item types, such as multiple-choice questions, open-ended questions, and true/false statements.
- Find interesting discussion questions, facts and quotes from famous people that can be used to stimulate class discussions.
- Creating vocabulary exercises. Book Creator can generate exercises with blanks and open brackets.
- Ease of use. Book Creator is simple and easy to manage.
- Addresses all learning styles. Book Creator enables the audio, visual and kinesthetic needs of all students to be addressed in the same book.
- Interactivity: Book Creator is designed to teach students by getting them excited to create their own books on the topics they are studying.

Using Book Creator in the teaching process can have some disadvantages, such as:

- Distraction - digital devices can be distracting, which can lead to a loss of focus or distraction from the task during class.
- It can be addictive to technology. An over-reliance on digital technologies can hinder the development of students' essential skills such as critical thinking and problem solving.
- It can induce an over-concern with design - although Book Creator acts as a creative outlet for many students, they may become too preoccupied with the design aspects of the application to put minimal effort into the writing part.
- Functionality limitations - the font library and range of shapes available are limited, which is great for school-aged children, but could limit teachers who have more advanced digital skills.

It is important to balance the use of such tools with traditional teaching and learning methods. Judicious use of technology can enhance learning, but it should not replace human interaction and evidence-based pedagogical approaches.

The use of such digital resources facilitates the creation of personalized learning experiences for students.

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zSpace Quick Start Guide for STEM Education, Book Creator | zSpace Quick Start Guide for STEM Education

Twee - an AI tool, friend of the teaching process

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Abstract

This paper presents ways of using the Twee platform in education, not only in English classes but also for other subjects, in this case for Physics. Twee is an AI tool designed to facilitate lesson planning for English teachers. It uses artificial intelligence to generate didactic design tools that can be used both in the physical context, in the classroom, and in the virtual environment. Twee offers a wide range of features that can help teachers create questions, dialogues, stories, letters, articles, multiple choice questions, true/false statements and more. The article details the use of Twee for Physics, 12-year-old students, using a video on Light Reflection. The purpose of this article is to present how Twee, based on a video uploaded to the platform, can create curriculum design products. The research objectives relate to: (1) the degree of accuracy with which Twee can convert the video message to text; (2) the degree of accuracy with which Twee can create various rating items based on a video uploaded to the platform. Twee is a tool that can save time for teachers, allowing them to focus more on interacting with students and improving the learning process. However, as with any digital tool, it is important to use it judiciously and balance it with other forms of learning.

Keywords: Twee, AI, AIED, Physics education, virtual environment, digital resources, teaching.

Introduction

In today's digital age, artificial intelligence (AI) has become a powerful catalyst for innovation in many fields, including education. One of the tools that exemplifies this revolution is Twee, an AI-powered tool that was developed specifically for English teachers (What is Twee in a Nutshell). This tool uses advanced AI algorithms to generate a wide range of questions, activities, lessons, and readings, tailored to the specific needs and proficiency levels of students (Twee: An AI-Powered Tool for English Teachers). By harnessing the power of AI, Twee aims to revolutionize the way English is taught, making it more dynamic, engaging, and effective for both teachers and students.

This paper presents ways of using the Twee platform in education, not only in English classes but also for other subjects, in this case for Physics.

This article proposes to explore the beneficial characteristics of Twee and how it can be used in various disciplines to enhance learning. We will discuss how Twee can save teachers' valuable time, as well as the quality of educational materials. We will also look at the versatility and staffing they offer, allowing teachers to tailor lessons to meet the specific needs and interests of their students. Finally, we will discuss how Twee can be used to provide the learning experience in and out of the classroom.

Methodology

The article details the use of Twee for Physics, 12-year-old students, using a video on Light Reflection. (Bostan&All, 2023).

The purpose of this article is to present how Twee, based on a video uploaded to the platform, can create curriculum design products.

The research objectives are: (1) to determine the degree of accuracy with which Twee can convert the video message to text; (2) to assess the degree of accuracy with which Twee can create various assessment items based on a video uploaded to the platform.

Twee - an AI tool for the teaching process

Twee is an AI tool designed to facilitate lesson planning for English teachers. It uses artificial intelligence to generate didactic design tools that can be used both in the physical context, in the classroom, and in the virtual

environment. Twee offers a wide range of features that can help teachers create questions, dialogues, stories, letters, articles, multiple choice questions, true/false statements and more.

Some key features of Twee are:

- Generating Questions: Twee can generate questions for any YouTube video in seconds.
- Generating dialogues, stories, letters, or articles, on any topic and for any level.
- Create assessment tests with various item types, such as multiple choice, open-ended questions, and true/false statements.
- Find interesting discussion questions, facts and quotes from famous people that can be used to stimulate class discussions.
- Creating vocabulary exercises: Twee can generate fill-in-the-blanks and open-bracket exercises.

The Twee platform is a tool created to help teachers design teaching and learning activities and share their teaching experience. This tool was developed at the London Knowledge Lab, UCL Institute of Education (Knowledge Lab, University College London) by a team led by Prof. Dr. Diana LAURILLARD and it's free for anyone. UCL Institute of Education is the most prestigious higher education institution, as it appears in the top universities in the field of education.

Through the Learning Designer platform, teachers receive a means that facilitates their didactic design, as well as the coordination of instruction with the help of the computer. This platform contains a suite of tools for didactic design, it allows each teacher to share his experience, to highlight good practice experiences; in fact, this platform can be considered a permanent support for pedagogical exchanges at the planetary level. The tool allows teachers to see other approaches to topics/lessons that interest them. Teachers can design their own lessons, or see other teaching projects, which they can use as inspiration. (Figure 1)

The Learning Designer platform contains two menus:

- the Browser menu - contains a library of didactic designs that are public (collection of pedagogical templates), which can be adapted in your own didactic design.
- the Designer menu - presents the pedagogical templates, which have the role of helping teachers in organizing their own ideas for the design of the teaching/learning unit.

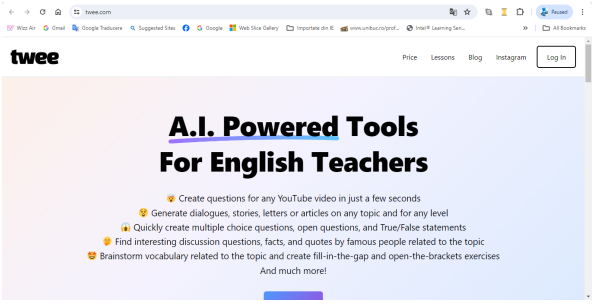

Figure 1

After the user has logged in to the platform (Figure 2. a)), the last created projects appear on the home screen (Figure 2. b)). To create a new project, access *My Projects*, then click on *Create Project*.

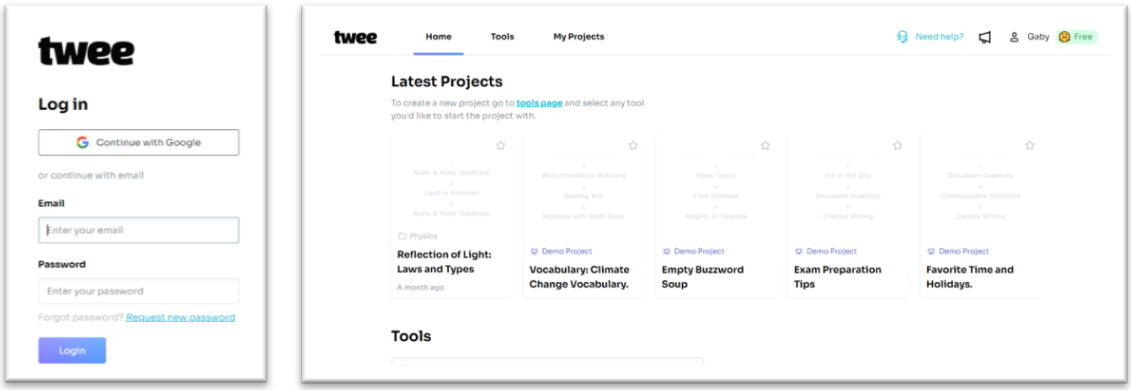

Figure 2. a); b)

Various options can be chosen here (Figure 3. a)). In the present article we will exemplify how we can build a lesson based on video content (You Tube). For the Free version, the movie must be less than 5 minutes.

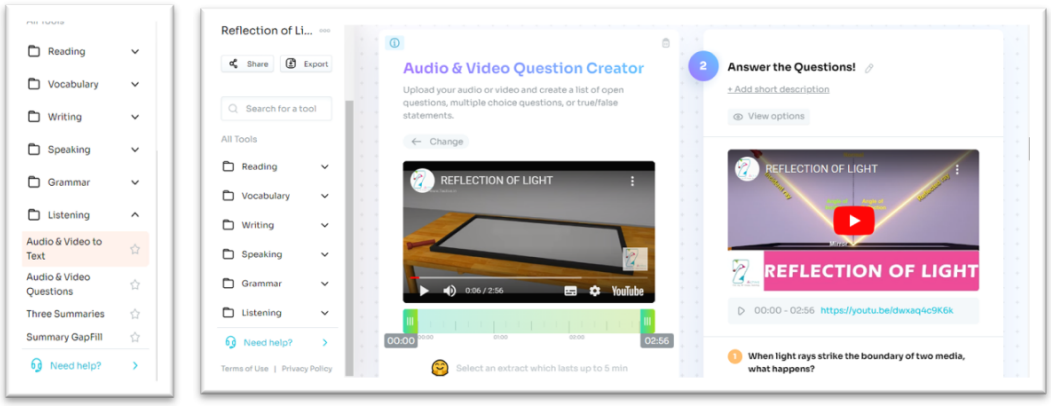

Figure 3. a); b)

After the video has been converted to text, other options can be accessed, such as the creation of evaluation items. Also, the platform can suggest activities for a text *Lead in activities for a text*, *Summary GapFill*, *Three Summary*, or various types of questions. (Figure 4.)

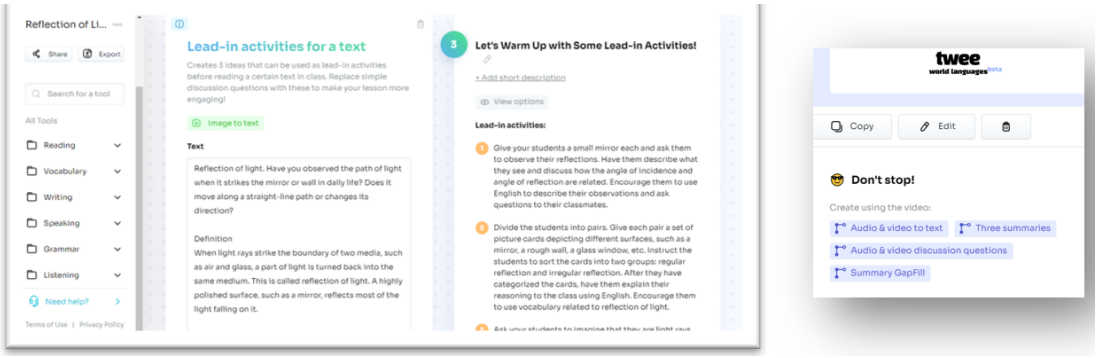

Figure 4. a); b)

After the content has been created (in our case the Light Reflection lesson, for a 6th grade gymnasium class), it can be distributed to other users, respectively to the students of the class. Access the Share icon on the top left of the screen, a new window will appear, where the teacher can fill in the email addresses of the invited students or a fellow teacher. They can view, edit or be co-owners of the content created on the Twee platform. In the Pro version (with money), the content can be exported as a pdf document. or in Google Forms. (Figure 5.)

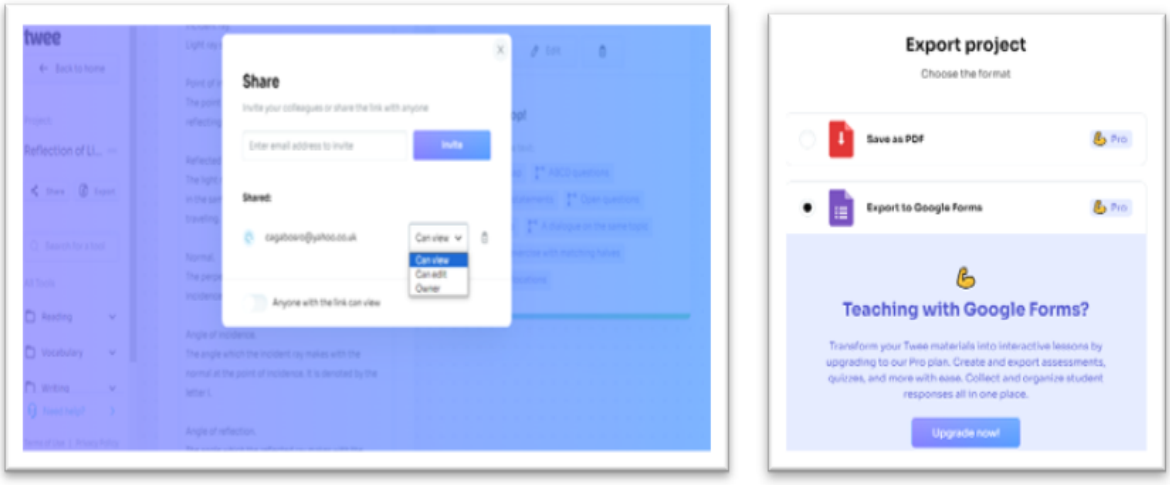

Figure 5

Results.

The result is a digital content of a physics lesson, from the optics chapter, namely Reflection of light, intended for secondary school students, from the 6th grade (12-year-old students). This is particularly useful for the teacher and his students. (Bostan&All, 2023).

Conclusions

Following the qualitative research, we could observe that the degree of accuracy with which Twee can convert the video message into text is very good, at least for the English language. I noticed that other languages were added, such as French, German, Italian, Spanish. The Turkish or Romanian language are not currently listed.

Also, the degree of accuracy with which Twee can create various assessment tests based on a video uploaded to the platform is quite good. It can create objective, semi-objective and subjective items.

Using Twee, like any other AI tool, comes with its own pros and cons.

Advantages: efficiency; personalization of educational content; diversity in the creation of evaluation items.

Disadvantages: it could lead to a dependence on technology and a loss of teachers' ability to manually create educational content; content quality may vary and may require human review and adjustment. Furthermore, although AI has made significant progress, there are still limitations. For example, Twee may not always understand context or nuances of language, which may lead to errors or ambiguity in the generated content.

Twee is a tool that can save time for teachers, allowing them to focus more on interacting with students and improving the learning process. However, as with any digital tool, it is important to use it judiciously and balance it with other forms of learning. The platform can be used not only by foreign language teachers but also by other subjects, including those in the STEM subject area.

It is important to balance the use of AI tools such as Twee with traditional teaching and learning approaches. Judicious use of technology can enhance the learning process, but it should not replace human interaction and evidence-based pedagogical approaches.

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The Impact of Artificial Intelligence on English Second Language Students: The review of Turnitin and Grammarly.

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Abstract

Inclusion in Higher Education has been dramatically debated among scholars. For ages language has been perceived as one of the gate-keepers, denying many students access to the academic discourse. With the growing usage of Artificial Intelligence (AI), these technologies can have positive and negative implications, specifically for second and third-language speakers. This paper discusses the application of Natural Language Processing (NLP) technologies- Turnitin and Grammarly in particular, and how their automated grading and feedback tools affect second-language English speakers. This argument is underpinned by the Autonomous and Ideological Models of literacies, that student writing and use of language is not only about grammar and spelling but is understood as entailing a host of issues pertaining to identity and how knowledge is produced, rather than simply the instrument to acquire technical skills. Literature on the use of Turnitin and Grammarly was reviewed, each claiming a market of between 30 and 34 million users, and the findings revealed that amidst several benefits offered by these technologies, they still lack recognition of context. This view connotes literacy as a singular, static skill rather than a multifaceted and dynamic set of practices that are shaped by various sociocultural, technological, and individual factors. The recommendation is that while we take advantage of the benefits offered by these technologies, we should also be a coincidence that reading and writing always concern social practices related to particular contexts and the kind of learning that takes place will always be dependent on those contexts.

Keywords: Artificial Intelligence, English Second Language Speakers, Autonomous Academic Literacies Model, Ideological Academic Literacies Model, Inclusion

Introduction

Language has long been perceived as a critical academic gatekeeper (Janks, 2004; McKenna, 2010, 2012; Assalihee & Boonsuk, 2022; Pham, 2022). English, as a global lingua franca, is also predominantly a primary medium of instruction across academic institutions (Baker & Fang, 2020; Galloway & Rose, 2021; Jindapitak & Savski, 2022). For instance, in Malaysia and South Africa, English is spoken as a second or third language. In Malaysia students predominantly speak Malay and Thai. Despite this linguistic landscape, English is still mandated as the medium of instruction from elementary through higher education (Assalihee & Boonsuk, 2022). Similarly, in South Africa, there are about eight native languages, with a significant number of students from working-class black communities speaking English as their second language. Nevertheless, the majority of South African universities utilise English as the medium of instruction, with only a few institutions still employing Afrikaans. Therefore, students whose home language diverges from the language of instruction, and their native languages are often marginalised, and they frequently encounter difficulties in higher education. (Wildsmith-Cromarty & Balfour, 2019; Pham, 2022). This raises concerns about how academia navigates issues of inclusion in education, particularly about teaching and learning in English.

Amid these issues, the advent of artificial intelligence (AI) introduces both opportunities and challenges, particularly for non-native English speakers. It has been greatly debated how these technologies can help students to improve their technical writing in English (Nova, 2018; Koltovskaia, 2022), however little attention has been given to how these technologies can potentially exclude non-native English speakers. This paper examines the use of Natural Language Processing (NLP) technologies, specifically Turnitin and Grammarly, and investigates the impact of their automated grading and feedback tools on individuals using English as a second language. Turnitin and Grammarly were selected due to their prominence among the top ten automated NLP tools and their familiarity with the researcher.

This paper argues that while these technologies offer some value in enhancing students' technical language skills, their autonomous functionalities, often ignore the fact that language is not only about achieving competency in using proper punctuation or correct spelling of words, but language is socially and culturally constructed and extends beyond the mere construction of grammatically correct sentences (Street, 2006). This analysis is significant to policymakers and educators who use these technologies, to be conscious of students' diversified identities and

socio-cultural backgrounds and identities when integrating these tools in teaching and learning so that inclusion in education is promoted.

Literature and theories.

An overview of NLP: s Grammarly and Turnitin:

Natural Language Processing (NLP) is an interdisciplinary field situated at the nexus of computer science, artificial intelligence, and linguistics, dedicated to enabling computers to understand, interpret, and generate human language. The primary objective of NLP is to facilitate natural language interactions between humans and machines, thereby enabling computers to perform a variety of language processing tasks. Grammarly and Turnitin are tools that employ Natural Language Processing (NLP) to analyse text for grammatical errors, spelling mistakes, punctuation errors, and stylistic issues. These tools also provide automated grading and feedback, assisting users in enhancing their writing skills by suggesting corrections and offering explanations for the recommended changes. While some researchers commend the accuracy of these tools (Dodigovic & Tovmasyan, 2021; Fitria, 2021; Anil et al., 2023), others critique their limitations (Dembsey, 2017; Yousofi, 2022), and some express ambivalence (Ghufron & Rosyida, 2018).

While Grammarly is partially commercialised, Turnitin is fully offered at a cost. In its free version, Grammarly claims to correct 150 types of errors, including critical grammar and spelling mistakes, and it also checks writing across various online platforms, such as email and social media. The premium version of Grammarly offers enhanced features, including over 400 checks and functionalities, such as vocabulary enhancement suggestions, plagiarism detection, and citation suggestions (Nova, 2018).

On the other hand, Turnitin is widely known for its text-matching tools, often mistakenly referred to as plagiarism detection tools (Zaza & McKenzie, 2018; Mphahlele & McKenna, 2019). Recently, Turnitin introduced an AI. Nevertheless, Turnitin is widely regarded as an effective tool for flagging potential plagiarism (Wigtil, 2022; Kostka & Maliborska, 2016) and reducing technical errors in writing (Eva, 2018). Some features that could significantly contribute to teaching and learning, such as Turnitin's GradeMark, which provides formative and summative feedback on students' work, are not thoroughly explored and are only used for technical language correction (Abrahamson & Mann, 2018; Balbay & Kilis, 2019). As indicated earlier, while extensive literature exists on these tools and their functionalities, there has been less focus on the ideological implications of their current usage in academia.

The Autonomous Model of Literacy and The Ideological Model of Literacies

The Autonomous Model OF Literacy is underpinned by the notion that literacy is inherently neutral and universally applicable, disregarding the diverse cultural frameworks within which literacy practices occur (Street, 2006). Language primarily functions as a means to encode and decode meaning (Street, 2006), thereby reducing reading and writing to the production of grammatically correct text. his perspective overlooks the complexity of meaning construction, assuming that students interpret texts precisely as intended by the author, with meaning neutrally embedded in the text awaiting decoding. Contrary to this view is the Ideological Model of Literacy which states that it is imperative to acknowledge that meaning is a contested terrain shaped by the interactions of various participants in the process of its construction (Lea & Street, 1998). The model is offering a culturally attuned perspective that acknowledges the diversity inherent in literacy practices across various contexts. This theoretical framework posits literacy as a social practice, recognising the intricate social embedding of reading and writing activities, which are heavily shaped by contextual factors (Street, 2006).

Within the conceptualization of literacy as a social practice (Street, 2005), the model refutes the notion that literacy can be neutrally imparted (Street, 2006). Instead, it contends that approaches to reading and writing are intricately interwoven with notions of knowledge, identity, and societal engagement. Educators and learners alike harbor specific understandings of literacy that inform the learning process and shape the acquisition of literacy skills. Reading and writing practices are inherently situated within particular social milieus, and the nature of literacy acquisition is contingent upon these contextual dynamics. Thus, the ideological model challenges the way NLPs

are used to address English language skills, which this paper argues is more autonomously oriented than ideological, which is elaborated in the next section.

Findings and Discussions

The autonomous and ideological implications of using NLPs for English second language speakers

Cultural Contexts and NLPs

Language and culture are intricately intertwined, as demonstrated by research (Assalihee & Boonsuk, 2022). These authors show that students place value on their cultural context in the learning process. Hence, they prefer instructional materials designed for teaching English to be aligned with their cultural and contextual backgrounds, which is an aspect often found lacking in NLP tools. NLPs often give feedback to students based on the algorithm designed by someone more likely with a Western perspective. Yet communication competencies are based on several factors including the capacity to use culturally appropriate language, and the capacity to learn the language in the context (Celce-Murcia, Dörnyei, and Thurrell 1995). Hence, a study aiming to enhance Malaysian students' interest in learning English found that students perceived learning materials, including textbooks, as inadequately designed and impractical for their real-world cultural contexts. The learning material was promoting the dominant Western culture which appears to be more powerful and visible than their indigenous cultures, to the point where they questioned the relevance of learning English. This discrepancy led to significant learning gaps due to difficulties in relating the materials to their own cultural backgrounds (Assalihee & Boonsuk, 2022). Such findings highlight the specific expectations students hold regarding academia, as noted by Barrón and Gruber (2021), which are often affected by power relations. The association of writing with power relations holds particular significance within an ideological framework (Collins & Blot, 2003). Power dynamics exert influence over myriad aspects of daily life, including educational opportunities, social positioning, and identity formation (Reder & Davila, 2005). These power struggles become a restraint to students because, as Bourdieu (1991) noted, even if these students may excel academically within their communities without mastering the dominant language, they encounter setbacks in academia due to a lack of what is termed 'linguistic capital' because where English is promoted as the dominant language, indigenous languages are often marginalised, undermining the value of students' mother tongues and impacting their identities, leading to tensions regarding access to education (Janks, 2004; Case et al., 2018).

The mechanistic use of NLPs and student identity.

As indicated earlier, Grammarly and Turnitin usage is for grammar corrections and "plagiarism detection," which they have proven to be successful to a certain extent, but they have been noted to be less effective in addressing issues related to context, content, and organisation (Ghufron & Rosyida, 2018). Turnitin, for instance, is often used by students solely to reduce their similarity index score without fully engaging with the feedback provided. Orlando et al. (2018) termed this behaviour indicative of a performance goal orientation, wherein students aim to avoid plagiarism detection by achieving a low similarity index. Their approach to Turnitin is characterised by a mechanistic mindset, focusing on modifying their writing to enhance originality, as reflected in the similarity index. Mphahlele and McKenna (2019) caution against the potential consequences of technology being perceived as a remedy to a perceived threat, as this may lead non-native English speakers to tailor their writing to meet the system's criteria, with the risk of losing sight of the purpose of writing coherently and contributing meaningfully to the existing scholarly discourse. In such scenarios, students may utilise the text-matching report provided by NLPs to identify sections of their assignment requiring modification, submitting their work multiple times until the similarity index meets acceptable thresholds. Pavelich (2019) similarly likens this scenario to a plagiarizer's dream, meaning it teaches students how to become good plagiarisers in that they can take someone's words, and put them through the system repeatedly until the system validates them as original.

When NLPs are used in this manner, students' identities are affected. Students are compelled to conform to the writing style dictated by NLPs, and in the process, they lose who they are because they cannot identify with how the text has been constructed by the machine. Nova and Utami (2018) investigated the perspectives of EFL (English as a Foreign Language) students regarding their use of Turnitin. The findings indicated that students expressed dissatisfaction with the feedback tools, noting instances where even their own sentences were flagged as plagiarism, and they were forced to change them to align with the system. This frustration by students is also

captured in Orlando et al.'s (2018) research, where a student did not identify with the recommendations of Turnitin but had little choice because the student might be excluded or called a plagiarist in cases where recommendations are ignored (Mphahlele & McKenna, 2019).

> *I am bilingual, and so I have to start assignments a lot earlier than everyone else because it takes me so long. Turnitin forces me to make changes to sentences. My English…. Turnitin would help. It forced me to change. I said to myself before that I wasn't able to change it [the highlighted sentence], but I found a way to do it because I had to. No matter if I spent one hour changing it, I had to change it; otherwise, I thought I wouldn't pass. Turnitin kind of forced me to change it. It gave me these new skills to paraphrase. (Orlando et al., 2018, 49).*

The frustration expressed by this student and perhaps many other EFL students might be evidence that it is not yet understood by academia that literacy is a social practice (Street, 2005), and it cannot be imparted neutrally outside of socio-cultural backgrounds (Street, 2006). Therefore, approaches to reading and writing are deeply intertwined with perceptions of knowledge, identity, and existence. Both educators and students hold particular conceptions of literacy that influence the learning process and the nature of literacies acquired. Since reading and writing practices are inherently shaped by specific social contexts, NLPs should be used with the consciousness that literacy remains a domain marked by ongoing contestation, both in terms of its interpretation and its application, rendering certain interpretations of literacy inherently 'ideological' (Street, 2006).

Conclusions and recommendations

This paper aimed to highlight that using NLPs such as Turnitin and Grammarly in an autonomous way may potentially exclude students who are not English native speakers. While acknowledging the effectiveness of these tools to a certain extent, the paper advocates for an ideologically nuanced approach to language learning that goes beyond mechanical assessment when integrating the NLPs into teaching and learning. The paper suggests adopting an inclusive stance towards the diverse varieties of global English spoken by students when they engage with feedback from these NLPs. It also advocates for assessing written and spoken assessments based on the strength of students' ideas and their ability to demonstrate learning outcomes rather than solely focusing on semantics and descriptive language habits that align with standardised norms (Lambert, S., Funk & Adam, 2022). This approach aligns with the ideological model of literacy, which emphasises the significance of social practices in reading and writing. It emphasises the importance of considering identities and power dynamics, ensuring that students' languages and cultures are not undermined in the process. This then calls for the active involvement of educators, rather than leaving the teaching solely to the tools. Lastly, studies are required to find ways to maximise the benefits of NLP tools while minimising and addressing their biases, discrimination, exclusion (Stephenson & Harvey, 2022), and contextual limitations to achieve equitable outcomes in education.

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A Comparative Analysis on Artificial Intelligence Tools That Can Be Used in Open And Distance Learning Systems

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Abstract

This article provides a comprehensive overview of Artificial Intelligence (AI) applications in Open and Distance Learning (ODL) systems. And also the aim is to review the AI tools used in ODL systems, examining their benefits and limitations. These tools have been comparatively examined within the conceptual framework of self-learning and lifelong learning. The characteristics of these applications, both positive and negative aspects, have been compared. While AI offers numerous advantages such as personalized learning experiences, enhanced accessibility, and optimized administrative processes, it also presents challenges like overreliance on technology, algorithmic biases leading to misinformation, and inability to protect student privacy. Although new and updated types emerge every day, the following categories are generally obtained for AI applications that can be used for ODL systems: Intelligent Tutoring Systems, Automated Assessment and Feedback Tools, Adaptive Learning Platforms, Chatbots and Virtual Assistants, Text-to-Speech and Speech-to-Text Tools, Personalized Learning Recommendation Systems, AI-powered Content Creation and Curation Tools, Plagiarism Detection Tools, Proctoring and Online Exam Security Tools, Data Analytics and Learning Insights Tools. This article aims to present suitable tools for a personalized, accessible, and effective future of ODL for students and educators, considering the limitations while harnessing the power of AI, and is intended to assist in the design of ODL.

Keywords: Artificial Intelligence (AI) applications, Open and Distance Learning (ODL) systems..

Introduction

The recent years have witnessed a growing association between education and the applications of artificial intelligence (AI) technology. This integration takes place within a digital environment equipped with a suite of tools that facilitate information processing and storage.

AI empowers personalized learning experiences: It acts as a powerful tool for students, offering tailored learning opportunities and adapting to their individual needs. This empowers teachers to be more effective, optimize teaching methods, and ultimately enhance the overall learning experience for each student.

Utilizing Artificial Intelligence (AI) within the educational landscape unlocks a vast array of possibilities, especially for Open and Distance Learning (ODL) institutions.

Artificial intelligence has emerged as a powerful tool for the advancement of distance education, particularly with the development of sophisticated expert systems. These systems act as virtual advisors in diverse fields, enabling the creation of adaptive learning environments. By analysing student performance within the electronic classroom, these systems can dynamically adjust the difficulty of learning materials, ensuring that each student progresses at an optimal pace and remains engaged in the learning process, minimizing the risk of frustration and disengagement.

AI techniques act as catalysts for students' skill development by providing access to cutting-edge scientific content and accelerating cognitive growth. Furthermore, these techniques analyse student data to recommend tailored educational materials and activities, fostering optimal learning pathways for each individual.

Since the 1960s, artificial intelligence has started to spread across various fields to serve and support human activities and has begun to enhance its capabilities. AI techniques are characterized by their superior abilities to analyse comprehensive data, make predictions, provide results, and assist in making more informed decisions. Artificial intelligence can automate specific repetitive tasks and process data, which saves time and human resources, delivers acceptable impacts, and creates a great working environment (Russell, S. & Norvig, P., 2016).

Distance learning is an educational experience and academic concept that characterizes the relationships between teachers and students in a non-traditional learning environment, where they are separated by space, time, or both. This method relies heavily on modern communication technologies to deliver educational resources to students, offering the advantage of making scientific material accessible to all learners. Consequently, the development and ease of use of communication tools enhance the importance and demand for this type of learning. (Bozkurt, A., 2019).

Independent learning, also known as self-directed learning empowers individuals to take the reins of their educational journey. Learners set their own learning objectives, identify suitable learning resources, and autonomously monitor their progress, all without relying solely on instructors or formal institutions (Merriam, 2001).

Lifelong learning, on the other hand, encompasses the concept of continuous learning throughout one's life, acknowledging that learning is not limited to formal education but extends to informal and non-formal learning contexts.

These concepts find a natural home in open and distance education (ODE), which breaks free from the confines of traditional classrooms. ODE offers flexible and accessible learning opportunities, aligning perfectly with the principles of self-directed learning and lifelong learning (UNESCO, 2002). ODE programs cater to diverse learner needs, schedules, and preferences. Learners can engage in self-paced learning through various modalities, such as online courses, correspondence programs, and open educational resources (OER). This flexibility allows individuals to pursue their educational goals at their own convenience, overcoming geographical barriers and time constraints.

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The connection between self-learning, lifelong learning, and open and distance education lies in their shared emphasis on learner autonomy, flexibility, and accessibility. In open and distance education, learners are encouraged to take an active role in their learning process, exercising self-directed learning strategies to acquire knowledge and skills that are relevant to their personal and professional development. Lifelong learning principles underscore the importance of continuous learning beyond formal education, aligning with the lifelong learning opportunities offered by open and distance education institutions. Together, these concepts promote a learner-centered approach to education, empowering individuals to become self-motivated, self-regulated learners capable of adapting to the evolving demands of the knowledge society.

Methodology

Types, features, limitations, and examples of AI tools applicable in open and distance education have been compiled into tables through literature review. A comparison of these tools has been conducted, highlighting their similarities and differences. Within the conceptual framework of self-learning and lifelong learning, the positive and negative aspects of using these tools in open and distance education have been elucidated.

Content analysis was conducted using the Taguette program (https://www.taguette.org/), a free tool for qualitative research designs. The features and limitations of artificial intelligence tools were coded within this framework and codes regarding their functions and limitations were obtained. Additionally, a comparative analysis was conducted to identify the similarities and differences between these tools in the context of their applications in open and distance education. The following research questions have been investigated. 1) What are the common categories, capabilities and limitations of AI tools and systems that can be used in Open and Distance Learning Systems? 2) What are the most desired features of AI tools for designing ODL systems? 3) How does the use of AI tools in ODL systems contribute to the concepts of self-learning and lifelong learning?

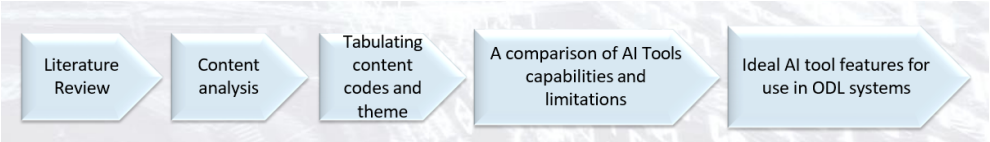

Figure 1. As can be seen from the literature review and subsequent processes.

The process is summarized in Figure 1. And Table 1 shows the features, purposes of use, example AI tool names, and additive reference of artificial intelligence tools used in distance education.

Table 1. Features, purposes of use, example AI tool names, and additive reference of artificial intelligence tools used in distance education

no	Category	Capabilities	Limitations	Name	Reference
1	Personalized Learning Systems	Tailor instruction and assessments to individual student needs Think of a customizable learning dashboard where students can choose what works best for them	Relies on student data privacy May not always provide the most relevant recommendations	Adapt, EdX, Coursera..	Dawson, S. (2019)
2	Automated Grading and Feedback	Provide timely and detailed feedback on student work	Limited to specific questions may lack nuance in feedback	Gradescope	Pursel, B. -2018
3	Intelligent Tutoring Systems	Offer personalized guidance and support to students learning new concepts	Limited subject areas May not replace human teachers	Khan Academy ALEKS, DreamBox	VanLehn, K. (2011)
4	Adaptive Learning Platforms	Adjust the difficulty level of content based on student performance Imagine a GPS system for learning, constantly rerouting based on progress.	Relies heavily on data quality Limited to specific questions	Khan Academy Knewton, IXL,	Khan, S. (2016)
5	Chatbots and Virtual Assistants	Answer student questions and provide support	Specialize in specific areas, do not provide extensive coverage Limited understanding of complex topics Can't replace human interaction for all needs	Google Classroom TutorMe, Chegg Tutors	Li, W., & Chen, W. (2020)
6	Text to Speech & Speech to Text Tools	Read text aloud to students with visual impairments or reading difficulties	Do not directly contribute to student learning process May not capture subtleties of expression Accuracy can vary depending on language and complexity	Natural Reader, Read&Write, Google Text-to-Speech	Boucouf, R., & Alaoui, A. (2016)

7	NLP TOOLS (speech recog., translator)	NLP tools can perform a wide range of tasks related to understanding, analyzing, and generating human language, making them essential in various applications such as information retrieval, sentiment analysis, machine translation, and more.	context understanding, language nuances, emotional and social cue detection, technical issues, privacy, accessibility, and high costs.	Dragon NaturallySpeaking	Wang, M., & Johnson, P. (2010)
8	Proctoring and Online Exam Security Tools	to ensure the integrity and fairness of online assessments	Can be susceptible to technical glitches May raise privacy concerns	Proctorio, Examity	Hussein et all (2020)
9	Plagiarism Detection Tools	help maintain academic integrity, ensure originality, and uphold ethical standards.	Do not offer teaching or guidance	Plagiarism Checker	Naik, (2015)
10	AI Powered Content Creation & Curation Tools	AI-powered content creation and curation tools automate the generation and management of personalized, high-quality content at scale, improving efficiency, engagement, and access to relevant information	Do not provide personalized instruction May lack originality or creativity Requires human oversight to ensure quality	AI Writing Assistant Title Generator, Quillbot, Grammarly, Nearpod	Sing (2024)

Results

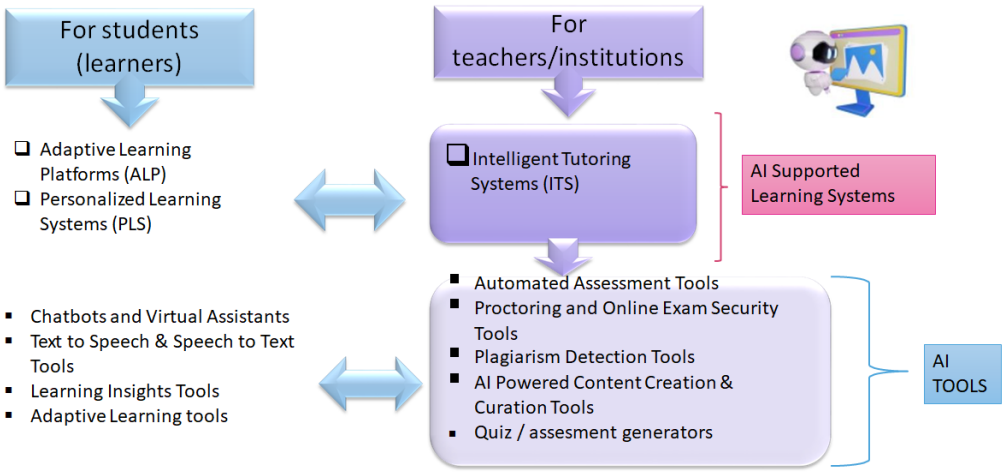

Figure 2. AI tool categories for ODL systems

Figure 2 shows the AI tool categories under the themes of students and teachers, obtained after analyzing the content summarized in Table 1. The explanations of ALP, ITS, and PLS, along with their comparisons, are as follows. ITS: Often domain-specific and focuses on problem-solving. ALP: Adaptive learning platforms: Can be used across various subjects and adapt to individual learning styles. PLSs: Offer the broadest range of personalization options, but may not always involve complex AI. PLS: Like a teacher who creates different assignments for students based on their strengths and weaknesses. ITS: Like a private tutor who closely monitors your work, identifies errors, and provides immediate, targeted guidance (Osadcha, 2020).

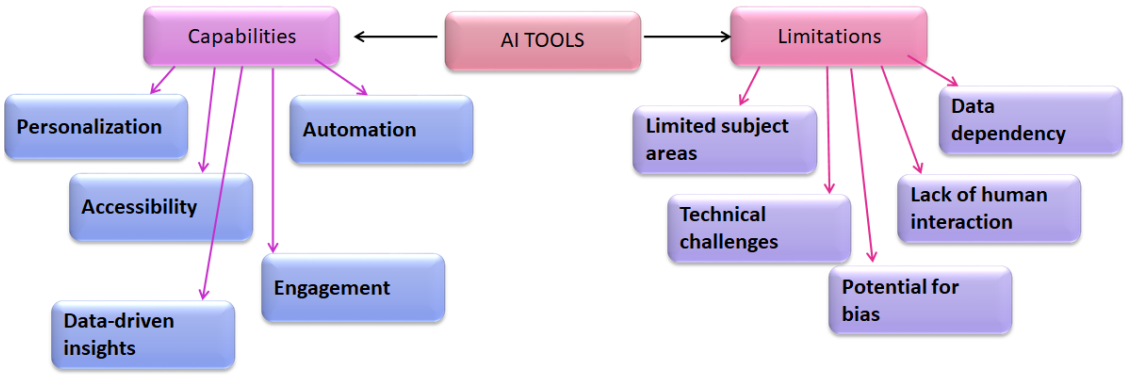

Figure 3. the common and desired capabilities and limitations of AI tools

In Figure 3, the categories from Table 1 and Figure 2 are presented in a different way. Here, the common and desired capabilities and limitations of AI tools are shown.

Common Capabilities

AI tools in education offer several key capabilities. Personalization involves tailoring instruction, providing personalized feedback, and creating adaptive learning paths to meet individual student needs. Automation encompasses automated grading, AI-powered chatbots, and content curation. Data-driven insights include student performance analysis, predictive modeling, and instructional decision support. Accessibility features such as text-to-speech, speech-to-text tools, and alternative learning formats cater to diverse learners. Engagement is enhanced through interactive experiences, personalized feedback, and adaptive learning paths, fostering motivation and a sense of ownership in students.

Common Limitations

AI tools in education face several challenges. They are highly dependent on the quality and accuracy of data, which can lead to issues of data bias and privacy concerns. These tools are often limited to certain subject areas, requiring significant expertise to develop domain-specific knowledge and adapt to new content. The lack of human interaction in AI tools means they may not provide adequate social and emotional support, struggle with communication nuances, and fail to build rapport with students. Potential biases in algorithms and human influence can lead to unfair outcomes, necessitating ongoing efforts to identify and mitigate these biases. Additionally, the technical challenges of implementing, maintaining, and integrating AI tools, as well as providing technical support, require significant resources and expertise that may not be available in all educational institutions.

Conclusions

While new AI tools emerge daily, this paper has categorized the common capabilities and potential limitations of AI tools suitable for open and distance education systems. Overall, AI tools have been shown to assist self-directed learners in open and distance education settings, aid educators in designing these systems, and support assessment.

The landscape of AI tools for open and distance education is constantly evolving, with new tools and functionalities emerging regularly. Despite this diversity, AI tools for open and distance education share common capabilities, such as personalization, automation, and data-driven insights.

And also AI tools also face limitations, such as potential bias, data privacy concerns, and the need for human oversight. AI tools can empower self-directed learners by providing personalized learning experiences, adapting to individual needs, and offering real-time feedback.

AI tools can assist educators in designing open and distance education systems by automating tasks, providing data-driven insights, and facilitating content creation. They can enhance assessment in open and distance education by automating grading, providing personalized feedback, and detecting plagiarism.

As AI technology continues to advance, further research is needed to explore the full potential of AI tools in open and distance education. Additionally, educators and policymakers should carefully consider the ethical implications and potential limitations of AI tools when implementing them in educational settings.

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Next Generation Teacher Training: The VR Skills Acquisition Project for Educators

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Abstract

This study aims to report on the outcomes of a teacher training program designed to enhance educators' abilities to use virtual reality (VR) and develop VR-based educational materials. The findings are derived from the project titled "Development of the Training of Trainers Program and Good Practices Guideline for Virtual Reality Environments" which was funded under the TÜBİTAK 3501 Career Development Program. Initially, a needs analysis was conducted to inform the preparation of the teacher training program. In this context, interviews were held with teachers who had previously received VR training or had the opportunity to use VR in their classes. Subsequently, a 60-hour training program, consisting of six modules, and aligned with 20 learning outcomes, was developed based on feedback from experts in educational technologies and curriculum design. Following a nationwide announcement, 42 teachers were selected through purposive sampling from 444 applicants to participate in the project. The training, which was delivered through both synchronous and asynchronous online sessions, spanned 14 weeks. The first four modules of the training focused on practical training in developing VR environments. In the fifth and sixth modules, participants were divided into seven groups of six, each guided by subject matter experts, to develop VR-based projects. These group activities resulted in the creation of four projects across various disciplines. The developed projects were assessed using a product evaluation rubric created by the research team. Additionally, these projects were integrated into the EVRECA platform. The analysis using the product evaluation rubric revealed that participants, initially with limited VR and technical knowledge, acquired significant skills and knowledge through the training program. Similarly, post-training evaluations indicated that participants reached a level capable of developing VR-based educational materials, and the training process positively contributed to their professional development. This study offers practice-oriented recommendations on integrating VR technologies into education and aims to contribute to the literature by outlining the effectiveness of such integrations.

Keywords: Virtual reality, teacher training, technical skills, program development, best practices.

Introduction

Virtual reality (VR) technology has garnered substantial attention in education, proving to be a highly effective tool for enhancing teaching methodologies and optimizing student learning outcomes. Although VR has seen widespread adoption across various fields of professional training, its application in teacher education remains relatively nascent (Huang et al., 2021). The increasing interest in immersive learning has catalysed the development of training programs specifically designed to bolster educators' proficiency in utilizing VR and creating VR-based educational content (Sari et al., 2021).

In technical education, VR-based training has shown significant efficacy in enhancing teachers' digital media literacy, self-efficacy, and problem-solving skills. By immersing participants in interactive, scenario-based simulations, VR training enables educators to acquire practical skills in creating and effectively utilizing digital media (Ha et al., 2022). Additionally, VR training encourages collaboration and teamwork among teachers, fostering an environment conducive to exchanging ideas and developing projects that promote professional growth (Yoon et al., 2023).

Despite its immense potential, VR technology remains underutilized in teacher education due to a pervasive lack of technical knowledge and experience among educators. This issue is particularly pronounced in educational content development, where the need for innovative, interactive materials demands specialized expertise. The gap in educators' abilities to create and implement VR-based learning materials effectively necessitates comprehensive training programs (Yu, 2021). To bridge this gap, teacher training programs are essential, empowering educators to incorporate VR technologies into their teaching practices (Bohné et al., 2021).

A well-structured VR training program should offer comprehensive guidance, ranging from foundational technical knowledge to advanced content development within immersive VR learning environments. These programs should be developed with the expertise of educational technology and curriculum design specialists to ensure alignment with practical learning outcomes and real-world classroom needs (Yu, 2022). Moreover, VR teacher training can significantly elevate the quality of educational content created by teachers. Training projects often incorporate interactive features that boost student engagement and comprehension, enabling learners to understand intricate concepts through experiential learning (Chinnaswami, 2023). Post-training evaluations revealed that participants exhibit increased confidence and proficiency in producing VR-based educational materials (Chang et al., 2022).

To overcome/address these challenges and empower educators with essential VR competencies, this study was conducted under the TÜBİTAK 3501 Career Development Program. The study aimed specifically at enhancing the integration of VR technologies in educational settings by refining educators' technical skill sets. The project has delivered a comprehensive training program covering topics ranging from fundamental VR operations to advanced content creation. The outcomes of the project not only underscore VR's potential for enriching educational practices but also provide valuable insights into the professional growth of educators transitioning from novices to proficient developers of VR-based educational materials. This project signifies a significant step forward in addressing the technical expertise gap among educators, highlighting the importance of tailored professional development in fostering the adoption of innovative educational technologies.

Educational Virtual Reality Campus (EVRECA)

A review of the literature reveals that virtual reality literature is still emerging, particularly in our country. Although the number of studies remains limited, the volume of research in this field has increased steadily in recent years (Kapucu & Yıldırım, 2019; Şimşek & Can, 2019). The majority of these studies appear to be intervention focused. It has been found that most of the research is conducted in the field of medical education, where specialized applications and platforms have been developed and utilized. Very few of the examined studies report the development of new virtual reality applications. Additionally, many virtual reality applications available to users through various platforms lack support for the Turkish language, indicating a growing need for more educational virtual reality applications in Turkish (Tunga & Geriş, 2020).

The Educational Virtual Reality Campus (EVRECA), developed within the framework of the project leader's doctoral dissertation, stands out as a pioneering application designed with key shortcomings in the literature in mind (pedagogical, design, technical, etc.) and allows for the development of psychomotor skills. This platform, based on the Internet of Things (IoT) education, consists of several fundamental elements and features an interactive structure where psychomotor skills can also be applied. Consequently, the IoT training content in the developed platform has been shown to enable participants to achieve success at the academic knowledge level and transfer this knowledge to real-life applications at a high level (Geriş & Özdener, 2023).

In this context, the EVRECA platform is suitable for use in educational environments. By the end of this project, it is planned to enhance and expand the platform, reaching a wider audience by developing new products during and after the train-the-trainer program. Additionally, the availability of a virtual reality universe with Turkish language support and a variety of educational content could create significant added value.

Training of Trainers

To promote the use of Virtual Reality (VR) technologies in teacher education, a needs assessment was conducted as the initial phase of the project titled "Development of a Training Program and Best Practice Guide for the Design of Virtual Reality Environments," executed under the TÜBİTAK 3501 Career Development Program. Semi-structured interviews with teachers experienced in VR, comprehensive literature reviews, and relevant field studies formed the basis for the development of the training program. These interviews thoroughly investigated teachers' existing knowledge and skills in VR technologies, their capacity to develop educational materials, and access to technological infrastructure. This process played a critical role in determining the program's content and objectives.

In planning the training program, it was decided to adopt a modular structure based on the results of the needs assessment. Designed to cover 60 instructional hours and align with 20 competencies identified by subject matter and educational science experts, the program was structured into six main modules with17 subtopics. The training was designed to enable teachers to use VR technologies effectively and integrate them into their teaching activities. Each module was structured according to Bloom's Taxonomy, aiming to provide participants with comprehensive knowledge ranging from basic VR operations to advanced content development.

The "Training of Trainers" program received significant interest from across Türkiye, with 42 teachers selected out of 444 applicants across the country. The selection ensured gender and interdisciplinary diversity among

participants, providing rich collaboration and diverse perspectives throughout the program. Training materials were precisely prepared to meet synchronous and asynchronous learning needs, and the assessment processes were carefully designed to monitor participants' skill development in VR. In this framework, daily logs and various assessment tools were employed to evaluate participants' progress during the training process.

Project Development Process

Following the completion of theoretical and technical training in the Virtual Reality Train-the-Trainer program, the project development phase commenced. At this point, the 42 participants in the project were first grouped into seven teams, each consisting of six members. Similar to the selection process for project participants, care was taken to ensure balanced representation within each group. Each group included three women and three men, as well as three information and communication technology (ICT) teachers and three teachers from other disciplines. This arrangement allowed for a consistent and balanced team structure.

After establishing the project groups, sub-channels were created within the MS Teams TÜBİTAK 3501 – VR Train-the-Trainer team to facilitate intra-group communication and enable project teams to hold meetings as needed. In addition, a communication group was set up via the WhatsApp application for the entire train-the-trainer process, while individual groups were also established for each project team to enhance communication efficiency. A Google Drive shared folder was also integrated into the process for groups or participants who requested it.

Once the project teams had chosen their topics, VR development activities have begun. Support was provided to the teams upon request throughout the process. For instance, assistance was given to Project Group 2 and Project Group 4 in the area of 3D modeling, to Group 7 in script development, and to Group 4 in VR integration. Alongside these forms of support, the project teams' progress was actively monitored, but there was no direct intervention in their work. This support was limited to a mentoring level.

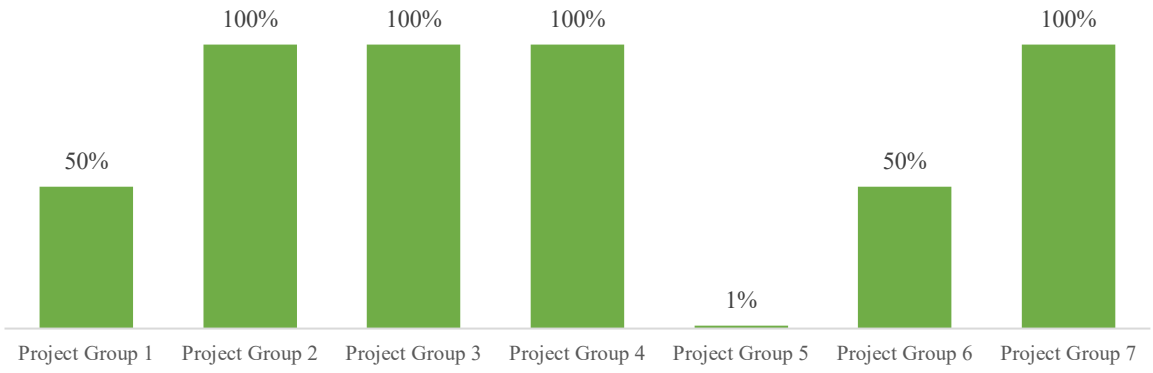

Figure 1. Completion status of projects

The completion status of the projects developed by the groups is shown in Figure 1. In details, four out of the seven groups successfully developed well-prepared educational content based on virtual reality (VR), while two groups had nearly completed the design of their educational materials. One group did not complete their project due to communication and other internal issues within the group. Since each group worked with different versions of Unity and some projects exhibited higher-than-expected batch values, efficiency revisions are necessary before integrating these projects into the EVRECA Education Pool. After these revisions and optimizations are completed, the projects will be included in the EVRECA platform.

Discussion

This project has clearly demonstrated the effectiveness of virtual reality (VR)-based education in enhancing teachers' technical skills. Throughout the training program, participants acquired significant practical skills in VR technologies through comprehensive and meticulously prepared training content, despite initially possessing limited knowledge of these technologies. Notably, the modules enabled teachers to learn VR operations, structure projects, and effectively utilize complex technological applications. As highlighted in studies by Chang et al. (2022), this skill development confirms that VR training is an effective tool for fostering self-efficacy and technical competencies. This educational model has significantly boosted participants' confidence and effectiveness in digital media literacy and content development processes.

Secondly, the project development phase underscored the critical importance of collaboration and teamwork in VR-based education. Interdisciplinary collaboration between information technology teachers and those from other fields enriched project content. By integrating the perspectives of teachers across different subjects, this collaboration generated creative ideas on how VR applications could be employed in various educational domains. These findings align with those of Yoon et al. (2023), demonstrating that VR training is an effective educational method that fosters collaboration and teamwork. Despite encountering various challenges during project development, teams received guidance and mentoring to overcome these difficulties.

Another significant finding of the project was the increased capacity of teachers to develop VR-based educational materials. During the training, participants gained comprehensive knowledge from fundamental concepts to advanced content development, enabling them to develop interactive and innovative teaching materials. VR's experiential learning structure allowed the participating teachers to make their lesson content more engaging and effective. This finding supports Yu's (2021) research, which emphasizes the positive impact of VR-based programs on teachers' educational material development processes.

The project outcomes support the professional development of participating teachers, emphasizing the importance of innovation and technology integration in education. By the end of the program, participants had enriched their VR-based educational content, enabling students to experience a more participatory learning environment. Additionally, the communication and collaboration network established among teachers facilitated knowledge sharing on how to use VR technologies in education. In the future, more customized VR training programs can be developed for teachers from different disciplines, and their effects can be studied in greater detail. The proliferation of such programs will accelerate the integration of technology into education, enabling teachers to produce innovative content.

Conclusions

The virtual reality (VR)-based training of trainer's program developed as part of the TÜBİTAK 3501 Career Development Program project has demonstrated an effective way to enhance teachers' project development processes and technical skills. Participant teachers acquired comprehensive competencies ranging from fundamental VR operations to advanced content development skills through a training program meticulously designed based on an extensive needs analysis. Throughout the program, teachers deeply explored the opportunities provided by VR technologies and discovered how to incorporate these technologies within their own disciplines.

The teamwork approach adopted during training encouraged interdisciplinary collaboration and inspired participants to create innovative projects. Through this collaborative network, teachers gained a deeper understanding of the potential of VR technologies in education and successfully created a collaborative learning environment using these technologies. Challenges encountered in the project development phase were overcome with guidance and mentoring support, significantly enhancing participant teachers' capacity to develop VR-based educational materials.

In conclusion, this project has demonstrated the effectiveness of VR-based training programs in developing teachers' technical skills and project development capabilities. By emphasizing the importance of innovation and technological integration in education, this project provides practical guidance for teachers from various disciplines on how to effectively use VR technologies in their classrooms. The broad dissemination of such training programs will enable teachers to develop innovative content in education and use technology effectively.

Acknowledgements

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Development of Interactive Learning Multimedia for Object-Oriented Programming: A Didactic Design Research (DDR) Approach

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Abstract

The Independent Curriculum Initiative empowers teachers to foster creativity and improve academic abilities, enabling them to use effective teaching methods and media. However, in practice, these ideals are not always in line with reality. Some teachers prepare lesson plans without adequately considering teacher perceptions and potential student responses, thereby creating learning obstacles and misunderstanding of the material, which ultimately prevents students from achieving the Minimum Completeness Criteria (KKM). This research aims to design and develop a didactic approach to improve learning outcomes and reduce learning barriers in Object Oriented Programming (OOP). This research uses the Didactical Design Research method with a One Group Pretest and Posttest research design. The findings show an increase in student cognitive learning outcomes through the application of website-based didactic and multimedia learning designs. However, students still encounter learning obstacles, especially epistemological, ontological and didactic ones, especially in applying material concepts into programming languages. Assessment of student responses to learning media resulted in a rating of 82.72%, which indicates a very good level of acceptance.

Keywords: Didactic Design, Learning Outcomes, Object-Oriented Programming.

Introduction

The Merdeka Curriculum (Independent Curriculum) is the answer to the educational system's needs in the era of the fourth industrial revolution (Sasikirana & Herlambang, 2020). Nadiem Makarim advocates that learning independence is the freedom to think without constraints in scientific thinking, and with learning based on independent learning, it can be a solution to applying technology in Indonesian education (Sibagariang et al., 2021). The freedom to think must begin with teachers. This opinion is supported by Bell Hooks, who interprets education as a practice of teaching and learning in which an enjoyable atmosphere is created for both teachers and students (Specia & Osman, 2015). In practice, teachers as facilitators are no longer just transferring knowledge but also assisting students in developing their intellectual and spiritual abilities. Moreover, students are not just passive recipients of material; they are also capable of critical thinking, analysis, sharp problem-solving, and feel unrestrained during learning.

The implementation of the Merdeka Curriculum enables teachers to develop creativity and enhance academic abilities, while also allowing them to utilize effective teaching methods and media (Saleh, 2020). Teachers must ensure that the learning process proceeds smoothly as it is their responsibility and professionalism (Fauzi & Suryadi, 2020). Learning involves interaction and activities among teachers, students, materials, and the surrounding environment, which are designed and organized through lesson plans. One of the key factors for successful learning is thorough preparation; therefore, teachers should be capable of devising appropriate lesson plans that aid students in understanding the material. Making learning dynamic prevents monotony, thus ensuring the successful achievement of the goals of the Merdeka Curriculum.

However, this sometimes doesn't align with the reality in the field. Some teachers devise lesson plans without considering responses to student feedback and the potential various responses students may have during learning (Komala et al., 2021; Mariyani et al., 2021; Suciawati et al., 2021). When teaching, teachers tend to use conventional methods, such as directly providing material to be memorized (Mariyani et al., 2021). In the implementation of the learning process, teachers still rely on existing source books without considering student responses. The lesson plans prepared by teachers only consider interactions between teachers and students and among students, while student interaction with the material tends to be ignored (Mariyani et al., 2021). Consequently, teachers often repeat basic concepts or prerequisite material that students should have mastered. This can lead to learning barriers for students and impact the lack of didactic anticipation reflected in the preparation done by teachers. Thus, in the learning process, there are often deadlocks in responding to student feedback, resulting in misconceptions of the material (Haqq, 2020; Komala et al., 2021; Mariyani et al., 2021;

Supriadi & Arisetyawan, 2020), due to student responses that are beyond the teacher's expectations and the likelihood that the lesson plan no longer accommodates the diverse learning trajectories of each student.

Learning difficulties in computer education are evident in the field, as shown by preliminary studies where 11 out of 60 students expressed difficulties in the Object-Oriented Programming (OOP) subject using the Java programming language. Students face challenges in adopting the object-oriented paradigm because their initial formative process is generally based on pure structural programming (Gutiérrez et al., 2022). The modular nature of the object-oriented paradigm poses a challenge for educators, as students tend to assimilate incorrect conceptions during this process, leading to problems in understanding and applying object-oriented programming. Students struggle to understand the relationships in object-oriented programming, which are related to the implementation of generalization, inheritance, association, and aggregation due to their lack of experience in learning this material (Musil & Richta, 2017). Additionally, students encounter difficulties in mastering polymorphism and overloading due to the high complexity of concepts in this material (Rajashekharaiah et al., 2016).

These learning barriers have an impact on students' learning outcomes in terms of cognitive, affective, and psychomotor aspects. In a study conducted by Zakhia and Dermawan (2021), it was found that 35% of students still obtained grades below the minimum passing standard, mainly due to a lack of mastery of basic programming concepts. This is caused by ineffective learning methods, which result in a decline in students' performance when studying object-oriented programming. The learning provided lacks real-life examples and practice, leading to low interest among students in learning the material.

One way to address this issue is by designing a didactic design or learning design that caters to the students' conditions and their environmental situation, while also considering the anticipation of diverse student responses during the learning process (Komala et al., 2021; Mariyani et al., 2021; Sukmawati & Purbaningrum, 2021). This can be achieved by conducting research related to education, known as Didactical Design Research (DDR). Several studies have discussed the application of Didactical Design Research (DDR), including analyzing didactic designs using Problem-Based Learning (PBL) (Komalasari et al., 2021), examining the DDR paradigm in developing teachers' pedagogical competence (Fauzi & Suryadi, 2020), developing didactic designs through DDR (Komalasari et al., 2021; Sukmawati & Purbaningrum, 2021), and the impact of didactic design on students' learning abilities (Komalasari et al., 2021; Sukmawati & Purbaningrum, 2021; Rønning, 2021).

Aligned with the Merdeka Curriculum, teachers need to integrate technology into the learning process. The biggest challenge in delivering material is the lack of using visual media, resulting in students not understanding the material well (Dewantara et al., 2019). The use of multimedia learning can certainly be considered. This is based on the statement that multimedia has significant potential to change how individuals learn, acquire information, adapt information, and so on (Dewantara et al., 2019). Additionally, multimedia can provide opportunities for educators to develop teaching techniques used to enhance students' mastery of concepts, learning outcomes, and critical thinking skills (Harsiwi & Arini, 2020).

Based on the background provided, the research problem formulation of this study is as follows: a) How to design a didactic design that can enhance students' learning outcomes in the Object-Oriented Programming subject?; b) How to develop a didactic design-based multimedia learning that is expected to improve students' learning outcomes in the Object-Oriented Programming subject?; c) What is the influence of didactic design and multimedia learning on improving students' learning outcomes in the Object-Oriented Programming subject?; Then, based on the research questions and background, the objectives of this study are as follows: a) To design and develop a didactic design that can enhance learning outcomes and minimize students' learning obstacles; b) To design and develop learning media based on the didactic design; c) To analyze cognitive learning outcomes and learning obstacles in students in the Object-Oriented Programming (OOP) subject. This research is conducted to determine the improvement of students' cognitive learning outcomes with the implementation of didactic design and learning media. In this research report, cognitive learning outcomes will be examined, and the classification of learning obstacles that will be used includes epistemological, ontogenetic, and didactic obstacles, which will be briefly outlined regarding the research methods, discussion of research results, as well as conclusions and research recommendations.

Methodology

Methods

The research adopts a qualitative approach using the Didactical Design Research (DDR) method. Didactical Design Research (DDR) is a study aimed at uncovering learning obstacles in the learning process and aims to anticipate and eliminate learning obstacles in teaching (Suryadi, 2013). The research design used in this study is an experimental study with a Pre-Experimental Design of the One-Group Pretest-Posttest Design type. This study

focuses on the development of didactic design in the Object-Oriented Programming subject with materials on inheritance at the Vocational High School (SMK) level for grade XI students majoring in Software Engineering (Rekayasa Perangkat Lunak). Additionally, the resulting product is a learning media that can aid in the learning process. The formal steps of Didactical Design Research consist of three stages: prospective analysis, metapedagogical analysis, and retrospective analysis.

In the prospective stage or the stage of didactic situation analysis conducted before starting the learning process. This stage involves the teacher's thinking about predictions and anticipation of student responses that are likely to occur during the learning process. In this stage, the researcher will conduct a literature review of previous studies, field studies, identify learning obstacles, design and organize materials, assessment questions, and learning media. The types of student learning obstacles used in this research are epistemological, ontogenetic, and didactic.

According to Suryadi (2013), epistemological barriers (Epistemology Learning Obstacle) are the knowledge possessed by students, which is limited to specific knowledge contexts only. Meanwhile, ontogenetic obstacles are learning barriers that occur due to the limitations of students in their cognitive development or in terms of mental readiness. Furthermore, didactic barriers are learning obstacles that arise because the methods, approaches, or teaching materials used by teachers are not supportive of learning.

In the metapedadidactic stage, the researcher will implement the didactic design and learning media that have been created. The research begins with administering a pretest to students before starting the learning process. Next, it enters the learning stage using the prepared learning media. After all topics have been studied, the final stage is administering a posttest to the students. Following these stages, students are then asked to provide feedback on the learning media. Subsequently, students will be interviewed regarding the learning process and the questions they have worked on.

In the retrospective stage, the researcher processes and analyzes the results of the pretest, posttest, interviews, student responses during learning, and student feedback on the learning media. Based on the results obtained, the researcher will identify the strengths and weaknesses of the didactic design and learning media that have been created. This will be used as a basis for recommendations for further research.

Population and Sample

The population involved in this study is the 11th-grade students of SMKN 4 Bandung majoring in Software Engineering (RPL). The researcher plans to use a non-probability sampling technique called purposive sampling. Non-probability sampling is a sampling technique where samples are taken from a population found or determined by the researcher or according to expert considerations, and purposive sampling is the selection of samples based on specific criteria determined by the researcher. The sample criteria used are students who haven't learned about inheritance.

Research Instruments

The researcher requires data to ensure that this study reflects the actual situation. To collect this data, the researcher needs research instruments, including field study instruments, assessment question instruments, material and media validation instruments, and respondent response instruments. The material and media validation instrument refers to the LORI 1.5 instrument developed by Nesbit & Leacock, which consists of nine assessment items or indicators, namely content quality, learning goal alignment, feedback and adaptation, motivation, presentation design, interaction usability, accessibility, reusability, and standard compliance (Mikhailova et al., 2018).

Data Collection Techniques

The data collection techniques used in this study include interviews, surveys using forms, and tests using forms. Field study interviews are conducted following interview guidelines, unstructured interviews are conducted to understand students' understanding and learning experiences. The forms used for this research are forms for experts and users. Expert forms are used to assess the suitability of media, questions, and materials. Then, user questionnaires are given to students to gather their feedback on the learning media.

Data Analysis

The collected data will be analyzed to draw conclusions from the obtained results. The first analysis conducted involves the data from the field study, including student learning experience questionnaires, teacher and student interviews, and learning obstacle test results. Then, the analysis proceeds to the stage of designing and creating learning instruments, including expert validation analysis of materials and media, validity testing, reliability testing, difficulty level testing, and discrimination power testing. Subsequent analysis involves assessing the assessment question results, student interviews, and student responses to identify learning obstacles and improvements in student learning outcomes. The final analysis is the assessment of student responses to the learning media.

A paper should contain the description of your study and should be structured in different sections such as: Abstract, Introduction, Methodology, Results, Conclusions, Acknowledgements (if applicable) and References. Please note that title and authors list should be coincident with the accepted abstract.

Results

Prospective Analysis Stage

In this stage, the researcher designs and creates a hypothetical didactic design and a Hypothetical Learning Trajectory (HTL) along with learning media in the form of a website based on the results obtained from the analysis stage and the design stage in the development of learning media.

Literature Review

The obtained result is that Object-Oriented Programming (OOP) material is complex and students struggle to learn it. To address this issue, besides the need for a learning design that can meet students' needs, a learning media that can assist students in learning the material can be used. In Yuliana and Anistyasari's (2023) research on the development of website-based learning media, it was found that the learning outcomes of students in the object-oriented programming subject can be seen from the average pretest and posttest results of class XI RPL, which have an average pretest score of 55.73 and an average posttest score of 89.4. It can be concluded that class XI RPL has experienced an improvement in learning outcomes.

Field Study

During the field study phase, the researcher conducted observations, which involved reviewing existing issues to obtain accurate data regarding the difficulties experienced by students in learning. Observations were carried out by interviewing RPL teachers and three students, as well as distributing forms related to student's learning experiences.

The data obtained indicates that the material is considered difficult to learn. Based on the table, many respondents answered that the material on C++ is considered difficult to learn. However, C++ is a subject taught during the odd semester or the first semester of the 10th grade, and some of them have already studied material about arrays. Meanwhile, the research was conducted by seeking samples who have not yet studied the material, so the researcher decided to use the Object-Based Programming (PBO) subject, which is rated as the second most difficult by students.

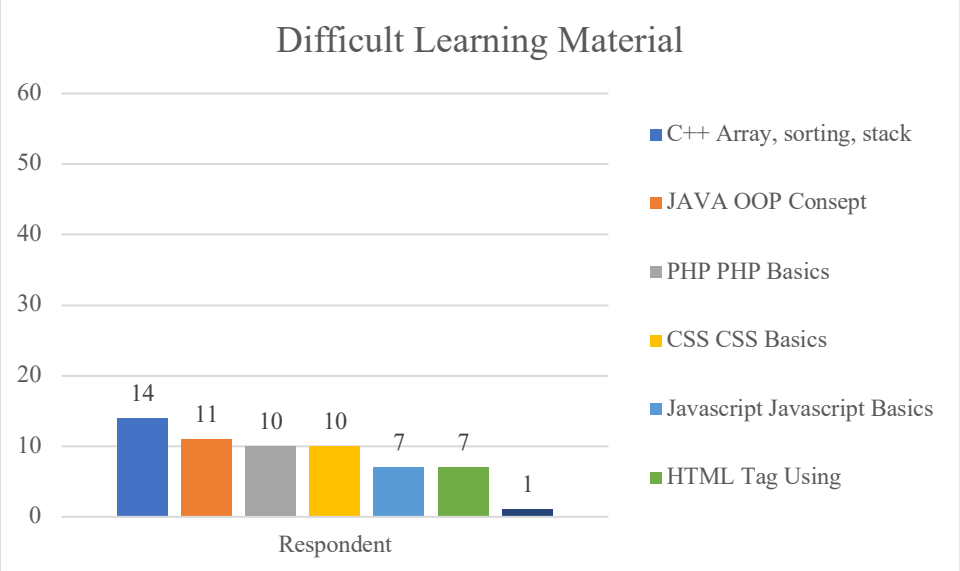


Figure 1. Difficult Learning Material Based on Student Response

After analyzing the learning experience forms, the reason that the subject and material are difficult to learn based on respondent's answers is shown in Figure 2.

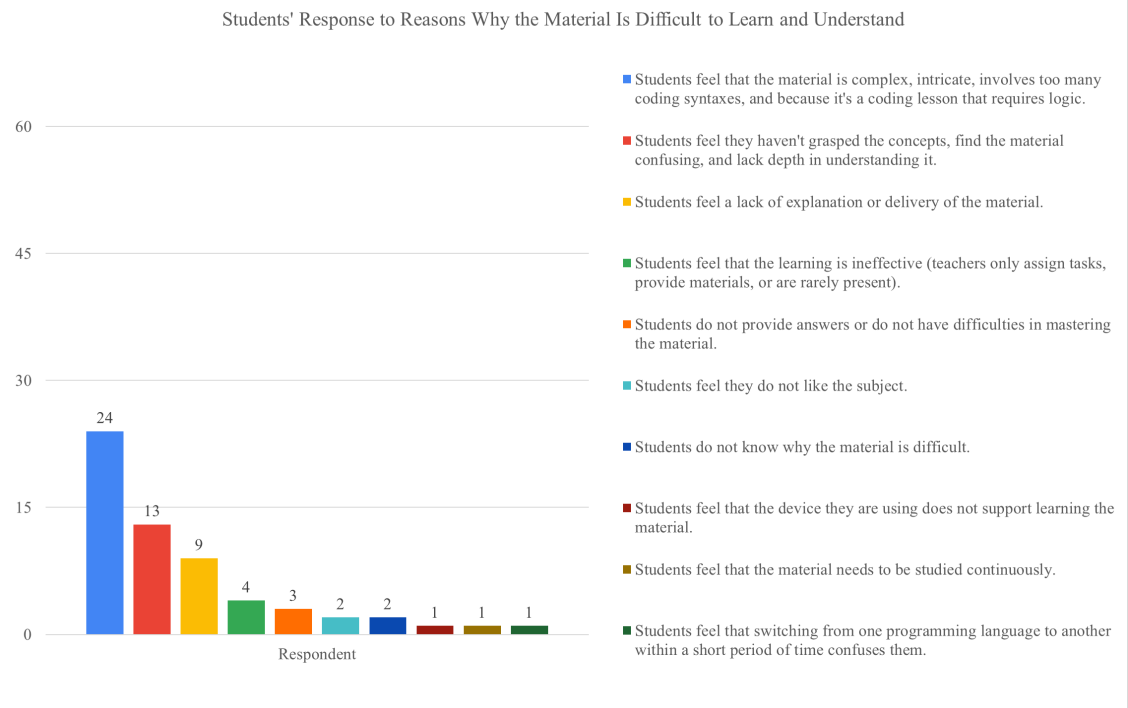


Figure 2. Student's response to the reasons why the material is difficult to learn and understand

There are the respondent's suggestions regarding the conducted learning, namely: 1) More practice; 2) Pay more attention to students, especially if someone does not understand; 3) Do not rush in delivering the material; 4) Reviewing the material gradually; 5) Game-based learning; 6) More varied learning methods to avoid boredom; 7) More detailed explanations of the material; 8) The need for interaction with the teacher.

Based on these results, the researcher compiles a learning obstacle test with Object-Oriented Programming (OOP) material consisting of 25 questions. To precisely determine the types of learning obstacles experienced by students and to ascertain whether the phenomenon observed in the test results indeed constitutes a learning obstacle, analysis of student interview results is also conducted. The types of student learning obstacles used in this study are epistemological, ontogenetic, and didactic.

If a student is able to answer one question but unable to answer a similar question in a different form, it is possible that the student is experiencing epistemological learning difficulties. Furthermore, if a student cannot answer a question because it is unclear or because they have not mastered the prerequisite material, then they may be experiencing ontogenetic learning difficulties. Additionally, if students state that they have not been given or taught related material, there may be didactic learning difficulties.

Based on the LO test results, 6 students scored above the Minimum Mastery Criteria or in Indonesian it is called Kriteria Ketuntasan Minimal (KKM), which is 75, while 25 students scored below the KKM. The questions are developed with reference to Bloom's Taxonomy at the cognitive levels C1-C4, focusing on the conceptual aspects of OOP.

Below are the learning objectives that need to be achieved by the students:
1. Students are able to define class, object, and method (C2).
2. Students are able to understand examples of the application of class, object, and method in everyday life (C2).
3. Students are able to apply class, object, and method in the Java programming language (C3).
4. Students are able to determine the parts of the class structure (C3).
5. Students are able to analyze the parts of the structure and concepts of the class (C4).
6. Students are able to define access modifiers (C2).
7. Students are able to determine the appropriate access modifiers in the programming language (C3).
8. Students are able to analyze the types and concepts of access modifiers (C4).
9. Students are able to determine problem-solving regarding access modifiers (C4).
10. Students are able to define encapsulation (C2).
11. Students are able to apply encapsulation in the Java programming language (C3).
12. Students are able to define inheritance (C2).
13. Students are able to understand examples of the application of inheritance in everyday life (C2).
14. Students are able to apply inheritance in the Java programming language (C3).

15. Students are able to analyze the structure and concepts of inheritance (C4).
16. Students are able to determine problem-solving regarding inheritance (C4).
17. Students are able to define polymorphism (C2).
18. Students are able to apply polymorphism in the Java programming language (C3).
19. Students are able to analyze the structure and concepts of polymorphism (C4).
20. Students are able to determine problem-solving regarding polymorphism (C4).
21. Students are able to define interfaces (C2).
22. Students are able to apply interfaces in the Java programming language (C3).
23. Students are able to analyze the parts of the structure and concepts of interfaces (C4).

The following is an explanation of the learning obstacles experienced by the students. Upon analysis of the learning obstacle test questions given to the students, and interview to several students and teacher the following results were obtained:

Table 1. Classification of Learning Obstacles

Learning Obstacle	Clasisfication
Limitations in understanding the concept of access modifiers in classes.	Epistemology
Limitations in understanding encapsulation that every private access requires setter and getter.	Epistemology
Incomplete definition of the polymorphism concept, limited to knowing only the same method names but with different method parameters.	Epistemology
Understanding the usage of classes but lacking knowledge of the class definition.	Epistemology
Insufficient understanding of the concept of inheritance related to parent class and child class	Epistemology
Unable to differentiate types of inheritance	Epistemology
Lack of mastery in implementing the concept of inheritance in programming languages	Epistemology
Misunderstanding the difference in implementing overriding and overloading.	Epistemology
Low interest among students in learning OOP.	Psychological Ontogeny
There is no learning objective or material related to access modifiers or encapsulation.	Didactic
There is no learning objective and material regarding interfaces.	Didactic

Designing and Development of Learning Instruments

In this stage, the researcher constructs the learning trajectory for students only focus on the topics of inheritance within two main class sessions for content delivery. The researcher designs and organizes the taught material, which focuses on Object-Oriented Programming (OOP) covering inheritance. In the inheritance section, students are taught about basic inheritance concepts, keywords related to inheritance, types of inheritance, inheritance implementation in the Java programming language, and problem-solving related to inheritance.

The researcher develops a teaching module as a learning plan that implements the Merdeka Curriculum. Based on preliminary studies, the researcher decides to use a Problem Based Learning (PBL) approach, aiming to enhance implementation skills and problem-solving abilities, foster collaboration for improved communication among students, and facilitate deeper learning alongside peers. According to Sultan et al. (2022), Problem Based Learning (PBL) is a learning model that begins with presenting problems, designing materials to promote knowledge and conceptual understanding, fostering critical thinking, cultivating self-directed learning, and developing collaboration skills for individuals to solve problems.

The researchers also designed several learning objectives related to inheritance as follows:
1. Students are able to define inheritance in Object-Oriented Programming during the learning process through Problem-Based Learning (PBL) based on everyday life phenomena accurately and effectively (C1).
2. Students are able to explain inheritance in Object-Oriented Programming through problem assignment when presenting their work (C2).
3. Students are able to implement inheritance in simple Object-Oriented Programming using the Java Programming Language (C3).

4. Students are able to determine inheritance in Object-Oriented Programming during the learning process through Problem-Based Learning (PBL) based on everyday life phenomena accurately and effectively (C3).
5. Students are able to solve problems regarding inheritance in simple Object-Oriented Programming so that the program can run accurately and effectively (C4).
6. Students are able to conclude solutions to problems regarding inheritance in simple Object-Oriented Programming through problem solving based on everyday life phenomena accurately and effectively (C5).
7. Students are able to develop simple Object-Oriented Programming programs by applying the concept of inheritance through problem solving based on everyday life phenomena accurately and effectively (C6).

The researcher also prepares Student Activity Sheets or in Indonesian it is called Lembar Kerja Peserta Didik (LKPD) to be worked on in groups. Figure 3 illustrates the learning flow for the inheritance materials, consisting of learning situations with multiple activities.

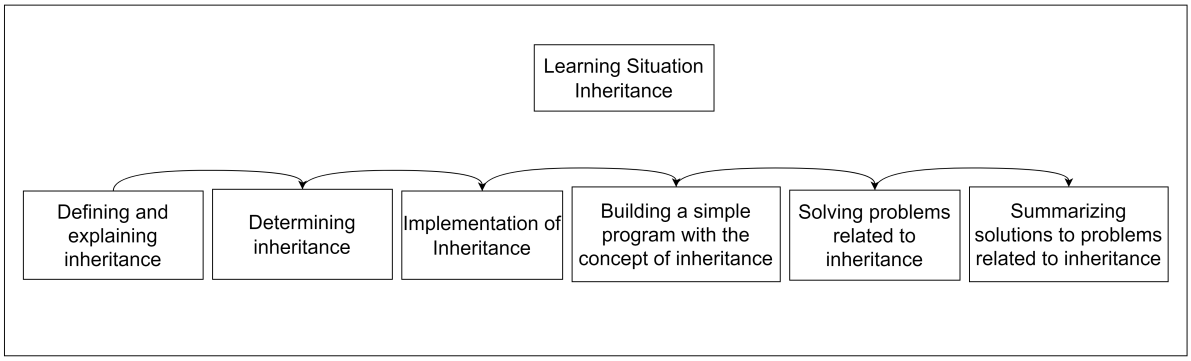


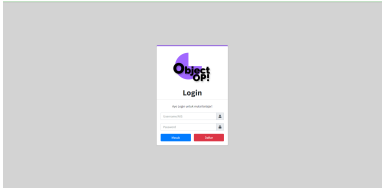
Figure 3. Learning Trajectory for Inheritance

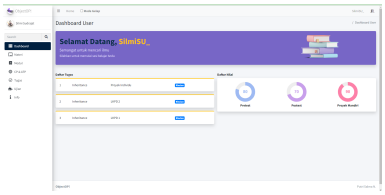
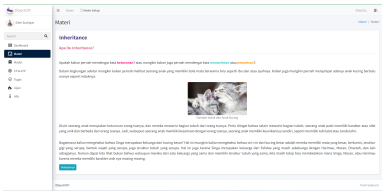
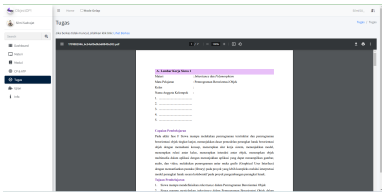
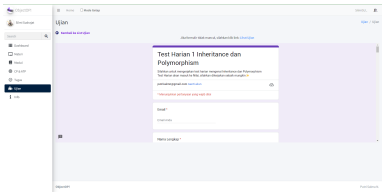
Based on this HLT, the didactic design is divided into two sessions (lesson designs) for the core material delivery activities consisting of six learning trajectories. In the first session, learning activities include basic concepts of inheritance up to implementation in the Java programming language. In the second session, activities involve case study resolution and building simple programs using the concepts of inheritance. The learning continues in the second session, where students will learn about the implementation of inheritance in the Java programming language. Learning activities will begin with the presentation of a case study, and by the end of the session, students will create a simple program to solve the case study.

Design and Development of Learning Media

In this stage, the researcher designs flowcharts, entity relationship diagrams (ERDs), and storyboards for the learning media. Subsequently, the designed outcomes are implemented into a website-based learning media. Table 2 shows the interface of the developed media

Table 2. Media Interface

Media interface	Description
	Home Page. It is the main page of the media. On the home page, when users access the media, they are prompted to click the start button to proceed to the login page.
	Login Page. It functions to enter the login page of the media by entering the registered username and password.

Media interface	Description
	Dashboard Page. The page contains information about the list of available tasks and the scores for the pretest, posttest, and project assignments.
	Material Page. It contains the learning content uploaded by the teacher for students to study.
	Assignment Page. It contains the selected assignment content from the task list to be worked on collaboratively by students. The assignment comprises Student Activity Sheets (LKPD) which include Problem Based Learning (PBL) learning steps.
	Exam Page. It contains exam or test content selected from the exam list where students can take the exam at any time. In this menu, students can take exams such as pretests, posttests, and daily quizzes.

Results of Expert Validation Testing

For the results of expert validation testing, it was conducted to evaluate the developed learning media. This test used the LORI 1.5 instrument. From the material test results conducted by the material expert, a final score of 76.5% was obtained with the category "Very Good," making it suitable for use as a learning instrument. Meanwhile, for the validation testing of the learning media, a final score of 87.1% was obtained with the category "Very Good," thus making it suitable for use as a learning instrument.

Metapedadidactic Analysis Stage

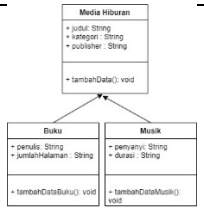
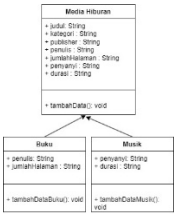
In this stage, the implementation of the didactic design and learning media takes place. During this stage, the researcher also records various student responses that arise during the learning process. At the beginning of the learning process, students are given a pretest, then proceed to the learning stage, and the final stage involves administering a posttest and conducting student interviews. Table 3 shows the learning activity, the hypothesis or anticipated student responses that may arise during the learning process, and the actual student responses during the learning process.

Table 3. Observation Results of the Learning Situation

Learning Activity	Hypothesis of Student's Responses	Actual Student's Responses
Students analyze the case study and determine the definition of the parent class from the given case study.	1. Students respond that a parent class is a superclass or a class that can pass attributes to its subclasses [expected response]. 2. Students respond that a parent class is a core class. 3. Students have difficulty defining a parent class.	• The majority of students responded that the *parent class* is a *class* that has derivatives, which is a response that beyond prediction • Students answer the first directive question: the

Learning Activity	Hypothesis of Student's Responses	Actual Student's Responses
		characteristics or traits of parents • Students answer the second directive question, which is passing on attributes and *methods*
Students determine the meaning of child class based on the case study provided.	1. The student answers that a child class is a class that inherits attributes or methods in a parent class or a child class is an extension of a parent class that inherits its attributes and methods. [expected response] 2. The student replied that the child class was just an ordinary class. 3. Students find it difficult to answer the definition of child class.	• Students give a response [1] where the response is in accordance with the expected prediction • Students ask, "Can *a child class* be a *parent class* too?"
Students determine the parent class along with attributes based on the case study provided.	1. Students answered that the parent class in the case study was a parent and the attributes were eyeball color, hair color, nose shape, and chin shape. [expected response] 2. The student answered that the parent class is the child and the attributes possessed are eye color, hair color, nose shape, and chin shape. 3. Students have difficulty answering *the parent class* and its attributes based on the case study provided.	Students give a response [1] where the response is in accordance with the expected prediction
Students determine child classes and attributes based on the case studies provided.	1. Students answered *that the child class* in the case study was the child and the attributes were eyeball color, hair color, nose shape, and chin shape. [expected response] 2. Students answered that *the child class* is a parent and the attributes possessed are eyeball color, hair color, nose shape, and chin shape. 3. Students have difficulty answering *child classes* and their attributes based on the case studies provided.	Students give a response [1] where the response is in accordance with the expected prediction
Students are asked the question "should the attributes of the child class always be the same as the parent class?"	1. The student answers that *the attributes of the child class* do not always have to be the same as *the parent class*, *the child class* can have other attributes that are not inherited from the *parent class* and do not absolutely have to be the same as the parent class. [expected response] 2. The student replied that *the child class* must have the same attributes as the *parent class* and must not have any other attributes. 3. Students have difficulty answering whether *the attributes of the child class* should be the same as *the parent class*.	• Students give a response [1] where the response is in accordance with the expected prediction • Students give real-life examples that child classes do not always have to have the same attributes as *parent classes*: when a child is born he has curly hair like his parents, but has moles on his hands that are not on his parents
Students are asked the question "when should	1. The student replied that inheritance is used if it is found that there is a class	• Students give a response [1] where the response is in

Learning Activity	Hypothesis of Student's Responses	Actual Student's Responses
inheritance be used in OOP?"	that can be extended from *other classes*. Like the class still has continuity with the previous *class*, it's just that there are other properties that are unique. Or when there are several classes that have something in common, then we can generalize some of these classes into a *parent class*. Also, to avoid repeated code writing [expected response] 2. Students answer that inheritance can be used at any time depending on the programmer 3. Students answered that *inheritance* is better used if the program is complicated 4. Students answer that innheritance is better used if there are interconnected classes 5. Students have difficulty answering when to use inheritance in OOP.	accordance with the expected prediction • Students answered in more detail, that the use of *inheritance* is done if you want the program code to be more organized and for the purposes of using the concept of *polymorphism*
Case studies on inheritance were given. There are Books and Music classes with their own attributes. Students are instructed to create a program to store Book and Music data using the concept of inheritance. Students must first determine the superclass and subclass.	1. Students fill the superclass with Entertainment Media as well as the Books and Music subclass [expected response] 2. Students fill the superclass with Books and Music 3. Students fill the superclass with Books and Music subclasses or vice versa 4. Students fill the superclass with Books and Music with no subclasses 5. Students fill subclasses with Books and Music without any superclasses Students have difficulty determining superclasses and subclasses	• Students give a response [1] where the response is in accordance with the expected prediction • Students explained that because generalizations were made to the Book and Music classes, the Media parent class was formed
From the case study, students were asked to determine the attributes of each class.	1. Students assign title, category, and publisher attributes to the superclass. Provide author and page count attributes on the Books subclass and provide singer and duration attributes on the Music subclass [expected response] 2. Students provide attributes on superclasses only 3. Students provide attributes on subclasses only 4. Students find it difficult to determine the attributes in each class	• Students give a response [1] where the response is in accordance with the expected prediction • Students explain that by generalizing to the Book and Music classes. There are several attributes in common between the two classes, so generalizations are made where the same attribute belongs to the parent class attribute, and different attributes belong to each class
From the case study, students were asked to describe the inheritance structure using a class diagram	1. Students draw a class diagram as follows: [expected response]	The majority of students draw a class diagram like response [1] where is the expected response

Learning Activity	Hypothesis of Student's Responses	Actual Student's Responses
	 2. Students draw a class diagram as follows:  3. Students draw a class diagram as follows:  4. Students draw a class diagram as follows:  5. Students struggle to draw class diagrams	
From the case study, students were asked to determine the type of inheritance used	1. The student replied that the inheritance used was single inheritance 2. Students answered that the inheritance used was multi-level 3. Students answer that the inheritance used is hierarchical inheritance [expected response] 4. Students answered that the inheritance used was multiple inheritance 5. Students do not know the type of inheritance used	• The majority of students responded [1] to single inheritance • Students answer the first directive question that the diagram has one parent class at the top, and two child classes below it in a parallel position then there is an arrow that goes to the parent class • Students are less confident and less able to answer the second directive question • Students mentioned again that the type of inheritance is hierarchical inheritance
Based on case study, students were asked to give their opinion on "what is inheritance in OOP?"	1. Students give the answer that inheritance is the process of inheritance of data and methods from an existing class in a new class. Where the new class is an extension of the previous *class* and has unique properties [expected response] 2. Students give the answer that inheritance is a process of assigning parent class attributes *to child classes*	• The majority of students responded [2] that *inheritance* is a process of assigning *parent class* attributes to *child classes* • Students give the answer to the first *clue* question, which is inherited • Students answer the second clue question: the *class child* can be further expanded

Learning Activity	Hypothesis of Student's Responses	Actual Student's Responses
	3. Students find it difficult to answer what inheritance is in OOP.	

Retrospective Analysis Stage

In this stage, the researcher analyzes the results of the pretest and posttest, interviews, observations of student responses, and student feedback on the learning media. Based on the analysis of the pretest and posttest results, it was found that 1 student had not reached the cognitive level of defining inheritance (C1), 1 student had not reached the cognitive level of explaining inheritance (C2), 2 students had not reached the cognitive level of determining inheritance (C3), 1 student had not reached the cognitive level of implementing inheritance (C3), 4 students had not reached the cognitive level of solving inheritance problems (C4), and 2 students had not reached the cognitive level of summarizing solutions to inheritance problems (C5).

In the overall posttest results, students still answered incorrectly on some specific question indicators, but in terms of scores, students' cognitive abilities in inheritance improved. Student's errors in answering questions may indicate that they still face learning obstacles. To verify and understand this, the researcher conducted interviews with three students who scored above the Minimum Mastery Criteria and two students who scored below it. Below is the classification of learning obstacles faced by students based on the findings from the assessment questions, interviews, and observations of student responses in Table 2.

Table 4. Learning obstacle that still exist among students

No	Learning Obstacle	Clasification
1	Student's understanding of prerequisite material is still lacking, particularly regarding encapsulation	Conceptual Ontogenic
2	Lack of understanding in implementing inheritance in programming languages	Epistemology
3	Unable to differentiate types of inheritance	Epistemology

Additionally, the majority of students have understood the concept of inheritance, grasped the concepts of parent class and child class, the use of "extends", and are more motivated in their learning.

After analyzing the data, it is evident that the didactic design needs improvement or revision to address the learning obstacles still present in students. Here are the aspects that can be revised from the previous didactic design:

a) Providing examples of inheritance using the Java programming language.
b) Providing examples of implementation and practice of inheritance with various cases.
c) Providing examples and tasks related to problem-solving with various cases in the form of programming code.
d) Adding learning activities for students to recall prerequisite material.

Student Feedback on Learning Media

The data processing is utilized to determine the results of student feedback forms on the learning media that has been created. The researcher employed a form consisting of 12 statements to obtain assessments from the students. Overall, the average percentage rating of student feedback on the learning media based on the didactic design for inheritance materials is 82.72%, categorized as "Excellent".

Table 5. Results of Analysis of Student Responses to Media

No	Statement	Ideal Score	Score Gain	Percentage
1	The learning media aids in understanding the concepts of inheritance.	165	133	80,60%
2	The learning media enhances the effectiveness of learning inheritance materials.	165	139	84,24%
3	The learning media improves my learning achievement in inheritance materials.	165	141	85,45%

No	Statement	Ideal Score	Score Gain	Percentage
4	The learning media has clear and easily understandable procedures, making it easier for me to use.	165	139	84,24%
5	The learning media is easy to use.	165	136	82,42%
6	The learning media supports the achievement of learning objectives in inheritance materials.	165	135	81,81%
7	The learning media makes the lessons on inheritance more engaging.	165	137	83,03%
8	The learning media makes learning about inheritance more enjoyable.	165	138	83,63%
9	The learning media is suitable for use as a learning tool for inheritance materials.	165	137	83,03%
10	I use this learning media as a learning tool.	165	136	82,42%
11	I think I will frequently use this learning media.	165	134	81,21%
12	I recommend this learning media to my friends.	165	133	80,60%
	Total	1980	1638	Average 82,72%

Conclusions

Didactic design and learning media for the Object-Oriented Programming (OOP) subject, specifically in the topics of inheritance, can enhance students' cognitive learning outcomes and minimize learning obstacles experienced by students. Although there has been an improvement in students' learning outcomes, there are still learning obstacles present, such as epistemological, and ontogenetic obstacle, thus requiring revisions to the didactic design and development of learning media to minimize student's learning obstacles. Student's responses to the learning media have been highly positive, indicating its potential to support further learning. However, this research still requires further investigation, namely: (1) The developed didactic design can be expanded or updated according to the needs and schedule of classes, (2) the learning media can be further developed by adding other features that can assist in the learning process with any teaching model. For example, adding quiz functions and checking quiz results on the website media so that teachers do not need to individually check and evaluate student's quizzes. Additionally, adding help features in the form of pop-ups so that students who are unfamiliar with menu icons feel supported and receive information about each feature function available in the learning media.

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Virtual Education Zone (VEZ)

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Abstract

With this project, in a virtual learning environment that will be created using virtual reality technology, students' motivation in studying and learning will be increased, learning environments will be more enjoyable, problem solving and higher-level thinking skills will be developed, VEZ (Virtual Education Zone)

By processing the data obtained through the use of the application, it is aimed to determine the points that make learning difficult on a course basis. In this project, we plan to develop a virtual reality application that includes various virtual reality training videos, animations, and documentaries. The application will include an artificial intelligence-supported assistant character for user interaction, single and multi-player educational games, a competition-based reward system that other users can see, and additional materials, assignments, and tests that will help users better understand the subject they are working on.

Keywords: Virtual Reality, Education, Immersive Learning, Artificial Intelligence, Gamification, Student, Interactive, Competition.

Introduction

With this Project, students can have real-world experiences in virtual environments, helping them understand the subjects better and consolidate their knowledge more effectively. Teachers can provide more effective teaching with interactive learning materials.

Our project aims to serve the education sector in the VR market. In this project, we plan to develop a virtual reality application that includes various virtual reality training videos, animations, and documentaries. The application will include an artificial intelligence-supported assistant character for user interaction, single and multi-player educational games, a competition-based reward system that other users can see, and additional materials, assignments, and tests that will help users better understand the subject they are working on. Four main modes were identified for this project: Tutorial Mode, Multiplayer Mode, Competitive Mode, and Homework Mode.

Our project is a virtual reality application designed to help users improve themselves and become more competent in various fields, with an emphasis on robotics, coding, K12 curriculum courses, and foreign languages. Users can use our project with any virtual reality glasses. While using the application, users will follow the learning paths related to the field they choose. These paths include various educational videos, documentaries and animations to inform users theoretically. The knowledge acquired will be reinforced with various assignments, tests, applied laboratory activities, and educational games.

Apart from the single-player mode, the presence of a multiplayer mode in the games will add a competitive element to the users. The aim is to increase user motivation with weekly and monthly tournaments as well as rewards that can be seen by the outside world.

Methodology

The development of the Virtual Education Zone (VEZ) project followed a systematic approach covering various stages from conceptualization to implementation. This section summarizes the methodology used in creating the VEZ, detailing the steps taken, technologies used and methodologies followed.

A. Related Works

Related Works section provides a summary of various studies that have explored the use of virtual reality (VR) technology in education.

There are many studies investigating the integration of virtual reality (VR) technology in education. Leung et al. [1] investigated the compatibility of VR-based learning environments with prominent learning theories such as constructivist and social cognition theories. They highlighted how virtual reality can create immersive and interactive learning scenarios to facilitate active learning and social interaction.

Chen [2] focused on leveraging VR technology to increase engagement and participation in constructivist learning. The VRID model was introduced as a framework for designing virtual learning environments in line with constructivist principles.

Checa and Bustillo [3] conducted a review of 135 proposals for serious games in immersive VR environments, identifying standards and differences between education and learning applications. Their work provides insights and recommendations for improving serious games in VR.

Radianti et al. [4] comprehensively analyzed existing research on immersive virtual reality (IVR) in higher education. They emphasized the potential of IVR to create engaging learning environments that encourage active participation and retention of information.

In a research paper titled "The Effects of Immersive Virtual Reality Environments on Students' Academic Achievement" [5], it was found that immersive virtual reality (VR) environments positively impact students' academic achievement, with a moderate effect size (d = 0.526). The study employed both quantitative and qualitative methods, revealing various benefits of VR on students' cognitive, affective, and psychomotor skills. These environments create a realistic perception and enhance learning, motivation, and interactivity.

Virginia Tech's College of Veterinary Medicine and University Libraries [6] have adopted VR technology for canine anatomy studies. Associate Professor Thomas Tucker, along with graduate and undergraduate students, developed a VR experience allowing veterinary students to interact with a 3D representation of a dog's anatomy. This immersive tool aids in understanding internal organs and skeletal structures, bridging theoretical knowledge with clinical practice. Unlike traditional methods, VR provides a more accurate and engaging depiction of a dog's anatomy, enhancing students' learning experience.

Overall, these studies and projects collectively demonstrate the vast potential of VR to enhance learning experiences across various disciplines, catering to different learning styles and needs..

And there are also projects launched on the market. MentalUp[7] is an online game platform for children aged 6-15. In addition to children's mental development, it also supports their development of attention, memory, problem solving, logic, visual and verbal skills. The platform includes more than 60 scientific and gamified exercises. Minecraft Education [8] is a game-based learning platform that encourages creativity, collaboration, and problem solving in an immersive digital environment. Educators in more than 115 countries use Minecraft: Education Edition across the curriculum.Khan Academy [9] is a non-profit educational organization founded in 2006 by educator Salman Khan with the slogan "world-class, free education for everyone, everywhere" Education Information Network, or EBA [10] for short, is a social educational electronic content network established by the Ministry of National Education of the Republic of Turkey. It is designed and operated by the General Directorate of Innovation and Educational Technologies affiliated with the Ministry.

Table 1. Comparison Chart.

	VEZ	MentalUp	Minecraft Education	Khan Academy	EBA

Ability to Play Simultaneously	Available	Not available	Available	Not available	Not available
Ability to Add Questions	Available	Not available	Available	Not available	Not available
Price(Annual)	10 – 20 €	300 ₺	5-12	Not available	Not available
Number of Courses Taught	More than one	More than one	More than one	More than one	More than one
Device Support	VR, Mobil	Computer, Mobile	Computer	Computer, Mobile	Computer, Mobile
Gamification	Available	Available	Available	Not available	Not available
Lecture	Available	Not available	Available	Available	Available
Origin	Türkiye	Türkiye	Sweeden	America	Türkiye
Year	2023	2015	2016	2018	2012

B.Virtual Education Zone(VEZ)

Initially, a comprehensive literature review was conducted to explore existing research and projects in the fields of virtual reality (VR), augmented reality (AR), artificial intelligence (AI), gamification, and interactive learning technologies in education. This review provided a foundation for understanding the current state-of-the-art, identifying gaps, and informing the design and implementation of the VEZ system.

The selection of appropriate technologies was crucial in ensuring the functionality and scalability of VEZ. Virtual reality (VR), augmented reality (AR), artificial intelligence (AI), web development frameworks and multiplayer network solutions were identified as key technologies for implementation.

An agile development approach was adopted to facilitate iterative development and incorporation of continuous feedback. The system architecture was meticulously designed to include features such as secure user authentication, personalized AI-powered assistance, multiplayer gaming, and data analysis capabilities.

Comparative analysis with existing training platforms and market competitors provided insight into the unique features and competitive advantages of the VEZ system.

Technology Areas to which the Project is Related

Virtual Reality (VR): VR technology is the main basis of the project. VR technology is used to increase immersion and efficiency in education.

Artificial Intelligence (AI): The project uses AI-powered characters to support the learning experience. These AI algorithms can provide adaptive learning paths, answer user questions, and provide tailored guidance, improving overall training effectiveness.

Software Development: The creation of VR applications, AI characters, and multiplayer games involves software development technologies and applications.

Interactive 3D Content Creation: Interactive 3D content is an important component of the project. This technology enables the creation of realistic and interactive virtual environments, enriching the learning experience.

Game Development: The project includes gamification elements, including competitive reward systems and multiplayer educational games. Game development technologies are used to create engaging and interactive learning activities.

Gamification: The inclusion of a competitive reward system and multiplayer modes introduces gamification into the learning process. Gamification technology is used to make learning more engaging and motivating.

Educational Technology (EdTech): The project falls within the field of educational technology, which utilizes digital tools and platforms to enhance the learning process. It is in line with the growing trend of integrating technology into education to achieve better outcomes.

Data Analytics and Learning Analytics: The project involves analyzing data obtained from user interactions within the Virtual Education Zone (VEZ) application. Data analytics and learning analytics technologies are used to evaluate students' performance, track progress, and identify areas for improvement.

Mobile and Web Technologies: The project may include the development of mobile and web applications that will support the VR education platform. These technologies allow users to access educational content and features through a variety of devices.

User Experience (UX) Design: UX design principles and methodologies are applied to ensure that the VR application is user-friendly, and intuitive and provides users with a seamless learning experience.

B.System Architecture

This section contains information about the system architecture.VEZ project outlines the user interactions, system processes, and resulting outcomes. Users input data through actions like entering the game or choosing multiplayer mode. The system processes these inputs, recognizing correct sequences, initializing games, or establishing network connections. Outputs include activated multiplayer modes, identifiers like StudentID and ResultID, and the creation of assignments with identifiers such as Learning Outcomes, AchievementID, StudentID, GameID, and AssignmentID.

Definitions Of Functions And APIs

API: Application Programming Interface.

UGS (Unity Gaming Services) API: The UGS API is the interface that allows developers to interact with Unity Gaming Services programmatically. It provides a way for game developers to integrate Unity's services into their games, enabling features like player authentication, leaderboards, in-app purchases, and other gaming-related functionalities.

.NET CORE WEB API: This specifically refers to the implementation of a web API using the .NET Core framework. Developers can use .NET Core to create RESTful APIs that handle HTTP requests and responses, serving as a backend for web applications, mobile apps, or any client that communicates over HTTP.

Figure 1 shows the use case diagram of this project. It is shown that the user first connects to VR technology. Subsequently, the user can access 4 different modes in the user interface. These are listed as tutorial, multiplayer, homework, and competitive modes. Our instructor using the application can control the user from the web. For example, it can assign homework and check homework.

Figure 2 shows the high-level design of the project. This diagram clearly shows the architecture of the system and provides information about the technologies used. First of all, our users can benefit from the training system by connecting to the project using VR. Every feature in the project was prepared in a system that can be used with VR. Our players can also check their homework by logging into the system from their computers or phones. The website of the project was created using HTML, CSS, and JavaScript. .netcore was used on the backend side

and Firebase was provided to the database. On the multiplayer game side, the multiplayer game service API was retrieved and connected to the server using a Unity cloud connection.

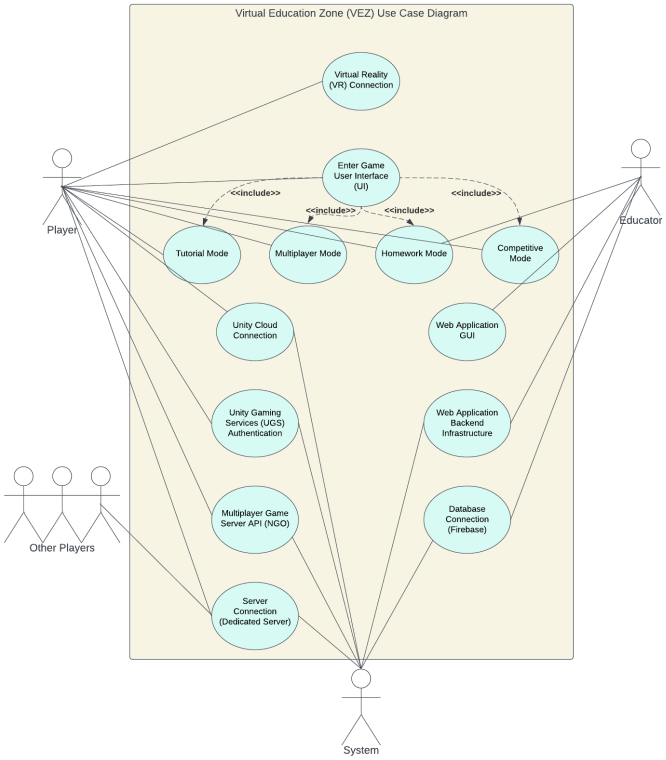

Figure 1. Use Case Design

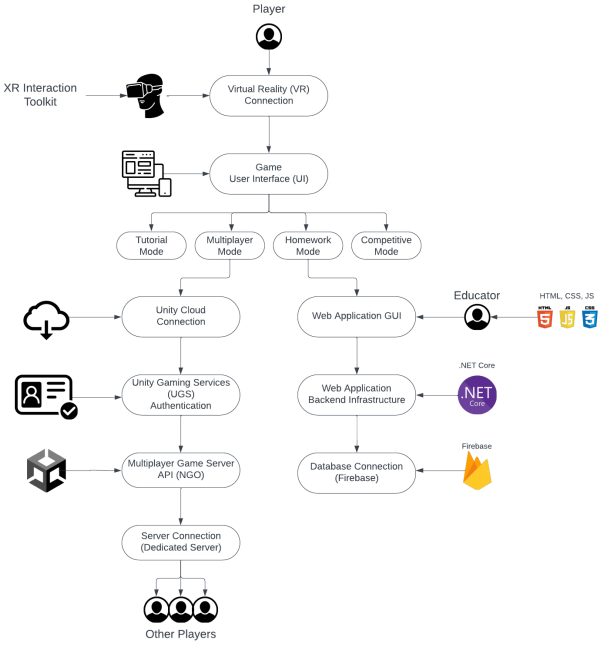

Figure 2. High Level Design

Results

The Virtual Education Zone (VEZ) project offers a comprehensive approach to leveraging virtual reality (VR) technology in education, aiming to improve learning experiences and outcomes. The VEZ system offers a promising platform for immersive and interactive learning through the systematic development process outlined in the methodology, combining knowledge from relevant studies and using key technologies such as VR, artificial intelligence (AI), and gamification. Comparative analysis with existing education platforms highlights VEZ's

unique features and competitive advantages, positioning it as a valuable addition to the VR education market. As VR continues to gain traction in education, the VEZ project contributes to a growing body of research and initiatives exploring the potential of immersive technologies to transform learning environments.

Conclusions

In conclusion, the Virtual Education Zone (VEZ) project underlines the transformative potential of virtual reality (VR) technology in education. VEZ offers a new approach to meeting the evolving needs of students and educators by delivering immersive and interactive learning experiences powered by artificial intelligence (AI) and gamification elements. The systematic methodology used throughout the development process ensures a robust and scalable system, while comparative analysis highlights VEZ's unique value proposition in the competitive VR education market. Looking forward, continued research and development efforts in VR education, supported by projects like VEZ, hold promise for shaping the future of learning and improving educational outcomes on a global scale.

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Designing a Teacher Professional Development MOOC For English Language Teachers

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Abstract

Massive Open Online Courses (MOOCs), offer promising potentials for flexible and scalable teacher professional development bridging geographical and temporal barriers provided they are designed and delivered effectively following robust learning design principles and contemporary learning approaches. This study outlines the design and development of a Teacher Professional Development MOOC entitled 'Technology-Enhanced Language Learning' (TELL-MOOC) which seeks to offer comprehensive and flexible training for English language teachers around the world. The primary objective of the TELL MOOC is to equip ESL/EFL teachers and teacher candidates with the knowledge, skills, and tools necessary to integrate technology effectively and responsibly into language education. ADDIE instructional design model guided the whole design and development processes. During the analysis phase, English teachers' needs were assessed through surveys and interviews in order to pinpoint areas for professional development. The TELL-MOOC's pedagogical approach and interactive components were inspired by the Community of Inquiry framework, which places a strong emphasis on cognitive, social, and teaching presence. Throughout the course, case-based problem-based learning activities as well as opportunities for sustained and reflective discourse through interactive activities aim to foster cognitive presence. The course's discussion boards, which are included in every module, are designed to improve social presence. Instructional videos, immediate feedback systems, and a strong facilitator presence all contribute to the establishment of teaching presence. During the development stage, video lectures, interactive learning activities, and case scenarios were among the multimedia learning elements that were produced. During the implementation phase, a diverse cohort of English teachers from different locations participate in the TELL-MOOC. The Kirkpatrick Evaluation Model (KEM) will be used to guide the evaluation phase. Learning analytics, discussion forum participation, pre- and post-surveys, facilitator observations, and learning analytics will be used to gather evidential data for the first three levels of the KEM, which include reactions, learning, and behaviors. This study adds to the expanding corpus of research on creating successful MOOCs for teacher professional development. The resulting MOOC provides an extensive, engaging, and theoretically grounded online learning experience catered to the needs of English language teachers globally by utilizing the ADDIE model, CoI framework, and the KEM for evaluation.

Keywords: Massive Open Online Courses, Teacher Professional Development, Adult Education, Technology-Enhanced Language Learning, Lifelong learning

Introduction

Massive Open Online Courses (MOOCs) have the potential to support teacher professional development bringing down the barriers of time and space. When designed and delivered in ways to provide meaningful and engaging learning experiences, MOOCs can potentially address the limitations of traditional professional development programs by giving educators the opportunity to participate in continuous and lifelong learning. For this reason, this study outlines the design and development of a Teacher Professional Development MOOC entitled 'Technology-Enhanced Language Learning' (TELL-MOOC) which seeks to offer scalable and flexible training for English language teachers around the world. The primary objective of the TELL MOOC is to equip ESL/EFL teachers and teacher candidates with the knowledge, skills, and tools necessary to integrate technology effectively and responsibly into language education.

Studies have shown that MOOCs can prove to be instrumental for educators to improve their techno-pedagogical content knowledge (TPACK) (Ma et al. 2023). Educators can collaborate with their peers from around the world, share best practices, and learn from a variety of educational perspectives by taking part in MOOCs that are designed with a social-constructivist approach to learning (Castaño-Muñoz et al., 2018). MOOCs developed and delivered through comtemporary approaches to learning promotes a more inclusive and diverse understanding of teaching and learning. Furthermore, educators can choose courses that correspond with their own interests and career goals thanks to this personalization, which increases the relevance and influence of their professional growth (AQaffas et al., 2020). In addition, asynchronous modality adopted in MOOCs allows educators to learn at their own pace, which makes managing professional development with teaching duties simpler.

Notwithstanding these affordances, the issues experienced in effectively utilizing MOOCs for teacher professional development hinder the positive potential impact of these innovative initiatives. Among the important factors to consider include the digital divide, learners' various degrees of self-regulation, and the requirement for institutional support to acknowledge and reward MOOC-based professional growth (Ma et al. 2023). Strategic policies and support mechanisms that promote the broad adoption and efficient application of MOOCs in advancing teacher professional development might help tackle these issues. Overall, MOOCs have the potential to profoundly change teacher professional development landscape by offering scalable, personalized, and meaningful learning opportunuties. Therefore, this study aims to design, develop, deliver, and evaluate a teacher professional development MOOC specifically designed to enhance ESL&EFL teachers' techno-pedagogical competencies.

Teacher Professional Development MOOCs

Teacher Professional Development (TPD) is essential to guaranteeing high-quality educational experiences and increased learning outcomes for students, and wider improved societal impact. It is necessary for teachers to equip themselves with updated competencies to create effective, engaging, and efficient learning experiences (Laurillard et al., 2016). Connectivist technologies in the digital age have led to a reconfiguration of teachers' duties and responsibilities, thus, effective TPD has become even more important (Saykili, 2018). MOOCs potentially provide the means to empower teachers to navigate the new skill sets required of them. In fact, research indicates that MOOCs offer significant potential for both professional and personal development for teachers (Wang & Zhu, 2019). According to research conducted by MIT and Harvard experts (Carapezza, 2015), 40% of MOOC participants were teachers, indicating that MOOCs can be useful resources for TPD (Nortvig & Gynther, 2017). Furthermore, MOOCs proved to be among the essential resources for educators who taught remotely due to the COVID-19 epidemic (Donitsa-Schmidt et al., 2022). However, although a significant number of teachers view MOOCs useful (Carapezza, 2015), relatively little research has been done on MOOCs' effectiveness for TPD. For this reason, this research project aims to design, develop, deliver, and evaluate a teacher professional development MOOC (TPD-MOOC) entitled 'Technology-Enhanced Language Learning'.

Massive Open Online Courses (MOOCs) can offer viable ways for educators to access flexible, accessible, and meaningful professional development and personal growth. MOOCs can accommodate various needs and requirements by providing a vast array of courses that are cost-effective and accessible at any time and place. Within this regard, the advantages of MOOCs for TPD have been examined in a number of research. Thanks to the flexible, self-paced nature of MOOCs, participating educators have the opportunity to learn on their own time and pace (Ma et al. 2023). Also, MOOCs have the potential to cultivate global connections and create dynamic online communities for peer learning and collaboration (Wang & Zhu, 2019). Furthermore, MOOCs can promote communities of practice and professional development by facilitating peer support, collaborative learning, and idea sharing among professionals (Milligan & Littlejohn, 2017). The advantages of MOOCs are also reflected in teacher attitudes and opinions towards MOOCs. For example, Brennan et al., (2018) conclude that teachers found the MOOC experience valuable, particularly in terms of acquiring new pedagogical strategies and expanding their subject knowledge.

Nevertheless, challenges associated with MOOCs for teacher professional development have also been identified. Low completion rates and high attrition rates in MOOCs raise issues that could compromise their usefulness for long-term professional growth (Castaño-Muñoz et al., 2018). Improved support mechanisms such as tailored feedback and facilitation can be offered to improve engagement and retention in MOOCs. Moreover, Ventista & Brown (2023) contended that the impact of MOOCs on teacher professional development is contingent upon the quality and relevance of their content in addressing TPD needs. Considering the gaps in TPD, it is of paramount importance to align MOOC content and curriculum to teachers' unique demands and learning contexts to optimize the potential advantages. Therefore, a number of factors are deemed essential for optimizing MOOCs' efficacy in TPD. As stated before, The initial step in bridging the theory and practice gap is to make sure that the MOOC curriculum meets the specific professional needs of the target educators and the practical educational contexts (Misra, 2018). Furthermore, the integration of engaging components such as discussion boards and collaborative learning activities can promote more in-depth learning and foster a sense of community. Also, continuous coaching or mentorship during the delivery of MOOOCs would allow teachers to apply new knowledge & skills learned throughout the MOOCs.

MOOCs offer educators with invaluable options for continuous professional development, especially in regions where traditional face-to-face training may be scarce or unaffordable. However, appropriate instructional design and pedagogical techniques are essential to make sure that MOOCs provide instructors with worthwhile and meaningful learning experiences. Thus, in order to ensure that the curriculum and content of the MOOC aligns with the specific needs of the target audience, ADDIE instructional design model was adopted throughout the development of the Technology-Enhanced Language Learning MOOC (TELL-MOOC). Furthermore, Community

of Inquiry framework, a social-constructivist approach to learning, informed the pedagogical decisions and the development of collaborative learning activities with the TELL-MOOC to provide effective, engaging, and meaningful learning opportunities for the participants.

Design & Development of TELL-MOOC

We adopted ADDIE instructional design model, one of the most utilized systematic design frameworks used for creating effective learning experiences, to develop the TELL-MOOC. Using the ADDIE model to guide learning experience design and course creation ensures an organized and methodical approach that supports in-depth needs analysis, well-structured learning design, effective learning activities & resources development, efficient implementation, and robust evaluation. Furthermore, the Community of Inquiry (CoI) framework guided the pedagogical approach and transactional components of the TELL-MOOC. The CoI framework underscores the role of social, cognitive, and teaching presence for creating meaningful and worthwhile learning experiences. The CoI framework promotes deep learning through the interplay of these three core elements, promoting critical and reflective thinking and collaboration among learners.

Adopting ADDIE Instructional Design Model for TELL-MOOC

ADDIE instructional design model provides a systematic approach to creating effective, engaging and efficient learning experiences. ADDIE stands for Analysis, Design, Development, Implementation, and Evaluation, guiding learning designers through a structured process to ensure the creation of high-quality learning experiences. In this section we will discuss how ADDIE informed the learning experiences design process for the TELL-MOOC.

Analysis

In order to determine the current needs of the target audience, ESL&EFL teachers, we conducted interviews 20 participants from 6 countries including Türkiye, the USA, Brasil, Germany, Palestine, and Kazakhstan. After the interviews were analyzed, we developed a Technology-Enhanced Learning TPACK scale to validate the qualitative findings. A total of 443 participants voluntarily completed the online TEL-TPACK scale. Both the qualitative and quantitative results revealed that teachers had varying degrees of knowledge, skills, and confidence in integrating technology into foreign language education. While some teachers were highly knowledgeable, skilled, and confident at developing TELL experiences, others needed extensive scaffolding on how to integrate technology into their teaching practices. This necessitated that the course curriculum and content cater both the novice and the expert. Therefore, the course was designed in a way that expert teachers can skip content they feel confident while giving them further chances to explore more resources and tools should they prefer to do so. Also, the course design provided more scaffolding for novice teachers to build up their confidence in TELL. Moreover, despite the varying degrees of TELL experiences, we discovered shared gaps such as integrating artificial intelligence (AI) in language education, providing personalized and differentiated learning via universal learning design, and ethical and responsible use of technologies including AI, and systematically evaluating the TELL experiences. The learning objectives were developed depending on the results of the analysis phase.

Design

The analysis stage informed the design phase in which learning objectives, content outline and sequencing, instructional strategies, media selection, TELL tool selection, and assessment strategies were determined. The following terminal learning objective was crafted:

‘By the end of the TELL-MOOC, participants will be able to proficiently create and systematically evaluate effective, efficient, and engaging technology-enhanced language learning experiences that cater to the diverse needs of language learners, demonstrating ethical and responsible practices in their design and implementation’.

Also, the following modules were designed depending on needs analysis results:

1. Module 1: Getting Started! *(Course Orientation Module)*
2. Module 2: Fundamentals of Technology-Enhanced Language Learning
3. Module 3: Interactive Web Technologies in Language Education
4. Module 4: Artificial Intelligence in Language Education
5. Module 5: Evaluating TELL Experiences
6. Module 6: Reflecting on Your Learning Experience *(Course Evaluation Module)*

In terms of educational media, instructional videos, reading resources, and interactive content was designed. In addition, hands-on learning experiences such as ‘TechVenture Time’ and ‘Interactive Workout’ activities as well as collaborative learning activities such as ‘Insights Corner’ and triggering scenarios such as ‘The Living Case’ activities were designed. Also, the orientation resources as well as assessment tools such as quizzes, and pre-course and end-of-course surveys were designed in this stage.

Development

During the development phase, the actual instructional resources and learning activities were created. This phase involved integrating various elements, including text, graphics, interactive elements, and video, to create an engaging and effective learning experience. The online course was also created in this stage on the free version of Canvas learning management system.

Implementation

This phase involves facilitating the learning experience through the learning resources and activities based on CoI principles. It also involves providing necessary support and resources to learners during the implementation process. At the time of writing, the implementation stage continues. There are 805 learners enrolled from 40 different countries worldwide. The pre-course survey and orientation module interactions on the get-to-know-your coursemates discussion forum shows that participants have varied educational, professional, and cultural backgrounds. The diversity of TELL experiences and expertise found in the analysis part is also evident from these interactions. At the time of the writing, day three of the course, there were 345 messages posted on the first discussion forum. The high number of messages in the first week of the course indicates that a significant engagement and interaction from the course participants.

Evaluation

The course will be evaluated following the Kirkpatrick Evaluation Model, which is a widely used framework for evaluating the effectiveness of training programs and learning interventions. The evaluations at three levels, reactions, learning, and behaviors will be conducted through interviews, pre and post course surveys, learning analytics & interaction data.

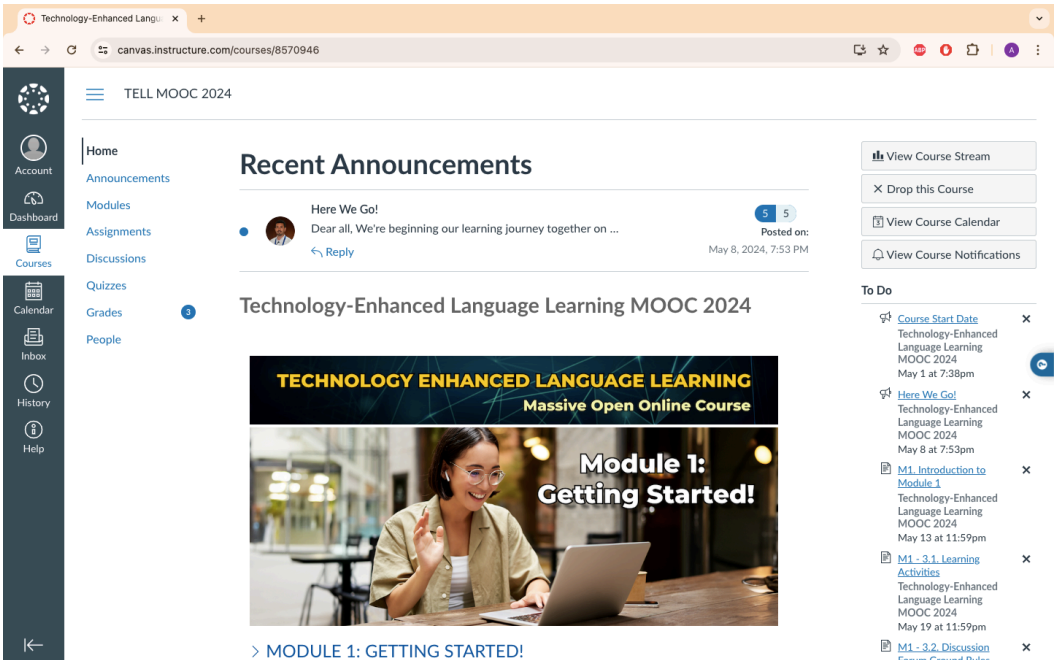

Fig. 1. Technology-Enhanced Language Learning MOOC

Manifesting Community of Inquiry Framework in the TELL-MOOC

The Community of Inquiry (CoI) offers a useful theoretical framework in identifying and optimizing the dynamics of online learning experiences. The CoI framework emphasizes intertwined elements of cognitive presence, social presence, and teaching presence as the three fundamental components necessary for a worthwhile and meaningful educational experience (Garrison et al.,1999). The effectiveness of the CoI framework in enhancing learning experiences has been demonstrated by its extensive validation and application in a variety of educational settings (Saykili, 2021).

Cognitive Presence

Cognitive presence refers to the extent to which learners can construct and confirm meaning through sustained reflection and discourse (Garrison et al., 2001). As a guiding framework, cognitive presence components were manifested through various learning activities in TELL-MOOC.

- *Triggering Event:* It is a well-thought-out activity to ensure full engagement and buy-in from the learners. Triggering event was manifested via *'The Living Case'* which were designed to arise curiosity to explore the content of the modules. As introductory cases, these activities presented relatable real-life

like scenarios in which EFL/ESL teachers experience dilemmas, issues or challenges associated with technology integration.

- *Exploration*: Refers to activities designed to help learners to understand the nature of the problem and then to search for relevant information and possible explanations. *'The Discovery Dive'* activities in TELL-MOOC represent this stage. The Discovery Dive presents the main content covered in each module. The aim of the Discovery Dive is to encourage participants to 'dive deeper' into the topics covered and offer resolutions for the 'Living Case'. In addition, optional *'The TechVenture Time'* activities in TELL-MOOC encourage learners to explore & experiment with tools to enrich their teaching.
- *Integration*: This involves the process of constructing a meaningful solution or explanation. This stage is manifested via *'The Insights Corner'* learning activities, discussion forum activities that aim to allow the learners to share their resolutions on the Living Case scenarios depending on the content explored in the Discovery Dive activities. The Insights Corner activities are based on the social-constructivist approach to learning to allow for the co-construction of meaning among participants. Also, *'The Interactive Workout'* allow learners to both experiment with & provide tentative solutions to the problems posed on the TELL-MOOC modules.
- *Resolution*: The fourth phase is the resolution of the dilemma or problem, whether reducing complexity by constructing order or discovering a contextually specific solution to a defined problem. This is manifested with *'The Insights Corner',* which allows learners to co-construct solutions through sustained discourse.

Teaching Presence

Teaching presence involves the design, facilitation, and direction of cognitive and social processes to achieve meaningful learning outcomes (Anderson et al., 2001). Teaching presence is manifested through various learning resources, activities, and strategies all throughout the course from initial design to delivery, and evaluation of the course in the final stage.

- *Design and Organization:* While design highlights the structural decisions made prior to the delivery, organization encompasses similar decisions made to adapt to changes during the educational transaction. This is manifested via the design of the holistic learning experience in TELL-MOOC, as well as actively responding to demands through refining the learning activities & resources.
- *Facilitating Discourse:* Facilitation of purposeful reflection and discourse seeks co-construction of meaning through respectful and open dialogue such as encouraging, acknowledging, or reinforcing learner contributions, and seeking to reach consensus.
- *Direct Instruction:* This component entails proactive and direct actions to facilitate effective learning. Examples of these interventions include sharing knowledge from various sources, introducing content/questions, and verifying comprehension with assessment and feedback.

Social Presence

Social presence is defined as the ability of participants to identify with the community, communicate purposefully in a trusting environment, and develop interpersonal relationships by projecting their individual personalities (Rourke et al., 1999). Social presence is manifested through various learning resources, activities, and strategies all throughout the course.

- *Affective Communication:* The implicit acknowledgment of a reciprocal relationship with the community is reflected in affective responses such as self-disclosure, and expressions of respect and welcome which are evident throughout the course discussions, and announcements.
- *Open Communication*: This is developed by acknowledging, appreciating, and replying to the inquiries and contributions of others. This promotes insightful engagement and dialogue. Open communication is manifested through actions such as continuing a thread, quoting other learners, asking for clarification, and complimenting.
- *Group Cohesion*: Throughout the TELL-MOOC, prioritizing intentional group identification is manifested with the use of social-emotional communication strategies to facilitate the development of personal ties with the group. This is done through careful use of inclusive language both within the learning resources such as videos, and readings to announcements, and discussion forum posts.

Through encouraging collaborative learning and the real-world application of technology in teaching methods, Community of Inquiry framework promotes deep learning, reflective and critical thinking—qualities that are crucial for developing techno-pedagogical competencies.

Conclusions

Massive Open Online Courses (MOOCs) present promising opportunities for flexible and scalable teacher professional development that transcends geographical and temporal limitations when they are planned and executed well. The goal of this study is to outline the design and development stages of a MOOC for teacher professional development called "Technology-Enhanced Language Learning" (TELL-MOOC). To meet the demands of English language teachers worldwide, the resulting MOOC uses the ADDIE model, CoI framework, and the Kirkpatrick Model for evaluation. Despite the tremendous interest among educators to participate in MOOCs for both professional and personal development, there is a dearth of research on how effective MOOCs are for teacher professional development. This study seeks to contribute to the growing body of knowledge regarding the establishment of effective MOOCs for teacher professional development.

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Breaking Down Degrees: Navigating the Pros and Cons of Modular and Unbundled Learning in Higher Education

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Abstract

In today's constantly evolving educational world, learners are looking for more and more personalized and on-demand experiences. This is evident in the level of higher education, where students increasingly seek greater control and flexibility over their learning paths. "People don't buy albums anymore; they buy songs. They read articles, not newspapers. So why not mix and match learning 'modules' instead of being locked into fourteen-week university courses?" This shift, as highlighted by the Massachusetts Institute of Technology (MIT) report (2013), reflects a broader societal trend towards customization and flexibility. Over the past two decades, universities have increasingly adopted credit-based modular curriculum structures to cater to diverse student needs. Modular degrees offer significant advantages in terms of flexibility, choice, access, and mobility. However, concerns are also raised regarding the potential fragmentation and incoherence in educational experiences, as well as the risk of undermining learning outcomes due to structural challenges. This paper aims to contribute to the debate on the use of modularized and unbundled learning in higher education. It begins by defining the modular system and discussing its background, highlighting the potential benefits of modular curriculum structures. The paper then examines the potential challenges modularization presents to academics and institutions. Lastly, the paper concludes the presented ideas and offers recommendations for future practices.

Keywords: unbundling, modular learning, stackable learning, short learning programs

Introduction

A module is a self-contained unit within a curriculum, complete with its own content and learning objectives, which integrates with other units to form a comprehensive educational program (Ministry of National Education, 2010, p.4). Modular teaching can thus be defined as instruction based wholly or partially on these modules. This approach stands in contrast to the traditional concept of the university 'course,' which typically follows a more linear and interconnected structure.

David Bridges argues that modularization fragments the course, significantly altering the traditional curriculum's identity (Bridges, 2000: 42). This fragmentation results from the division of the curriculum into small, independent, non-sequential units, which allows students to accumulate credits toward their qualifications at their own pace (French, 2015). Over the past two decades, universities have increasingly adopted credit-based modular structures to meet diverse student needs and provide greater flexibility.

Many academics acknowledge the benefits of modular degrees, such as increased flexibility, choice, and access. They also argue that modular structures allow universities to respond better to employer needs, expand student markets, and use resources more efficiently (French, 2015). However, concerns exist regarding the potential fragmentation and incoherence of the educational experience, as well as challenges related to learning outcomes and pedagogical integrity.

The rationale for modularization addresses five key needs: catering to diverse student groups, offering more student choice, responding to employer needs, promoting interdisciplinarity, and maximizing resource efficiency (French, 2015). This approach benefits mature professionals balancing work and family, and international students seeking mobility between institutions. Additionally, it supports lifelong learning by allowing individuals to return to education at different life stages without the commitment of a full-time degree program.

The concept of modularization in higher education emerged in the United States in the late 19th century, reflecting the modular nature of the human mind. Harvard University’s introduction of an elective system in 1869 marked the beginning of this shift, later evolving into a credit-based degree system by the 1890s. Modularization today aims to offer targeted, user-friendly educational opportunities, both online and offline, breaking down courses into smaller, more manageable units. This evolution mirrors broader societal trends towards customization and flexibility in various aspects of life, including work and leisure.

Before starting modular instruction, students typically undergo a pre-test to determine their competency level. Based on these results, students may require preparatory training or may advance to more challenging modules if

they demonstrate proficiency (Goldschmid & Goldschmid, 1974). This iterative process of assessment and feedback ensures that learning objectives are met, using various evaluation techniques, including tests, oral exams, and projects. This tailored approach not only caters to individual learning paces but also addresses gaps in knowledge, promoting a more thorough understanding of the subject matter.

In the Netherlands, the Academic Council supports flexible modular programming. A proposed "convergence education model" allows students to choose from various modules in the first two years before focusing on specific module sets in the latter years (Van Eijl, 1986). This model promotes both breadth and depth in education, encouraging students to explore different fields before specializing, which can lead to more informed career choices and a broader skill set.

Research comparing learning outcomes between condensed and traditional courses generally shows that shorter modules can be as effective, if not more so, than longer courses. For example, Van Scyoc and Gleason found that students in a three-week microeconomics module performed comparably to those in a traditional 14-week semester (Davies, 2006). These findings suggest that intensive, focused learning periods may enhance retention and understanding, though they require high levels of student motivation and engagement.

In Ethiopia, a study aimed to raise awareness about modularization among students demonstrated significant improvements in understanding after targeted training (W/Yohannes, Habte, Tafesse, & Buraka, 2014). These findings underscore the importance of informed implementation and student support in modular programs. By providing adequate resources and guidance, institutions can help students navigate modular systems effectively, ensuring they reap the full benefits of this educational approach.

In Guiamalon's (2021) inquiry, educators grapple with the practical obstacles that come with implementing modular learning methods. With a qualitative design, the study sheds light on significant concerns and challenges faced by teachers. These include issues like finding suitable educational materials tailored for modular instruction, determining effective assessment methods suitable for this approach, and the necessity for thorough teacher training and ongoing support to navigate the complexities of modular education. The research underscores the importance of addressing these challenges to improve the adoption of modular learning.

Positive Aspects

Modular degrees facilitate credit transfers, allowing students to move between universities and retain academic achievements. This flexibility enables students to explore various disciplines and change courses while keeping earned credits, which is particularly beneficial for those unsure of their academic paths when starting university. In the US, for instance, students can transfer credits between institutions, accumulating the necessary credit hours for a bachelor's degree through modules carrying three credit hours each (French, 2015).

Modular instruction combines the advantages of innovative instructional approaches, such as performance targeting, individual pacing, and frequent feedback (Gedikoğlu & Semerci, 2016). By considering students' interests and needs while preparing modules, the effectiveness of modular teaching can be significantly enhanced (Cengizhan, 2008). This customization can lead to higher student satisfaction and better learning outcomes, as students engage more deeply with content that is relevant to their goals and interests.

Modular degrees also offer an open model that encourages students to structure their own education. According to Van Meel, students achieve better learning outcomes when they can set individual learning objectives and pace their studies (1993: 8). This student-centered approach increases motivation by allowing learners to choose modules aligned with their personal and career goals. It also supports the development of self-regulation and independent learning skills, which are crucial for lifelong learning and professional development.

Universities can use modularization to respond to market needs and enhance the relevance of their degrees. It allows for easier curriculum adjustments and the creation of new qualifications tailored to employer demands. Combining modules from different departments can lead to interdisciplinary degrees that are highly valued in the job market. This adaptability is particularly important in fast-evolving fields such as technology and healthcare, where staying current with industry developments is crucial.

Cost reduction and resource efficiency are key drivers behind modularization. Jenkins and Walker note that educational arguments for modular courses are often overshadowed by institutional efficiency needs (1994). Modular structures are argued to reduce costs through more planned resourcing and centralized administrative functions, enabling better use of the academic calendar and institutional resources (King, 1995; van Meel, 1993). This efficiency can help universities manage financial pressures and allocate resources more effectively, potentially improving overall educational quality.

Immediate reinforcement and feedback in modular teaching address deficiencies in student performance promptly, fostering a sense of achievement (Rich & Scott, 1997). Modular courses emphasize progression through a step-

by-step approach, allowing regular assessment and feedback that supports skill development and continuous learning (Hodgson & Spours, 1997). This approach not only helps students stay on track but also allows instructors to identify and address learning issues early, improving overall outcomes.

Modularization also supports competence-based learning, where learning is broken down into competences rather than courses. Online providers can create tailored programs that meet labor market needs by leveraging modularization and advanced technologies (Weise & Christensen, 2014). Traditional transcripts are inadequate for conveying student abilities to employers, highlighting the need for more detailed assessments of learning outcomes. Competence-based assessments can provide a clearer picture of a student's skills and readiness for specific job roles, enhancing employability.

Modular education is integral to innovation at institutions like MIT, where a modular approach allows for targeted learning and easier curriculum updates (MIT, 2013). This flexibility supports the incorporation of cutting-edge research and industry practices into the curriculum, ensuring that students gain relevant and up-to-date knowledge. Additionally, it allows for the rapid development and deployment of new educational offerings in response to emerging trends and technologies.

Negative Aspects

Despite its benefits, modularization can lead to inconsistent and fragmented education due to poorly designed student choices (French, 2015). The shift towards a customer-centered education system, where students are seen as products, raises concerns about the quality of education and its alignment with market demands (Nygaard et al., 2018). This market-driven approach can prioritize profitability over educational integrity, potentially compromising the depth and breadth of academic programs.

One central tension in the modularity debate is the balance between vocational relevance and the acquisition of knowledge. Modular degrees, often focused on 'key skills,' may compromise the depth and coherence of traditional curricula (Bridges, 2000). Important subjects might be excluded due to lack of demand or misalignment with institutional goals. This can result in graduates with narrow skill sets that may not fully prepare them for the complexities of their professional fields or for lifelong learning.

Interdisciplinarity, while a positive feature of modular programs, can also pose challenges. Teaching diverse groups of students from different disciplines requires significant time and effort, and ensuring that all students achieve the intended learning outcomes can be demanding (Poynter, 2002). Additionally, the increased frequency of assessments and feedback in modular courses can be costly. These demands can strain faculty resources and potentially reduce the quality of instruction if not adequately managed.

Bob Brecher argues that student choice is not always beneficial and that universities must guide students to make choices that align with their academic goals (2005: 80). Robin Wynyard critiques modularization as the 'McDonaldization' of higher education, where knowledge is acquired in disjointed packages with little emphasis on coherence (2001: 208). This critique suggests that modular systems might prioritize convenience and efficiency over the development of a coherent and integrated body of knowledge.

Research indicates that students prefer modular and condensed course structures for their flexibility and freedom of choice. However, poor module choices can lead to fragmented education, emphasizing the need for formal guidance in the decision-making process (Hennessy et al., 2010; Hedges et al., 2014). Without proper advising and support, students may struggle to construct a cohesive educational experience that meets their long-term goals.

While modular systems work well online, they face logistical challenges in face-to-face teaching environments. Fragmented approaches are less feasible on campus due to the time required for preparation and transitions between classes. Moreover, the social and collaborative aspects of traditional classroom settings, which are important for developing critical thinking and communication skills, might be diminished in highly modularized programs.

Conclusions and Recommendations

The growing interest in individualized education in higher education reflects the recognition of diverse learning needs. However, balancing student choice with quality and academic standards remains a challenge. Effective assessment of modular courses and understanding the impact of condensed formats on learning outcomes are crucial. Institutions must invest in developing robust advising systems to help students navigate modular programs and make informed choices that support their academic and career goals.

To mitigate the risks of fragmentation, measures such as setting prerequisites, identifying compulsory modules, defining progression levels, and providing formal guidance are essential (Hennessy et al., 2010; Bell & Wade, 1993). Technological advances in higher education, particularly online teaching, are transforming traditional

teaching roles, enabling the hiring of educators without doctoral degrees. This shift requires a reevaluation of teaching qualifications and the development of new training programs to ensure high-quality instruction.

Davies (2006) argues that the success of intensive teaching formats depends on student motivation and preparation rather than the duration of the course. As more students design their learning paths from disaggregated online resources, institutions must adapt to new accreditation models that validate parts of the whole, reflecting a trend towards "just-in-time" education. These models should emphasize competence and mastery over mere credit accumulation, providing a clearer indication of student capabilities to employers.

The following table delineates the potential benefits and challenges associated with modular learning in higher education, as discussed in this article. By systematically outlining these key aspects, readers gain a clear understanding of the nuanced dynamics involved in transitioning towards modularized educational structures. This table serves as a practical tool for educators, policymakers, and stakeholders alike, facilitating informed decision-making and strategic planning in the ongoing debate surrounding the adoption of modularized and unbundled learning approaches.

Table 1. *Analysis of Potential Benefits and Challenges of Modular Learning in Higher Education*

Potential Benefits	Potential Challenges
Flexibility in learning path	Fragmentation of education
Customization of courses	Lack of coherence
Greater student control	Structural challenges
Access to diverse subjects	Credit transferability
Enhanced educational mobility	Curriculum coordination

In conclusion, modular and unbundled learning offers significant opportunities and challenges. With careful planning, guidance, and adaptation to technological advances, higher education can harness the benefits of modularization while mitigating its drawbacks. Future research should focus on long-term outcomes of modular education, exploring how it affects student success, employability, and lifelong learning. By continuously refining modular systems and supporting students through robust advising and feedback mechanisms, institutions can create flexible, relevant, and high-quality educational experiences that meet the needs of diverse learners in an ever-changing world.

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Advancing Energy Education: A Conceptional Framework for Improved Learning via Adaptive Generative Networks

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Abstract

The evolving landscape of global energy systems underlines the urgent need for innovative educational strategies in energy systems engineering. This study introduces an Adaptive Generative Network (AGN) based educational framework aimed at enhancing the learning experiences in energy systems engineering. By integrating AGNs into the educational processes, this research explores the potential for personalized and adaptive learning experiences capable of meeting the diverse needs of students. Utilizing a combination of traditional educational materials and modern AI-driven techniques, the framework seeks to dynamically adjust learning content based on real-time student performance data. Preliminary findings suggest that such adaptive learning environments can significantly improve understanding of complex engineering concepts and better prepare students for real-world challenges. The methodology employed involves a rigorous analysis of existing educational materials, student feedback, and industry expectations, ensuring that the AGN-enhanced curriculum is both relevant and effective. The study's implications extend beyond energy systems engineering, suggesting a paradigm shift towards more responsive and student-centered educational practices in technical disciplines.

Keywords: Adaptive Generative Networks, energy systems engineering, personalized learning, educational technology, AI in education.

Introduction

Energy Systems Engineering is a large and diversifying field. It can be described as one of the disciplines mainly concerned with the design, analysis, and optimization of the processes relevant to the production, distribution, and use of energy. Here is where engineers focus on alternatives in the use of fossil fuels. In particular, the focus of this discipline is sustainable and environmental energy solutions. The course taught at the faculty of engineering in the field of energy systems generally includes such elementary courses like engineering, technologies and energy converting, energy storage technologies, energy management, and state policy, along with assessment of the economic and environmental effect. Furthermore, it seeks to provide students with the analytical and technical skills required in the design, analysis, and improvement of energy systems, along with providing the ability of problem-solving and project management. Training programs, although theoretically oriented, may be designed with vast laboratory studies, and some even have a project learning module where theory is backed by practical application.

The importance of energy education is increasing as sustainable and efficient management of energy systems around the world becomes critical. Today, the energy sector is constantly evolving due to rapid technological advances and increasing environmental awareness. In this context, energy education requires equipping engineers, policy makers and other relevant professionals with the knowledge and skills that will enable them to adapt to these changes and use energy resources more effectively. However, challenges encountered in energy education include insufficient funding, outdated training materials, and difficulties in integrating competencies appropriate to industry needs into curriculum. Additionally, the rapid development of renewable energy technologies requires academic institutions to make constant updates to keep up with these innovations, which is both a costly and challenging process.

Adaptive Generative Networks (AGN) is a relatively new concept in artificial intelligence research and has the potential to deliver personalization and adaptive learning experiences, especially in the education sector. By analysing users' behaviour, preferences and learning styles, such networks can produce learning materials and activities specific to each student. For example, an education platform developed using an AGN can identify topics that a student is struggling with and offer customized content and interactive lessons to reinforce these topics. This technology could revolutionize education by providing students with more in-depth learning opportunities through real-time data analysis and simulations, especially in complex and ever-changing fields, such as energy systems engineering. The adaptability of AGNs may play an important role in enhancing individualized learning pathways and academic achievement in education.

In this study, a conceptual framework that can restructure educational processes and make maximum use of the positive developments that AGNs will bring to this process is presented. Thus, it has detailed an innovative

approach to energy systems engineering education and aims to enable students to better adapt to real-world problems while ensuring that the educational process constantly renews itself.

Methodology

Literature Review

When the literature is examined, it is understood that different approaches have been tried in terms of energy systems engineering. In the summary in the next paragraph, scientific studies containing suggestions ranging from traditional approaches to the help of more technological tools are presented. Here, it can be seen that recent studies generally focus on technology-oriented improvements. In addition, the most important developments of the recent period are AGN-based Large Language Models such as ChatGPT (Open AI, 2023), Gemini, Llama (Touvron et all. 2023), Claude etc. With this, the suggestions have become more artificial intelligence-supported and offer promising outputs.

A range of studies have highlighted the need for a comprehensive and interdisciplinary approach to energy systems engineering education. Azzaro-Pantel (2008) and Astier (2008) both emphasize the importance of combining process systems engineering and electrical engineering disciplines to address the challenges of sustainable energy systems. Sluss (2011) further underscores the need for curriculum reform in electric energy systems education, particularly in light of the industry's shift towards sustainability and smart grid technologies. Piper (2003) provides a practical perspective, advocating for a systems engineering approach to teaching energy, which includes a focus on energy sources, conversion, storage, utilization, and economics.

Caratozzolo (2021) and Singh (2021) both emphasize the need for adaptable learning approaches in sustainable energy engineering education, with Caratozzolo specifically highlighting the effectiveness of Active Learning and Challenge-based Learning. Chai (2021) and Momoh (2009) focus on the integration of renewable energy and distributed energy generation in power engineering education, with Chai using the backward design model to redesign a Year 3 course and Momoh stressing the importance of interdisciplinary research and education in developing innovative methods for power system analysis and operation. These studies collectively underscore the importance of adaptive and interdisciplinary approaches in enhancing energy systems engineering education.

AGN

AGN represent an innovative development in the field of deep learning and artificial neural networks. These networks are developed on the basis of traditional generative adversarial networks (GANs) and can model complex data distributions thanks to the generator and discriminator components in their original structure. The main feature of AGNs is that they contain a discriminator that constantly evaluates the outputs produced by the generator and provides feedback. This structure enables AGNs to produce high-quality data samples that are similar to real-world data. Additionally, these networks have the ability to generate new data samples using information learned from datasets, making them ideal for applications in fields such as synthetic data generation, data augmentation, and even art and design.

The adaptability of AGNs makes the learning process dynamic, allowing them to make automatic adjustments to specific application requirements. These networks can operate particularly effectively in environments with variable data structure. For example, an AGN model can be used to detect volatile trends in financial markets and make predictions based on these trends. This offers flexibility that exceeds the limitations of traditional models, especially considering the non-linear and dynamic nature of time series data. AGNs allow for more accurate and reliable results because the model can adapt its learning process in real time and understand complex data relationships.

Training AGNs requires special attention and resources because these networks involve interactive training of both the generator and the discriminator. This process must be carefully managed to ensure model stability and prevent model crashes. AGN models can be intensive on computer resources, especially when trained on large and complex data sets. Therefore, training such models often requires high-performance computing systems. However, when configured and optimized correctly, AGNs can provide significant benefits in various fields, especially in machine learning, artificial intelligence, and data science applications. The potential of this technology opens new doors in many industrial and academic research fields, especially thanks to its adaptation and customization capabilities.

Objectives and Targets

AGN can offer great benefits in energy education processes, especially in providing personalized learning experiences and dynamic adaptation of educational materials. The adaptive capabilities of AGNs can make energy education more effective and efficient by constantly monitoring student performance and automatically adjusting

learning materials according to the student's progress. This process identifies subjects in which students are weak, allowing them to focus more on these areas and increasing the student's overall understanding and learning speed. With the application of AGNs, learning materials in technical and complex subjects such as energy engineering can be tailored to the student's current level of knowledge and learning style. For example, if a student understands the basic concepts of photovoltaic energy systems without difficulty, AGN can provide this student with the opportunity to learn in depth by presenting more advanced applications and complex simulations. On the other hand, for a student who has difficulty with basic subjects, AGN can facilitate the student's understanding by presenting subject explanations in more simplified and repetitive formats.

This type of adaptive learning approach can significantly increase the efficiency and effectiveness of educational processes. While traditional education methodologies generally follow a fixed curriculum and teaching style, a dynamic and flexible learning environment can be provided with AGN. This allows students to progress more quickly and effectively according to their individual learning needs. Additionally, AGN-powered systems provide real-time feedback to teachers and educators, helping them understand which teaching techniques are more effective and how the curriculum can be improved.

Conceptional Framework

The conceptual framework presented within the scope of the study is presented in Figure 1.

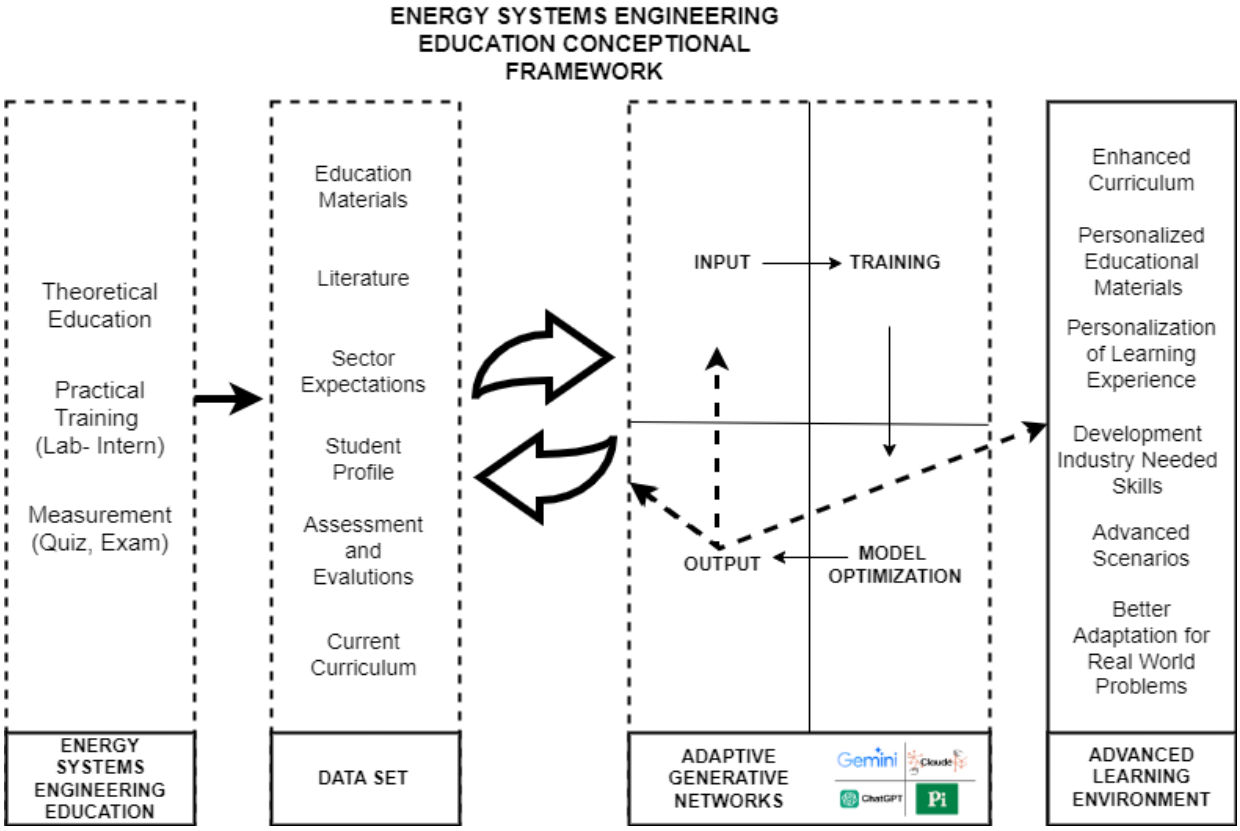

Figure 1. Conceptional Framework

This framework aims to evaluate the effectiveness of an AGN-supported educational platform to optimize the integration of theoretical knowledge and practical applications and increase students' capacity to create solutions to real-world energy problems. Energy systems engineering generally consists of theoretical training, practical training and measurement activities.

The data collection process consists of three main components:

Educational Materials and Curriculum Evaluation: A detailed analysis of the existing educational materials and curriculum will be made, and as a result of this analysis, the areas that need to be integrated with AGN will be determined.

Student Feedback and Performance Data: Feedback to be received from students in courses integrated into the AGN system and performance data collected through evaluation tools such as exams and quizzes.

Sector Expectations and Expert Opinions: Sector expectations and AGN's compliance with these expectations are evaluated through interviews and surveys conducted with professionals in the energy sector.

All data obtained by Dataset will be evaluated with the help of expert GPTs created within AGNs, and results will be obtained. This process is planned as a cycle and will be open to continuous improvement by feeding itself.

AGNs generally perform optimization and obtaining results as a result of the training created with the inputs and these training sets. At this stage, the network trained with inputs such as important literature sources of the sector, expectations, student profiles, evaluation results and current curriculum will be constantly fed and a self-improving system will be formed.

In the output section, the results obtained are; It is aimed to develop a more improved and constantly self-improving intelligent system by providing curriculum, Personalized educational materials enhanced, Development Industry Needed skills, Advanced Scenario, and Better Adaptation for Real World Problems outputs.

Conclusions

The utilization of Adaptive Generative Networks (AGNs) for energy systems engineering education is one of the steps that are being taken to get the required things get done and keep up with the changing learning requirements of this modern era. As the case in this study, AGNs has a really strong machine for the customization and adaptation of educational material, this closely aligns with the different learning varieties of students. This ability delivery of customized content that is designed for future pupils as the function of real-time data analysis of their current performance represents a sea change. Now we are able to conduct teaching in manner that is significantly more advanced and effective.

On top are the results from the application of AGNs in educational settings which state that the systems in this capacity can significantly make students be more active and able to absorb the needed knowledge better. Personalization is a new feature of modernized educations programs powered by the AGNs, and it has been shown to go beyond increasing academic performance but also to instil in students a sense of passion about the complex energy systems engineering concepts. Unlike other sectors, the energy sector is undergoing drastic technological changes recently and the global energy scene is also changing fast. Talking of such changes, the ability to identify and be in tune with such changes needs a workforce that is highly adaptable and knowledgeable.

The research also puts the point across the fact that there is an utmost importance of persistent feedback loops in the optimization of the AGN simulators for educational purposes. Industry and students' feedback has been critically diffused in all the development stage of the AGN model for it to be designed to embrace the learning outcomes and the anticipated educational needs of modern engineering programs and institutions. This cyclic approach defined by the constant demand for the renewal of the educational substance allows to keep what is taught up-to-date and helps the mastering of the essential skills and knowledge.

Thus, the emergence of Adaptive Generative Networks into energy engineering education opens up a favorable roadto experiential, potent, and adaptive learning environments. Utilization of AI and machine learning algorithms in the educational discipline boosts students through modern grid management and sustainability challenges preparation. Because the future of AGNs is filled with further effors to maximize its potential,I believe this technology can be utilized in multiple disciplines beyond engineering so that the foundation of learning can also be transformed.

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Exploring the Impact of MOOCs on Undergraduate Students Pre-, During-, and Post-COVID-19.

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Abstract

The 21st-century learning ecosystem is characterised by the prominent role of technologically advanced learning spaces. The COVID-19 pandemic has disrupted and exposed the limitations of the existing learning ecosystem, resulting in widespread shutdowns of public spaces for safety and survival. A web-based questionnaire was developed to investigate the need for more information regarding Nigerian students' involvement in online learning and the factors contributing to the growing trend of student enrolment in such programs. Although studies on Massive Open Online Courses (MOOCs) have primarily been conducted by institutions offering these courses, commercial platforms such as Coursera and Udacity have yet to provide extensive research data despite possessing sizeable datasets. This study aimed to investigate undergraduate students' participation in MOOCs pre-COVID-19, during and post-COVID-19. The primary objective of this study is to examine the significant increase in undergraduate participation, assess the extent to which this surge has impacted participation levels, identify the significant constraints that may hinder effectiveness, evaluate the completion rates in MOOCs, and understand how participation in these courses leads to temporary job placements. Furthermore, this study seeks to investigate which certification courses undergraduate students pursue while engaging with massive open online courses (MOOCs), examine their perceptions of these courses, and evaluate the success rate of course completion. The outcomes of this research will enhance empirical knowledge regarding Nigerian university students' aspirations and goals for better quality education and improved learning content. Additionally, the findings will provide valuable insights for researchers in educational technology and instructional design, highlighting the needs and desires of African learners and the potential factors contributing to incomplete course completion and increased participation.

Keywords: Online Learning, Engagements, Perception.

Introduction

The learning ecosystem of the 21st century is one in which technologically enhanced learning spaces cannot be overemphasised. COVID-19 opened the learning ecosystem to see its lack of preparedness to face the challenges of a widespread pandemic that led to the shutdown of the entire human race out of its opened ecosystem to be enclosed for safety and survival. This has opened the learning space to numerous opportunities that aid remote and online learning systems, particularly the Massive Open Online Courses known as MOOCs. This has increased the number of participants who can access learning content (Lachaud & Tijus, 2022) at their own time and desired place of learning, not restricted to the traditional schooling systems. Hence, the pandemic came with its restricted challenges to human collaboration and opened opportunities within the education sector, where technology quickly filled up gaps in a restricted learning zone via remote and online learning.

The term MOOCs was first used in 2008 for courses offered by the extension division of the University of Manitoba, though historically with opposing views as to its origin (Bates, 2022) (counter cite). However, in March 2012, a platform for MOOCs called edX was developed as an open-source platform by the Massachusetts Institute of Technology (MIT) and Harvard University; edX was later sold to a nonprofit online course provider called 2U (Duran, 2022). These MOOC platforms, like Coursera, Udacity, edX etc.,

advanced to partner with universities to host degree-based courses and micro-credentials (Marques, 2013., Shah, 2017., Weinhardt & Sitzmann, 2019). By 2021, evidence revealed that approximately 70 MOOC-based degrees and over 1,670 MOOC-based micro-credentials existed, while seven universities had already launched 15 degrees as of 2017. (Shah, Pickard & Ma, 2022 Bates 2022). The various MOOC platforms as of 2021 were attributed to having 220 million course-takers globally, with over 19,000 certification courses developed (Shah et al., 2022). While 24 Chinese MOOC platforms offered about 69,000 courses, with XuetangX, a MOOC platform having about 80 million learners as of 2021 (Ma, 2022)

The essential features of MOOCs across many platforms include and may differ from one platform to another but have typical architecture such as a login prompt, registration page, user guide, video lectures, computer-marked assignments, peer grading assessment, supporting materials, quizzes, shared comment or discussion space, non-moderation discussion, badges or certificates, and learning analytics. However, the classification of resources other than MOOCs, including open textbooks and Open Educational Resources (OER), and often made available in ways that make them more accessible for reuse (Bates 2022) in varied ways, even among resources considered by MOOC platforms during the instruction learning experience design sometimes could be void of learners pain point, as such. Before commencing instructional development, it is essential to consider the theoretical framework.

The theory of connected age is grounded in connectivism, which emphasises the importance of communication and information sharing in learning (Setho, 2023). Connectionism represents global collaboration within the learning process and the interconnected world facilitated by the Internet. This theory reflects the skills and tasks necessary for learners to thrive in the digital era, as highlighted by Siemens (2014), who focuses on connectedness in learning design or pedagogy. We can call this approach "connected learning", which is perceived as a process of building connections. Such networks and connections between people, ideas, and resources lead to competency driven by connections rather than direct experience. Despite the benefits of a global learning ecosystem and collaborative tools, studies have highlighted concerns about the limitations of the theory of connected age, which might have neglected the cognitive burden due to digital overload and tech dependence, potentially overlooking those without access (Wang et al., 2021), as experienced in underdeveloped and developing regions in Africa with an eclectic power supply and damaged Internet cables as a result of vandalism. Learners can move to a self-directed learning environment, where they take charge of learning, information, and knowledge creation through informal network interactions (Forster, 2007; Kop & Hill, 2008). Effective technology use, collaboration, and resource access for communication and peer-to-peer interactions are crucial for learning design based on pedagogical principles and learning science. Learners must organise information according to their needs and participate in community building to foster innovation and learning support in a networked environment. (Siemens, 2005; Downes, 2005; Kop & Hill, 2008).

Furthermore, intentional design cannot overemphasise the importance of designing learning experiences in MOOCs or online distance learning programs to promote collaboration, contribution among learners, and community building. MOOC systems have been increasingly emphasising the validation of micro-credentials to authenticate informal educational systems while considering work-life balances (Neil, 2021; Iniesto et al., 2022; Maryann et al., 2022 & Hada, 2023.) and the required skills needed to succeed within a required field in a connected learning experience design, the exploration of computers to create lifelong learning experiences not limited by space or regulated by a school system, instead by an individual's collective efforts to learn within a shared experience. The connected age is about creating learning pathways that are not limited to learning race, region, background, or ideology, but promote effective participation in learning. However, specific gaps have been a significant concern in certain African countries, mainly developing countries, such as Nigeria. Massive open online courses are becoming increasingly integrated

into educational systems, with schools offering elective courses to many learners through learning management systems, such as Moodle and CANVAS by Instructure. This trend is not limited to formal institutions, as business schools and private organisations like ALX, Utiva, and Learntor in Nigeria and selected African countries are also embracing technology-based training for young adults aged 16–26.

Although MOOCs have been extensively studied by institutions offering commercial services (Bates, 2022), platforms such as Coursera and Udacity have not significantly contributed to research efforts due to their possession of substantial data. The founding partners of edX, MIT, and Harvard have conducted research primarily on their courses for commercial gain. Therefore, this study aims to explore the impact of MOOCs on undergraduate student participation and completion rates in Nigeria pre-, during, and post-Covid-19. Specifically, this study compares the surge in participation levels during the pandemic with those of the previous period. The main objective is to investigate the increase in undergraduate participation, assess the impact of continued participation, identify potential barriers to effectiveness, evaluate completion rates in MOOCs, and explore the connection between participation in these courses and temporary job placements. Additionally, this study intends to investigate the types of certification courses that undergraduate students pursue while taking massive open online courses (MOOCs), examine their opinions of these courses, and assess the success rate of course completion.

Methodology

The study utilised a survey approach to collect data from university students in Nigeria based on the established objectives. The surveys were administered online to students who had taken courses in their academic careers at Nigerian universities. The questionnaire was reviewed by experts and comprised three categories: demographic information, dichotomous items, and multiple response types. It was composed of a five-point Likert scale and was completed by 144 participants. The survey had six sections, with the first section gathering demographic information, such as age, gender, educational level, and school name and location. The second section measured respondents' online course engagement using eight items. The third section collected data on respondents' participation in MOOCs using six items. The fourth section gathered the participants' perceptions of MOOCs with 14 items. Finally, the fifth section identified constraints and contained eight items categorised as pre-, during-, and post-COVID-19.

Results

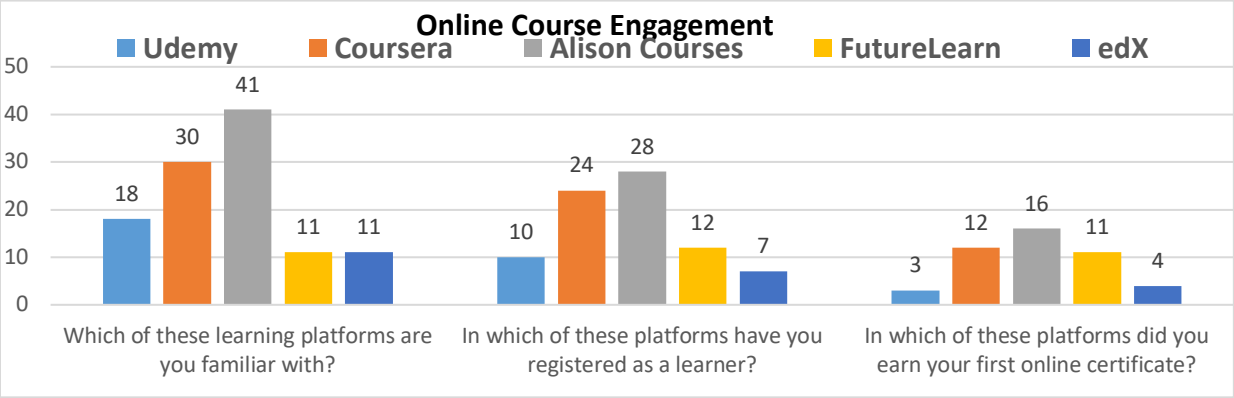

Figure 1. Which of the MOOCs do university students take their online courses?

The clustered chart indicates that 144 tertiary students responded to the questionnaire, and Alison Courses had the highest familiarity with 41 respondents, followed by Coursera with 30 respondents, Udemy with 18 respondents, and FutureLearn and edX with 11 respondents each. Among those who were familiar with Alison Courses, 28 had a registered account and 16 had earned a certificate. For Coursera, 24 had a

registered account and 12 had earned a certificate. For Udemy, 10 had a registered account and 3 had earned a certificate. For FutureLearn, 12 had a registered account and 1 had an error response. For edX, seven had a registered account, and four had earned a certificate.

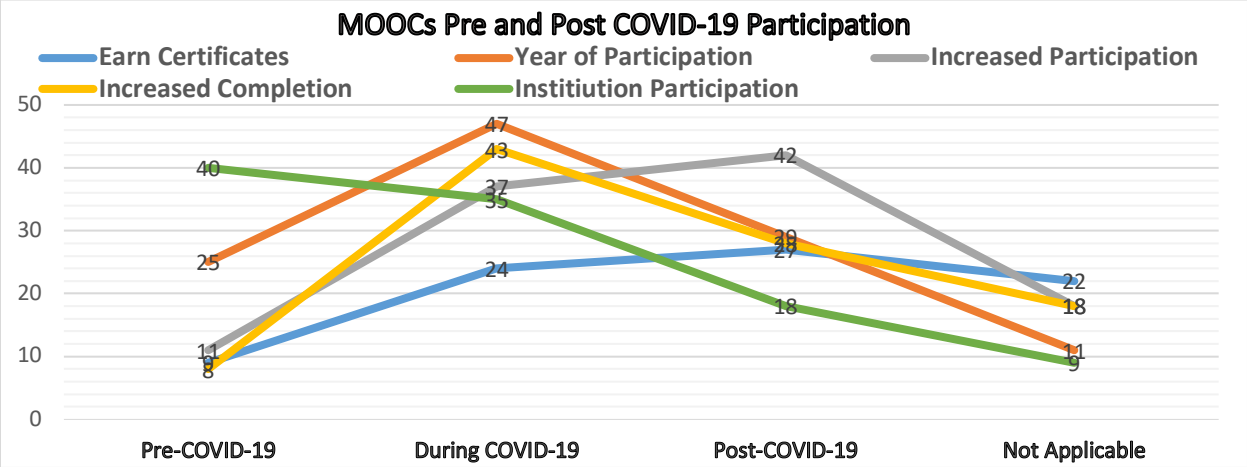

Figure 2. Is there an increase in tertiary students' participation in MOOCs Pre and Post COVID-19?

The chart shows that nine respondents earned a certificate pre-COVID-19 compared to the 25 who participated, while 11 indicated they increased participation and only nine could indicate completing a course, while 40 of the respondents stated they had participated in intuitional online courses. The year of involvement showed that pre-COVID-19, only 25 of the 144 respondents participated in MOOCs related tasks. At the same time, the participation level increased to 47 during-COVID-19 and the participation dropped to 29 post-COVID-19; 11 respondents indicated that it did not apply to them. The Increase in participation showed that respondents had more MOOC courses to register for. Pre-COVID-19, 11 indicated that they had participated in MOOC course taking, while during COVID-19, the participation increased to 37 participants, and the surge continued post-COVID-19 with a participation increase of 42, while 18 declared not applicable to 144 respondents. Increase completion showed that pre-COVID-19, only eight out of the 144 respondents had a completion rating; the surge was felt during COVID-19 to 43 completion ratings, which later dropped post-COVID-19 to 28 out of the 144 respondents, while 18 indicated not applicable. The institution MOOCs' participation pre-COVID-19 revealed higher participation of 40 of the 144 respondents, which later dropped to 35 participants during-COVID-19 and a continued downward slope to 18 respondents post-COVID-19, while nine respondents indicated not applicable.

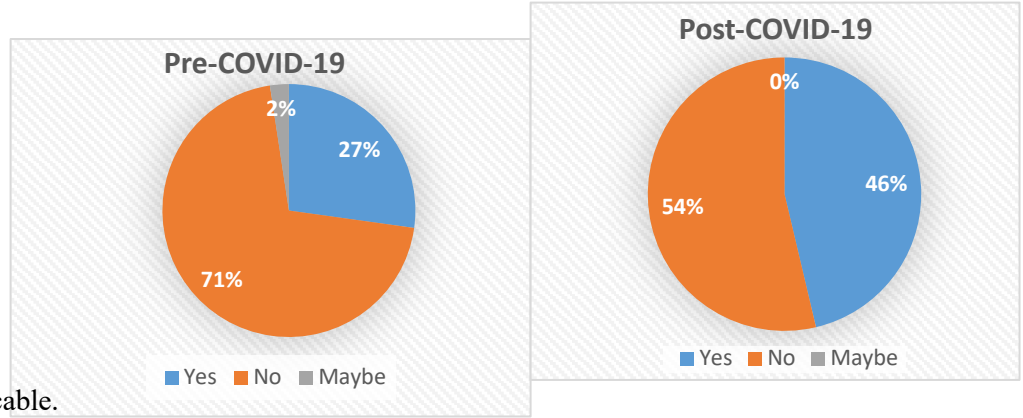

Figure 3. What is the Tertiary students' completion rate of courses enrolled in MOOCs pre- and post-COVID-19?

The broad overview from the pie chart above shows the 144 undergraduate respondents' reports on the course completion rate; they responded to the question, before the COVID-19 pandemic outbreak, did you participate in taking an online course? If yes, were you able to complete the courses?' The results revealed that only 27% of the respondents reported having completed online courses during the pre-COVID-19 period, while the percentage increased to 46% post-COVID-19, and only 2% were uncertain. The 71% of those who did not complete online courses pre-COVID-19 dropped to 54%, showing some progress in online course participation post-COVID-19.

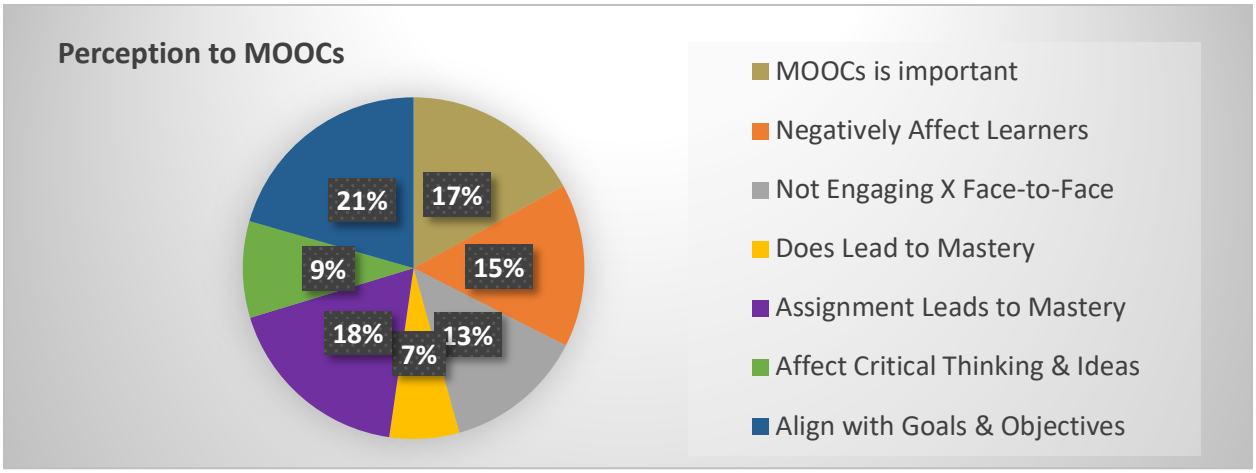

Figure 4. What are tertiary students' perceptions of MOOCs during and after COVID-19

The pie chart shows that MOOCs were important to undergraduate students 17% of the time due to the COVID-19 outbreak, based on 144 respondents. In comparison, 15% perceived that it negatively influenced their ability to learn effectively. Despite 17% perceiving MOOCs as essential to their learning, only 7% attested to attaining mastery of content knowledge. In comparison, 18% agreed that assignment activities helped them demonstrate mastery of MOOCs more, and only 9% believed that they could improve their critical thinking skills.

Table 1. What are tertiary students' significant constraints while participating in MOOC courses pre-COVID-19 and after post-COVID-19?

Constraint	Pre-COVID-19 (%)	Post-COVID-19 (%)
Lack of Quality Smartphone	36.8%	31%
Poor Electricity Supply	52.8%	51.4%
Poor/Slow Internet	49.3%	48.6%
Cost of Internet	49.3%	45.8%
Effective Time Management	34.7%	30.6%
Course Engagement	9.7%	11.1%
Clear Learning Objectives	13.2%	10.4%
Hard to Comprehend Courses	22.2%	18.27%

The chart shows the significant challenges encountered by undergraduate students pre-COVID-19: 36.8% lacked quality, while post-COVID-19, the number dropped to 31%. Poor electricity supply to charge

devices and gadgets pre-COVID-19 was 52.8% being the highest in terms of constraints, while it later decreased to 51.4% post-COVID-19, and poor/slow Internet came next to the highest at 49.3% pre-COVID-19 while post-COVID-19 respondents reported at 48.6% followed by the cost of Internet at 49.3% pre-COVID-19, while post-COVID-19 reduced to 45.8%. However, 34.7% of respondents reported effective time management before pre-COVID-19, while the post-COVID-19 report reflects 30.6%. It was also reported that online courses were not engaging pre-COVID-19 at 9.7%, whereas post-COVID-19, the number increased to 11.1%. The respondents also reported a lack of clear learning objectives in courses registered pre-COVID-19 13.2%) and post-COVID-19 (10.4%). However, before COVID-19, 22.2% found the MOOCs course hard to comprehend/understand, while after COVID-19, 18.27% reported lower ratings, and 9.8% and 9.1% reported that questions were not applicable, respectively.

Conclusion

This study sheds light on MOOC familiarity, enrolment, and participation trends among tertiary students. The pandemic appears to have influenced participation, but completion rates remain a challenge; the average MOOC completion rate is usually as low as 10% (Furukawa et al., 2022). These findings contribute to understanding online learning dynamics in the Nigerian context and can inform educational strategies moving forward. As of 2016, statistics revealed that about 4 billion people worldwide had no internet access, making enrolment in MOOC difficult. (Weinhardt & Sitzmann, 2019). The study highlights increased MOOC participation during the COVID-19 pandemic, but a decline post-pandemic. Completion rates improved but remain a challenge. Persistent issues, such as poor infrastructure and high costs, hinder effective online learning. These findings provide valuable insights into the online learning landscape in Nigeria and can inform future educational strategies.

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Exploring Higher Education's Hesitance to Web3 Adoption

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Abstract

Web3 heralds a new era for the Internet. By leveraging blockchain technology and embracing decentralization as its core principles, it offers a transformative array of technologies that can fundamentally alter various fields, including research and education (Filipčić, 2022). While higher education institutions face mounting pressure to align with societal transformation, industry requirements, and educational needs, enhancing teaching and learning methodologies and decentralizing ownership and control of learning and data are among the advantages of Web3 (Savelyeva & Park, 2022). Thus, some universities are experimenting with and implementing emergent Web3 technologies that enhance teaching and learning (Hussain, 2012). However, blockchain technology's integration into higher education is still in its infancy, marked by modest adoption rates. The enduring viability and effective assimilation of any new technology within education rely on educators' acceptance (Davis et al., 2009; Hennessy et al., 2007) and understanding why and how to use these tools to make the adoption successful and sustainable (Moges, 2013; Jimoyiannis et al., 2013). Many studies have investigated the adoption of ICT in Web 2.0; however, a dearth of studies has focused on Web3 adoption in higher education. This systematic literature review aimed to examine the reluctance of higher education institutions to embrace Web3 technologies, providing valuable insights for researchers, educators, and decision-makers in higher education.

Keywords: Web3 technology acceptance, Web3 in higher education, Blockchain technology acceptance, DeSci, decentralization of education

Introduction

Higher education institutions (HEIs) face numerous challenges in today's dynamic landscape. These challenges include adapting to changing student needs and addressing digital literacy gaps, enhancing retention rates (Gkrimpizi et al., 2023), and ensuring the quality of education (Mairal, 2023). OECD member countries also identify these concerns in higher education, such as employment, skill development, cost, completion rates, and assessment methods (OECD, 2019). In the past, universities primarily focused on imparting propositional knowledge, while the acquisition of procedural knowledge was left to professionals in the field (William, 2023). The distinction between propositional knowledge (knowing-what) and procedural knowledge (knowing-how) has been widely debated. However, as professional roles evolve in the twenty-first century, there is a growing emphasis on acquiring procedural 'frontier knowledge' (Stein, 2014). There are rapid changes in industries, with many new occupations emerging. Consequently, there is a significant demand for reskilling, as nearly half of workers are projected to require additional training in their core skills to meet the changing demands of the job market (Mamaqi, 2023). To compete globally, HEIs need to adopt technological advancements to remain relevant (Gkrimpizi et al., 2023). To thrive in the digital age and fulfill their educational mission, HEIs must equip students with future workforce skills, promote research excellence, and navigate policy and regulatory changes (Ruben et al., 2023). Financial constraints are one reason for HEIs' ability to adopt innovative technologies and upgrade infrastructure, however, effective leadership and governance are crucial for aligning digital initiatives with strategic goals and fostering a culture conducive to change (Kitchenham et al., 2010; Ruben et al., 2023).

Digital transformation is not a recent development, as relevant principles have been present in various manifestations for at least half a century (Gkrimpizi et al., 2023). Technology integration in higher education has led to substantial transformations, prompting institutions to align with their students' digital preferences (Guedes & Almeida, 2010). Leveraging technology as a learning aid makes education more adaptable and engaging, helping students develop essential skills like spatial visualization, innovative thinking, problem-solving, and critical thinking (Zongo, 2014). Industry 4.0, a new term widely used in educational literature, aims to prepare students for the Fourth Industrial Revolution (Mejía-Manzano et al., 2022). Fundamentally, Industry 4.0 seeks to equip students for the evolving industrial landscape. In education, the correspondence of the term Industry 4.0 is called Web 3.0 or Web3. Web3 in education presents technologies such as the Internet of Things (IoT), cloud computing, artificial intelligence (AI), advanced robotics, and blockchain are illustrative of the advancements propelling this

transformation. Their impact on both public and private entities and society at large is rapidly intensifying due to the expanding accessibility and computational capabilities of devices (Meenakshi et al., 2022).

Web3 and Blockchain Technologies

Web3 refers to the next generation of the internet, characterized by decentralized and peer-to-peer networks (Meunier, 2018). This technology is powered by blockchain, a distributed ledger system that enables secure and transparent transactions. At its core, blockchain is a cryptographically secure and immutable chain of blocks containing data, with each new block linked to all prior blocks, providing a decentralized and trustless environment where participants can transact and interact without intermediaries.

Blockchain allows academic researchers to have greater control over their intellectual property rights and the ability to track the ownership and usage of their work (Turcu et al., 2019). Research can benefit from increased trust, transparency, and efficiency. The promises are not limited to research. It can secure student records and optimize course registration processes, preventing the repetition of courses and reducing platform abandonment (Mejía-Manzano et al., 2022). Additionally, blockchain enables seamless IoT, VR, and AI integration into open and distance learning environments (Yıldırım & Şahin, 2018).

More examples of blockchain's benefits in education were mentioned by Grech and Camilleri (2017), presenting eight use cases: issuing secure certificates, verifying multi-stage accreditation, automatic recognition and credit transfer, creating lifelong learning passports, tracking intellectual property, rewarding and reusing content, facilitating learning payments, funding learners, and verifying learner identity. These benefits are getting more attention because traditional data storage systems have significant weaknesses in privacy, integrity, and ethical access to accounts. Blockchain technology ensures data transactions adhere to predetermined rules, making fraud or data manipulation nearly impossible. The further benefits are mentioned as diversifying learning approaches and increasing the accessibility of education (Karataş, 2018).

There is a growing interest in micro-credentials among governments, higher education institutions, and the corporate sector (McGreal et al., 2022). Still, most digital systems for managing educational certificates fail to ensure data security and system reliability (Xu et al., 2017). With all of these and more to mention, blockchain's potential to transform education is increasingly recognized; however, secondary studies like Yumna et al. (2019) call for more research into its application in higher education. Yumna et al. (2019) emphasized the need for comprehensive research into blockchain's educational applications, noting gaps in existing literature. This paper examined higher education institutions' reluctance to embrace Web3 technologies, providing valuable insights for researchers, educators, and decision-makers in higher education.

The Current Literature

Implementing blockchain technology in higher education holds promising potential for innovation and advancement (Gala et al., 2021). Portugal et al. (2023) reviewed continuous user identification in distance learning, emphasizing the need for real-time identity verification in HEIs during the COVID-19 pandemic. The study examined intelligent proctoring systems, image-based and voice-based identification, and biometric trait combinations, addressing data privacy issues and identifying research gaps. The paper noted that distributed ledger technologies, such as private blockchains, can address privacy-preserving biometrics challenges by overcoming single points of failure, eliminating third parties, and providing trustworthy, unmodifiable history logs.

Micro-credentials offer flexibility, accessibility, and the ability to distinguish oneself from future employers (Iniesto et al., 2022) and gained traction in higher education as a way to address the evolving needs of the workforce (Bawack & Kamdjoug, 2020). In their paper, Pollard and Vincent (2022) argue that current micro-credentials focus on employability rather than holistic learning. Orman et al. (2023) provided a detailed perspective on the practical application of micro-credentials in career advancement with blockchain technology. The researchers investigated the role of blockchain technology in ensuring the authenticity and reliability of digital credentials, highlighting its potential to enhance the recognition and value of micro-credentials in the academic and professional spheres. Another related work conducted by McGreal et al. (2022) examined how micro-credentials can help mitigate the rising costs of traditional higher education, match employer expectations with graduate skills and competencies, and provide solutions to students' lack of job opportunities.

Blockchain technology was utilized to increase students' learning motivation as well. For example, Andre (2022) explored crypto to increase student agency and motivation in higher education settings The researcher proposed a reward system for students with an education-focused cryptocurrency token for attendance, good grades, etc. In a mixed-method study, Andre surveyed 322 students on their opinions of this crypto token. Then followed that with a quantitative study of 28 respondents' opinions to "…measure the prevalence of those sentiments". Andre found that almost 90 percent of the participants said this system would motivate them to study and were open to or excited about implementing the coin. However, it raised some concerns as well, yet to be solved, about inequitable

access to education, adherence to local laws, administrative support and acceptance, gaming the system by paying off other students, issues of financial privacy, and teacher adoption of the system.

Fleener (2022) uses social inquiry and a futurist framework to study two primary data sources, The Millennium Project's "Work/Technology 2025" report and The American Council on Education (ACE) report on "Connected Impact: Unlocking Education and Workforce Opportunity through Blockchain" to find shared challenges in adopting blockchain applications for the future of education. In doing so, Fleener finds that blockchain technology's adoption into higher education is both predicated on and simultaneously helps to further a new educational mythos and conceptualization of what it means to be a learner by empowering lifelong learning, embracing technology and futurism and otherwise breaking up a dichotomous and binary approach to formal education.

Dai and An (2023) conducted a study on constructing a blockchain-based regional higher education information resource-sharing model. The research addressed challenges in the education sector, such as scattered teaching resources, duplicate resource construction, security issues with digital education data, high platform operating costs, and the protection of intellectual property rights. The study involved the design of a novel model that leverages blockchain technology to ensure secure transactions, protect intellectual property, and reduce operational expenses in the sharing of educational resources. The model provided a secure and transparent framework for sharing educational resources, enhancing collaboration among institutions while safeguarding data integrity and privacy. Similarly, Mejía-Manzano et al. (2022) also marked how blockchain can enhance the security, transparency, and efficiency of educational processes such as credential verification, academic record keeping, and learning assessments. Educational institutions can create tamper-proof records of student achievements, facilitate seamless credit transfer between institutions, and enable individuals to have greater control over their educational data.

Methodology

A systematic literature review gathers and interprets all available research to answer a specific question (Revunov et al., 2020). We conducted a systematic review to explore the use of blockchain technology in education, following Barbara Kitchenham's guidelines (Castillo-Martínez & Ramí-rez-Montoya, 2021). Our research question was, "What is the current state of research on blockchain technology in higher education?" We included peer-reviewed studies on blockchain in education published in English and excluded non-peer-reviewed articles and those not focused on educational environments. We searched ERIC and ProQuest databases using keywords like "blockchain technology" and "education." Initially, we found 1,214 results. Refining for peer-reviewed, full-text articles from 2017 to 2024, we focused on the last three years, yielding 306 papers (297 in English). After filtering, 33 articles related to higher education remained. We rigorously reviewed these for relevance. We used predefined criteria to evaluate research methods, findings' relevance, and authors' credibility. We organized data into themes, conducted thematic analysis, and synthesized findings, highlighting key points and gaps. We summarized the studies, identified themes, and noted limitations in the literature. We found a growing body of research on blockchain in education, detailed in the following section.

Results

Web3 technology, which leverages blockchain and decentralization principles, can revolutionize higher education by enhancing teaching and learning methodologies and decentralizing ownership and control of learning and data (Ademola, 2013). However, despite the potential benefits and opportunities that Web3 offers, higher education institutions have hesitantly adopted this technology (Grech et al., 2021; Tahora et al., 2023; Teng, 2021). This hesitance can be attributed to several factors. Firstly, there needs to be more awareness and understanding regarding Web3 technology among higher education institutions (Gala et al., 2021). As we found from the literature review, there needed to be more studies on higher education implementations and dissemination of these studies. Despite its benefits, the studies investigated in this search have yet to specifically address the need for more adoption of blockchain technology in higher education. The findings indicate a need for more research discussing the reasons for this disparity. Additionally, there needs to be more evaluations demonstrating the impact of blockchain in higher education (Savelyeva & Park, 2022), and the dissemination and impact of blockchain technology in this sector still need to be improved. Savelyeva and Park (2022) criticize the existing literature for its excessive focus on technology and financial aspects while mainly ignoring blockchain technology's potential to address equity and quality in education. That leads to a need for more awareness, which is evident in the fact that many people still need clarification about the definition and implications of Web3 (Ademola, 2013). Secondly, one main factor related to the first reason surrounding Web3 adoption is the maturity of blockchain technology (Gala et al., 2021). While blockchain technology has shown promise in various applications, including finance and cryptocurrencies, its current maturity level and the financial hype surrounding it raise concerns among higher

education institutions (Kosmarski, 2020; Tahora et al., 2023; Teng, 2021). In most cases within higher education research, blockchain technology is mentioned in relation to micro-credentialing or open learning.

Another factor contributing to the hesitance in Web3 adoption is the need for more comprehensive research and evidence regarding its effectiveness and impact in the higher education sector. Most of the current literature focuses on the use of technology rather than the use of the information it conveys or the adoption of technology in higher education institutions (Popenici & Kerr, 2017). This lack of research and evidence leaves higher education institutions uncertain, making it difficult to make informed decisions about adopting Web3 technology (Bawack & Kamdjoug, 2020; Yumna et al., 2019). Furthermore, higher education institutions face several challenges that hinder the adoption and implementation of Web3. One challenge is the training of educators. Many educators in higher education institutions may not have the necessary knowledge and skills to integrate Web3 technology into their teaching practices effectively. Additionally, institutional gaps and regulatory constraints may prevent higher education institutions from fully embracing Web3 adoption (Teng, 2021). Moreover, there may also be concerns regarding data security and privacy associated with Web3 adoption (Meunier, 2018). Overall, it is evident that higher education institutions have been hesitant to adopt Web3 technology due to factors such as a lack of awareness and understanding, concerns about the maturity of blockchain technology, a lack of comprehensive research and evidence, challenges with educator training and institutional gaps, regulatory constraints, and data security and privacy concerns (Oganda et al., 2020).

Limitations and Future Work

This study was limited to two databases, which may have constrained the results. However, the findings represent the most relevant work on using blockchain technology in higher education. Further research utilizing a broader range of databases could extend these findings. Additionally, this paper provides foundational information on the topic, enabling data collection from participants to triangulate the results and inform higher education institutions about the benefits of blockchain technology in their field.

Conclusions

In conclusion, the current literature highlights various benefits of blockchain technology in higher education, drawn from both empirical and theoretical perspectives. Although empirical studies on blockchain in education are limited, hindering its widespread adoption, the existing research provides a strong foundation for future implementations (Grech & Camilleri, 2017). Higher education institutions are currently grappling with numerous challenges, such as evolving student needs, digital literacy gaps, retention rates, and maintaining high educational standards. The adoption of Web3 and blockchain technologies offers a significant opportunity for these institutions to tackle these issues and remain competitive in a technologically advanced global environment. The implementation of blockchain technology in education has the potential to revolutionize the way we approach learning and ensure the protection of data (Teng, 2021). By utilizing blockchain technology, educational institutions can enhance the security and privacy of student data, ensuring that sensitive information remains encrypted and protected. Although Web3 and blockchains promise increased security, transparency, efficiency, and better control over intellectual property, their uptake in higher education has been sluggish. This reluctance stems from various factors, including a lack of understanding and awareness of Web3, concerns about blockchain's maturity and financial volatility, and a shortage of comprehensive research and evidence regarding its effectiveness in higher education. The current body of literature on blockchain technology in education tends to emphasize financial and technological aspects, often neglecting its potential to improve educational equity and quality. There is a pressing need for more extensive research and evaluation to thoroughly understand the impacts and benefits of blockchain in this context. Addressing challenges such as educator training, institutional barriers, regulatory issues, and data security and privacy concerns is crucial for facilitating wider adoption. Despite the study's limitation to two databases, it highlights key research on blockchain technology in higher education and underscores the necessity for further exploration. Expanding the scope of research to include a broader range of databases and conducting empirical studies will provide deeper insights and guide higher education institutions in understanding blockchain technology's practical benefits and applications. By overcoming these obstacles, higher education institutions can harness the power of Web3 and blockchain to enhance their educational mission, promote research excellence, and prepare students with the skills needed for future careers.

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Navigating Post-Pandemic Terrain in Goa, India: French Language Educators' TPACK Proficiency and ODL Preparedness

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Abstract

The importance of having Open and Distance Learning (ODL) was felt in a tremendous way during the COVID-19- pandemic. The stakeholders in Goa, India, responded to the Herculean challenge of providing education in online distance mode by training teachers on their technological skills. During this period, the Ministry of Education, Government of India also put into action the National Education Policy (NEP 2020) which encourages the use of technology to improve the learning experience. In addition, at the school level, Digital Infrastructure for Knowledge Sharing (DIKSHA), a national platform was also being used as a repository of eContent for teachers, learners and caregivers. Considering the focus on ODL in NEP 2020, it is essential that teachers have the required techno-pedagogical skills. Thus, we attempt to measure the level of Technological Pedagogical and Content Knowledge (TPACK) of French foreign language teachers in Goa, India. We further investigate to what extent variables such as zone and age play an important role. Using the mixed method approach, data were collected using a validated TPACK questionnaire and followed by depth interviews from August to December 2023. The results indicate that the French language teachers in Goa, India have a notable TPACK score, however, those in certain age and area-wise groups have varying levels in certain sub-criteria. Based on this data, recommendations are made for training workshops in order to equip teachers with the required skills for ODL.

Keywords: French teachers, TPACK, teacher training, ODL, techno-pedagogical competence

Introduction

With the COVID-19 pandemic and subsequent lockdowns, the education system in India shifted from the face-to-face mode to emergency remote delivery. This was a herculean challenge in a huge and diverse country like India because teachers needed to be reskilled and innovative solutions needed to be found in low network and low infrastructure schools. The stakeholders in Goa, a state on the western coast of India, responded to this challenge by conducting various training sessions to improve the technological skills of the teachers.

In addition, a national platform called DIKSHA (Digital Infrastructure for Knowledge Sharing), was also used as a repository of eContent for learners at the school level, teachers and caregivers. During this period, teachers from Goa created eContent for DIKSHA in video as well as in text-based-printable form for those learners who didn't have access to devices (Gomes, 2021). The Ministry of Education also put into action the National Education Policy 2020 (Ministry of Human Resource Development, 2020) which encourages the use of technology to improve the learning experience as well as the reach of education. It states that the "use and integration of technology to improve multiple aspects of education will be supported and adopted".

In our current times, Open and Distance Learning (ODL) is a crucial component. ODL in India can be traced to 1962 (Bose, 2021). The Indira Gandhi National Open University (IGNOU) is said to have the largest number of enrolments in the world (India Today Web Desk, 2015). Foreign language learning is also imparted in ODL mode. In the context of French foreign education in Goa, classes are conducted in a wide range of institutions, in face-to-face as well as online mode, having different access to technology. It is vital to investigate teachers' ability to integrate technology into teaching-learning, as it is a significant factor that affects the efficiency of online and distance education. Thus, we attempt to measure the level of Technological Pedagogical and Content Knowledge (TPACK) of French language teachers in Goa, India.

The ability to effectively use technology is proving to be a comprehensive and constantly evolving skill-set. Given undesirable situations such as the pandemic, this integration has become more important than ever. Teachers are nation builders, and having confidence and an optimistic attitude towards technology can improve their overall effectiveness, which is the first requirement of quality education.

The TPACK Framework by Mishra & Koehler can be used to assess techno-pedagogical competence. This TPACK framework is based on 3 components: content, pedagogy and technology (Mishra & Koehler, 2006). Building on Shulman's idea of PCK (Pedagogical Content Knowledge) (1986), the TPACK framework attempts to capture some of the essential qualities of knowledge required by teachers for technology integration (Koehler,

2013). The framework includes 7 components, namely: PK (Pedagogical Knowledge), CK (Content Knowledge), PCK (Pedagogical Content Knowledge), TPK (Technological Pedagogical Knowledge), TK (Technological Knowledge), TCK (Technological Content Knowledge), TPCK (Technological Pedagogical Content Knowledge).

Prior studies have indicated that variables like age and zone have a role in teachers' techno-pedagogical skills. The years of teaching experience which is directly proportional to chronological age impacts TPACK levels. (Murthy and al., 2022). As a result, Ng (2012) identified 2 groups: younger "digital natives" teachers who are accustomed to extensive use of technology and older teachers who have generally had less exposure to ICT (Information and Communications Technology) during their careers. Furthermore, it was inferred that young teachers possessed expertise in digital tools (TK) relative to their level of understanding in PK and CK ; this result was noticeable given the lower number of years of experience (Murthy and al., 2022). Consequently, the results generally indicate that older teachers have a pessimistic view of e-learning, where the integration of technology is required at every stage (Murthy and al., 2022).

In terms of the impact of the variable 'zone' on TPACK levels a study by Huda and al. (2023) based in a rural area, revealed that teachers' lack of preparation for the use of technology prevented them from fully participating in this vital integration of content and technology. Chen and Jiang (2023) also worked with novice teachers in rural schools in China and reported that rural schools still need to work on creating a 21st-century teaching environment to adapt to the technological age, improving rural digital infrastructure and teacher skills. The results of Nimisha and Lalit (2019) concur with the previous study. Their findings show that urban teachers had a mean score of 4.53, while rural teachers had a mean score of 4.45. Thus, they conclude that urban teacher-educators have significantly different TPACK skills from rural teacher-educators.

Regarding TPACK studies in languages, Cheng (2017) shares that this domain has not been widely explored. In their critical review of research on TPACK in language teaching, researchers identified 19 languages (Tseng and al., 2022). However, except for studies by Eghtesad and Mehrabi (2021) it is observed that fewer studies have been carried out on how French language teachers in non-native contexts perceive content, pedagogy and technology. Thus, with the aim of filling this gap, this study looks at how teachers of French, particularly in Goa, viewed their TPACK. In order to determine teachers' level of awareness of educational technologies, the following research questions were framed:

- What is the perception of TPACK among French language teachers in Goa?
- How do differences in zone and age affect their TPACK?

Methodology

This section presents the hypothesis of the present study, the research approach employed, the data collection process and the data analysis procedures. The study was conducted from August to December 2023.

The study includes 3 hypotheses:

1. The TPACK Level of French Language Teachers in Goa is high
2. The TPACK of urban teachers is higher than that of rural teachers
3. There is a significant difference in the average score of teachers according to age

A mixed-method approach (Anadón, 2019) was used with the TPACK questionnaire; and supporting interviews. There are many reliable and valid questionnaires for assessing TPACK; however, the one adapted by Elas and al. (2019) was selected because it was created for English language instructors. Elas and al., 2019 used a questionnaire developed by Archambault and Crippen, (2009); Schmidt and al., (2009). We adapted this questionnaire to our study, by replacing the word language taught with French. The TPACK questionnaire using a 5-point Likert scale comprised 34 questions divided into 7 sub-dimensions.

The questionnaire was delivered to teachers in person (by visiting schools and institutions). Subsequently, an online version of the questionnaire was created to better reach a larger number of teachers who are not easily accessible. We used convenience sampling while selecting participants in view of the fact that Goa is a small state and that the number of schools offering French courses is comparatively lower, with fewer French language teachers. The purpose of the survey was explained to participants. Ethics were respected throughout the research process, with permission sought and confidentiality maintained. The data from the survey was collated and analysed using Google Sheets. Further, interviews were conducted with some of the respondents.

Results

34 teachers responded to our survey. Further, 5 respondents (P8, P19, P24, P29 and P34) agreed to participate in the interview. In this section, the data is analysed and discussed taking each hypothesis into consideration.

H1. : The TPACK Level of French Language Teachers in Goa is high

The overall TPACK score is M=3.9, SD=0.39 (Table 1). Given that a 5-point Likert scale was used in the TPACK questionnaire and the TPACK Mean score is above 3, Hypothesis 1 is valid. The TPACK level of French teachers in Goa is high.

Table 1. TPACK level of French language teachers in Goa, India

Variable	Mean	SD
TPACK Level	3.93598615916955	0.3940332064

The mean score for the 7 subcomponents was above 3.5, indicating that teachers generally assess themselves at a high level. This result is in line with research conducted by Murthy and al. (2022) and Nimisha and Lalit (2019). It was observed that respondents gave priority to PK (M=4.28, SD=0.58). This could be interpreted as teachers emphasising the creation and application of a learning environment and relationship with students rather than content (CK) in our case, French. The lowest-rated component was TPACK (M=3.71, SD=0.83). These results may seem contradictory to one another; the highest overall TPACK score was favourable, but in the individual TPACK component, teachers scored the lowest. This tells us that the teachers who took part in the research feel unable to integrate ICT into teaching content and instructions.

H2: The TPACK of urban teachers is higher than that of rural teachers

The institutions that the teachers work in are categorised as urban or rural. As indicated in Table 2. teachers in urban settings scored higher (M=3.95; SD=0.35) than teachers working in rural settings (M=3.86; SD=0.52).

Table 2. Mean Score of French language teachers based on the variable of zones

Zones	Mean	SD	Sample Size
Urban	3,958144796	0,3545232265	26
Rural	3,863970588	0,524707743	8

The critical t-value for a one-tailed test with a significance level of 0.05 is 1.83 (Table 3). Given that the t-statistic 0.47, is positive, it indicates that the mean score of urban teachers is higher than that of rural teachers. Since the p-value 0.32 is above the 0.05 significance level the hypothesis is accepted. Thus, we can conclude that the average TPACK of urban teachers is significantly higher than that of rural teachers; therefore, hypothesis 2 is valid.

Furthermore, teachers working in urban areas scored highest in PK (M=4.32, SD=0.57), followed by CK (M=4.19, SD=0.60) and PCK (M=4.15, SD=0.53), and lowest in TPACK (M=3.69, SD=0.85) Whereas teachers working in rural areas scored high in PK (M=4.06, SD=0.56) followed by CK (M=4.03, SD=0.54) and TPK (M=3.8, SD=0.64) and the lowest score was obtained in TK (M=34.2, SD=0.94). Since urban teachers (M=3.95, SD=0.35) outperformed rural teachers (M=3.86, SD=0.40), these results validate the hypothesis that the TPACK of urban teachers is higher than that of rural teachers. These results are similar to those of Huda and al., (2023) Chen and Jiang., (2023); Nimisha and Lalit., (2019). Teachers in rural areas could be facing issues such as lack of preparation in the use of technology and the lack of digital infrastructure. This along with the lack of access to stable internet access are possible reasons to justify the lower TK score received by teachers in rural institutions.

H3: There is a significant difference in the average score of teachers according to age

As indicated in Table 4, the mean score of all 4 age groups was 3.7 and above.

Table 3. Mean score of French language teachers based on the variable of age

Age Groups	Mean	SD	Sample Size

18 - 29	4.026143791	0.3695376227	9
30 - 39	3.977375566	0.3991690197	13
40 - 49	3.726470588	0.3319029286	10
50 - 60	4.308823529	0.5615259733	2

The t-statistic for all groups is below the critical t-value, as seen in Table 5. The p-value for all groups is above the 0.05 significance level.

Table 4. T stat of the age groups of French language teachers

	18 - 29 vs. 30 - 39	18 - 29 vs. 40 - 49	18 - 29 vs. 50 - 60	30 - 39 vs. 40 - 49	30- 39 vs. 50- 60	40 - 49 vs. 50 - 60
t stat	0.294459942	1.851773435	-0.67996505	1.574952392	-0.818741864	-1.417964009
P (T<=t) bilateral test	0.771775381	0.082602301	0.619840747	0.130213476	0.563237525	0.391032088
T Critical bilateral test	2.10092204	2.119905299	12.70620474	2.079613845	12.70620474	12.70620474

Since the p-value is above the 0.05 significance level in all groups the hypothesis will be accepted. Thus, hypothesis 3 is valid.

Teachers in all age groups performed best in the same component - PK, but each group was deficient in different components. For teachers in the youngest category (18-29), the challenge lies in TPK (M=3.77, SD=3.7), which involves integrating an appropriate type of technology into lessons. Even though they may be exposed to a wide variety of technologies, they further need to work on integrating them into their courses. P8 (part of the 50-60 age group) shares her view of young teachers, saying "... the younger teachers were very good at it, (...) I think they were also trained in, when they were doing the B.Ed (Bachelors of Education) they already had a lot of knowledge of computers and all that."

However, the real question is how they use this technology to help and complement their teaching methods. On the contrary, P34, who belongs to the 18-29 age group, is confident "I feel the younger generation have grown up using all these platforms it would be easier for me to teach my class with online resources".

For teachers aged 30 to 39, the challenge lies in the TCK component (M=3.53, SD=0.91). This includes knowledge about the various technological devices or applications that enable content to be conveyed in a more interesting and effective way. The right choice of technologies can limit or influence the way we teach. For example, P19, who belongs to this age group but scored a higher TCK compared to the others in the group, mentioned the use of French language cartoons with English subtitles to introduce greetings in French. Further, the participant also stated that the use of these technologies along with social media made teaching concepts "a little easier". The students in their class felt confident using various greetings and even asking questions in French.

The teachers who took the initiative to further their knowledge and skills also had a higher score. P19 states that, in addition to the training provided by the institution, he also carries out research on his own:

> "We do have training workshops in school off and on, like, but that's mostly once in a year or twice a year. But apart from that, I keep myself, you know, abreast with things about how we can use technology and how technology is updating. For example, I came across ChatGPT, a few months ago and I found out that students are using ChatGPT to do their assignments (...) So, (...) I've kept myself abreast of knowing only these softwares, knowing how students are influenced by these softwares".

As for the 40-49 age group, with the lowest scored component of TK (M=3.41, SD=6.36), they lack knowledge of technology and will therefore need more training and sessions. During the pandemic, teachers had to use new tools

like Google Meet or Zoom on their devices. They had to use these tools, perhaps even without having a choice. P24 (who belongs to this group) describes his first technological experience in these terms:

> "The first year (of the pandemic) was very traumatic in terms of teaching French… other subjects I didn't have a problem with. Students in the 8th STD were learning French for the first time, and I also was not comfortable with technology, because that's the time we just learned how to give online classes and presentations. My colleagues helped me later on and at home, my son and husband helped me.(...) Much later, maybe I knew what to click, find links (...) ".

This indicates that teachers were perhaps confronted with educational technologies for the first time during the sudden COVID-19 pandemic. At the time, using specific tools and softwares was necessary in order to adapt to the pandemic. If teachers showed resistance, it meant they faced problems with infrastructure and bandwidth (because the Wi-Fi system may have been set up after the pandemic; as P8 says), skills and knowledge about how to use the technology and, in some cases, hesitation and reluctance to adapt teaching to the online mode.

As for the 50-60 age group, even with 2 participants, the overall mean score obtained is high compared to all other groups (M= 4.30, SD= 0.56). One reason for this could also be the significant number of years of experience in teaching, which could contribute to the high overall score of this sample. However, they achieved the lowest score (M=3.92, SD=0.70) in the TPACK component, which was not the case for teachers in other groups. Lin and al. (2013) found that the correlation between age and TPACK factors could be influenced by teaching experience. Similarly, in their study, Murthy and al (2022), also noted that teachers over 50 years had a better understanding of components such as PK, PCK and TPK than teachers under 50. However, the results and statements of the participants in our study may seem contradictory, as shown by P8's statement "now the teachers I think have trouble with other things they have to download and upload so many things". In a way, this statement reflects the fear or stress associated with everything to do with technology.

Conclusion

The present study indicates that French language teachers in Goa, India have a higher level of techno-pedagogical knowledge and skill, indicating their preparedness to use technology in Open and Distance Learning. However, they have varying levels in terms of zones and age groups. The teachers interviewed also indicated that while they use a fair bit of technology, they acknowledge that they may not be using it efficiently and hence would benefit from workshops. Teacher trainers should consider specific training rather than general preparatory workshops to be included in the required 50 hours of annual training. Since TK, TCK and TPACK are the lowest-rated components by French teachers, the training platform for teachers in India should strive to develop more technology-focused content in relation to critical topics such as; first, TK, basic and intermediate technology knowledge. Secondly, TCK, so teachers need help in exposing, finding and creating technology-based materials in language teaching. Finally, the lowest-rated subcomponent, TPACK. Therefore, in this regard, it is necessary to train French language teachers in the real integration of techno-pedagogical competence.

Training could include tutorials live, along with examples from their syllabus. Putting this into practice would help French teachers in Goa enormously and prepare them for the technological challenges ahead. Teacher training for foreign language teachers could also focus more on group-wise training to cater to their specific requirements, as well as training on technological knowledge, content knowledge. Considering the focus on ODL in NEP 2020, it is essential that teachers acquire the required techno-pedagogical competencies for successful implementation. Today, even traditional teaching emphasises the role of technology (Tseng and al., 2022) mentioned in Li and al., (2022). Consequently, teachers would need to focus on developing the holistic integration of 3 vital components: content, pedagogy and technology.

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An Investigation of Secondary School Students' Knowledge on Savings: The Writing-to-Learn Activities

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Abstract

In this research, it was aimed to reveal the knowledge of secondary school students about the concept of saving and how to be thrifty. The research is a basic qualitative research design. The study was carried out with the 37 students in the 5th grade of a secondary school. Students were asked to write letters about the concept of saving and how to be thrifty and the collected letters were subjected to content analysis. But two letters were excluded from the study and coding was done on 35 students' letters. The result of data analysis, four themes were identified as the wasting of resources, protection of earth resources, the definition of savings, and, recycle were revealed respectively according to the frequency. The wasting of resources theme consists of the sub-categories of wasting water, electricity, food, time, money, clothes and paper, respectively according to the frequency of recurrence. As a result of the study, it has been revealed that secondary school students have a high awareness of the value of saving, how to be thrifty, and are aware of the problems that await our world if resources are not saved.

Keywords: Social studies, saving, the writing-to-learn activities.

Introduction

The word "savings" is defined in the Turkish Language Association (TDK) dictionary in different ways such as saving money, goods, etc., the authority to use something as one wishes, careful use of money or anything that can be consumed, spending carefully. It can be defined as using existing resources wisely for the future, avoiding excessive consumption and transforming them into a way of life. In this sense, the concepts of saving and sustainability are interconnected. Teaching the concept of saving will open the doors to a sustainable world. Saving is one of the core values emphasized in the social studies course. As a matter of fact, when the words "saving" and "social studies" are searched together in Google Scholar, it is seen that the number of studies on the subject is 4,490 (It is the result of the search performed on 05.05.2024). Issues such as saving, conscious use of resources, recycling, reducing waste, effective use of money, making a correct budget planning, distinguishing between needs and wants, giving priority to meeting basic needs, preparing a shopping list, and situations that conscious consumers should pay attention to have found a wide coverage in the 2018 social studies curriculum at every grade level. The thrift value has been added to the 2018 social studies curriculum, and it is aimed to make students adopt behaviours such as being frugal and avoiding waste in the center of the concept of conscious consumer. Among the specific objectives of the curriculum, the value of frugality is emphasized with the statement "Recognizing the limits of the natural environment and resources, striving for the protection of natural resources by developing a sense of environmental sensitivity and having a sustainable environmental understanding". Thus, it is aimed to create awareness that natural resources are limited and to raise awareness about the efficient use of resources.

Table 1 shows the objectives that deal with saving in the social studies curriculum (MoNE, 2018). As seen in Table 1, the value of thrift is included in the fourth grade social studies curriculum in the learning domain of Production, Distribution and Consumption. It can be said that the value of thrift is directly included in four objectives of the fourth grade curriculum. In the fourth grade social studies curriculum, the value of saving is first given by mentioning the distinction between the concept of want and need. It was emphasized that there may be many wants and that it is not always possible to meet all wants, so priority should be given to needs. Then, it was aimed to teach the student to recognize the economic activities in their immediate environment and to draw attention to the benefits of saving on the products produced, to emphasize being a frugal individual by explaining what conscious consumer behaviors are, to create a budget and how to be economical in the budget and to teach the benefits of preparing a budget for their lives.

Table 1. Objectives about the saving in the 2018 social studies curriculum

Learning Area	Grade Level	Objectives
The Society and People	5th grade	SB.5.1.3. As an individual who is aware of his/her rights, he/she acts in accordance with the duties and responsibilities required by the roles he/she takes in the groups he/she participates in.
Individual, Places, and Environments	5th grade	SB.5.3.4. Question the causes of natural disasters and environmental problems in their environment.
Production, Distribution and Consumption	4th grade	SB.4.5.1. He/she distinguishes his/her wants and needs and makes conscious choices between the two.
		SB.4.5.2. Recognizes the main economic activities in his/her family and immediate surroundings.
		SB.4.5.3. Demonstrates conscious consumer behavior as a responsible individual.
		SB.4.5.4. Creates a sample budget of his/her own.
		SB.4.5.5. Uses the resources around them without wasting them.
	5th grade	SB.5.5.4. Analyzes the production, distribution and consumption network of products to meet basic needs.
		SB.5.5.6. Uses his/her rights as a conscious consumer.
	6th grade	SB.6.5.2. Analyzes the effects of unconscious consumption of resources on living life.
	7th grade	SB.7.5.1. Explains the importance of soil in production and management with examples from the past and present.

Finally, the concept of waste, the consequences of waste and the benefits of being frugal were emphasized. As a whole, in the fourth grade, it was aimed to teach students the harms of waste, the benefits of being frugal and the importance of living their lives as a frugal individual. The value of thrift is given in the learning area of "Production, Distribution and Consumption" in the fourth grade social studies textbook (Uygun et al., 2022). It can be said that the value of thrift is indirectly included in the fifth, sixth and seventh grade curriculum outcomes. The value of saving is also indirectly 7th grade curriculum included in the Society and People, Individual, Places, and Environments learning areas. In the present study, it was aimed to reveal the knowledge of secondary school students about the value of saving and how to be thrifty.

Methodology

The study is a basic qualitative research design. This research was conducted with 5th grade middle school students. Fifth graders were chosen in this research, because they had already learned about saving in the past year. The topic of saving is one of the socioscientific topics in the social studies curriculum (e.g., yes to consumption, no to waste, I use resources correctly). In collecting the research data, it was decided to use the writing for learning activity, which is a method suitable for the complex nature of socioscientific issues that require multidimensional thinking. The data collection tool was distributed to the students and an explanation was given about the purpose of the research and it was stated that the participation was based on the principle of voluntariness. Students were asked to write a letter in one class hour explaining the concept of saving and the measures to be taken for saving in order to raise awareness of the society. This study was conducted with the participation of 37 students in the 5th grade of a middle school in Kayapınar, one of the central districts of Diyarbakır. But two letters were excluded from the study and coding was done on 35 students' letters. In the study, codes such as P1, P2, P35. The distribution of the participants according to gender and age variables is given in Table 2.

Table 2. Distribution of participants by their gender and grade level.

Age	Female	Male	Total
10	2	3	5
11	13	13	26
12	3	1	4

Data Analysis

After the collection of the research data, the data analysis phase began. Data analysis was conducted through content analysis. The aim was to conceptualize the data and reveal themes that could describe the phenomenon. The content analysis is mostly used to analyze data collected through both written and visual methods. First of

all, closely related words are identified and categories related to the topic are developed accordingly (Batdı, 2021). Data with similar trends are then placed into appropriate categories. The aim of content analysis is to discover concepts and connections that can explain the data collected, i.e. to uncover patterns hidden in the data (Yıldırım & Şimşek, 2011). The data were analyzed by the researcher. In order to ensure the reliability of coding in content analysis, it is recommended that the coding phase be carried out by more than one person. However, in cases where this is not possible, the same person repeating the coding several times in different time periods contributes to obtaining accurate results (Batdı, 2021). In this scope, the coding were checked by the researcher twice in 15 days and no any differences were detected between the codes.

Results

As a result of the content analysis, secondary school students' suggestions on the concept of saving and how to be thrifty four were grouped under themes. These themes and subcategories of each theme are presented in figure 1.

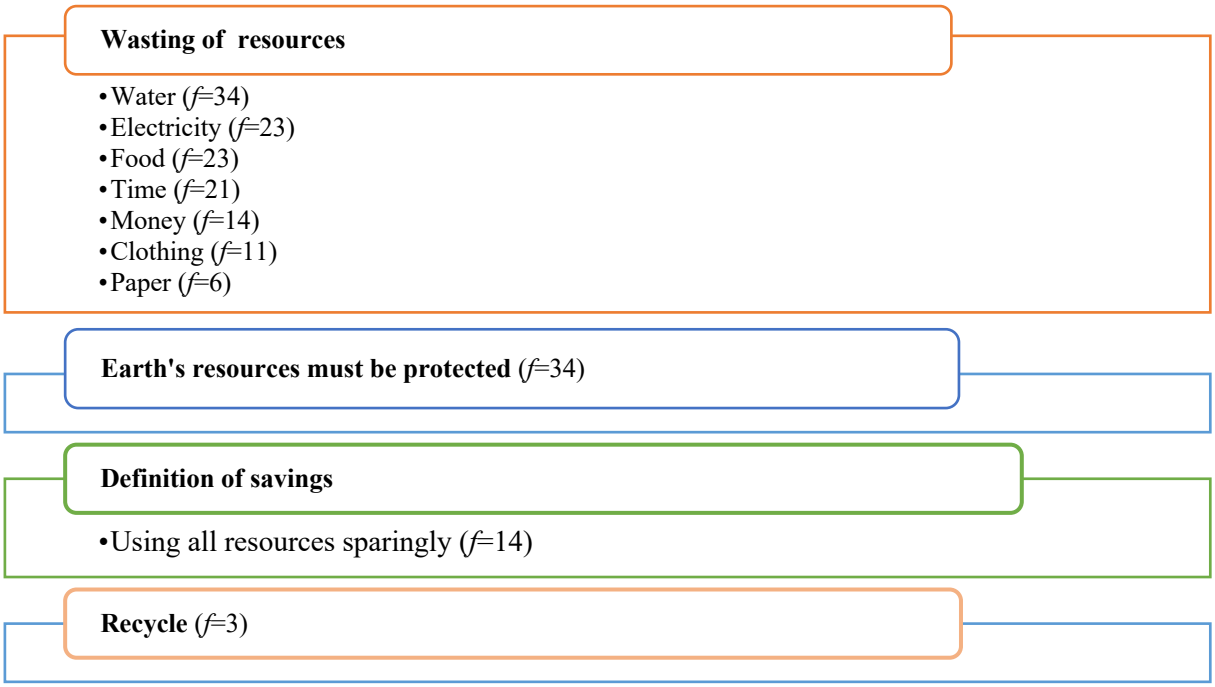

Figure 1. Themes and subcategories of participant opinions

As can be seen in Figure 1, the first theme is related to the wasting of resources. This theme consists of the sub-categories of wasting water, electricity, food, time, money, clothes and paper, respectively, according to the frequency of recurrence. Sample excerpts from participant letters for some of these categories are presented in Table 3.

Table 3. Examples of participant opinions on themes and subcategories

Wasting resources themes subcategories	Subcategories of participant opinions
Wasting water	• *There are people who leave the faucet on while brushing their teeth. If you don't turn off the faucet, 50 years from now there will be people looking for water in the deserts, there will be people dying of thirst, there will be an apocalypse, if the faucet fails, call a plumber to repair the faucet and let's save water (P26).* • *We should not leave the water running while brushing our teeth, and we should have faucets repaired if they are broken or dripping (P30).*
Wasting electricity	• *Do not forget the importance of electricity and do not leave electrical appliances such as televisions and tablet lamps on for no reason. Turn off the light when moving from one room to another (P11).* • *Do not turn on the air conditioner unless it is hot (P17).*
Wasting food	• *Let's not throw away the excess food, let's give it to animals (P3).* • *There is bread left over from yesterday at home, but we are a society that does not eat that bread, we go and buy fresh bread and then that bread goes to the garbage and this turns into food waste. (P20).* • *When we waste bread, we do not care about the labor of the people who make it. We*

	should not buy more bread than necessary. Think about the people who labor while making that bread, they spend their time in the field and grow wheat, all the wheat is ground and turned into flour, workers in the bakery work day and night to make bread. My elders, we don't realize it, but when we throw those breads in the garbage, we are actually throwing away bread. We are not only wasting labor but also eating the rights of others (P9). • *When we cook, let's make enough. Let's take as much food as we can eat on our plate. We should put the rest of the food in a container and put it in the refrigerator (P30).* • *Children in Africa are starving we suffer from food waste (P31).*
Wasting time	• *Our elders, don't spend our time on the phone, tablet or computer, take care of your children in your free time, take them places instead of staying at home (P14).* • *When we spend free time on our phones, tablets and computers, our eyes are damaged, our brains are damaged and time is wasted (P20).*
Wasting money	• *We should use money for our needs first. Mom says we can buy our needs first and then one of our wants. (P4).* • *To be thrifty, we must first meet our needs, and if we have money left over, we can buy what we want (P7).* • *If you need an eraser and a pen, don't use your money to buy junk food (P33).* • *Don't spend unnecessary items, if your hair is not long, don't cut it, if your hair is not white, don't dye it (P14).*
Wasting clothes	• *We can give our shrinking clothes to our cousins (P3).* • *We should not wear shoes, boots, caps and hats once and throw them away (P6).* • *We shouldn't buy new clothes when we have too many (P7).*
Wasting paper	• *Let's not waste paper, thousands of trees are cut down to produce one sheet of paper (P10).* • *We must not tear up the papers (P21).* • *You are tearing paper for nothing, children in schools use paper for texting for nothing, remember that paper is made from trees (P32).*

Another theme that emerged as a result of the content analysis is the definition of saving. Under this theme, there is subcategory of using all resources sparingly. In addition to this theme, the protection of earth resources, definition of savings, and, recycle were revealed respectively. Sample quotations from participant letters for some of these categories are shown in Table 4.

Table 4. Examples of participant opinions on themes and subcategories

Themes	Subcategories of participant opinions	
Definition of savings	*Using all resources sparingly*	• *Saving means saving something or using it neither more nor less than necessary (P4).* • *Saving is not using something in vain (P8).* • *Saving means not spending too much on something (P7).* • *Saving means not wasting anything (P27).*
Earth's resources must be protected		• *We should not waste, we need to protect our world (P7).* • *Too much water is consumed in the world for nothing. If we spend so much every day, what will we use in the future? (P12).* • *If we use too much water and electricity, animals will suffer along with us, glaciers will melt, we will have no water to drink, but if we use it properly, we can prevent global warming (P19).* • *If we do not become conscious consumers, we will become extinct very soon. The world will disappear, glaciers will melt, dams, seas, lakes will all dry up, global warming will occur. To prevent this from happening, we should not waste, let's be a conscious consumer (P5).* • *We need to be conscious to leave a better life and world for the generations after us (P20).* • *If we keep wasting, we will lose everything (P35).*
Recycle		• *Let's throw the clothes we don't use in the clothes boxes. Because if we throw them in the garbage, it would be a waste, there are people in need and we should give them to them. (P25).* • *To avoid waste, we can put a bucket in front of the water coming out of the pipes on rainy days and after the rain stops, we can take the bucket and water the trees (P26).*

Conclusions

In this study, which examined the perceptions of secondary school students about the value of saving in the Social Studies curriculum, students defined the concept of saving as conscious consumption, not wasting, and using resources responsibly. The majority of the students mentioned the waste of water, electricity, food and time and offered suggestions on how to avoid waste in these issues. This result is similar to the findings of the

study conducted by Utkugün (2023). Utkugün (2023) found that middle school students defined the concept of saving as not wasting water-electricity-bread/food, not spending unnecessary money, using sufficiently and consciously. Within the scope of this study, students exemplified the importance of conscious consumption through the damages that the unconscious use of resources will cause on living life in the future. This can be interpreted as students being aware of the problems that await the world in the near future if waste continues.

Another result of the study is that students emphasized the issue of wasting time. Students stated that most of their parents or peers spend a significant amount of time in front of phones, tablets and televisions. In order to use time more effectively, they mentioned that responsibilities should be fulfilled first. Some of the students mentioned the waste of money, clothes and paper. They suggested not buying clothes unnecessarily and sharing worn out or shrinking clothes with others to prevent waste. Students emphasized that in order to prevent waste, it is necessary to stop overconsumption and for this purpose, not to buy things that are not needed. In this way, they stated that both over consumption can be prevented and money can be spent for needs. As a matter of fact, Terzi and Altunışık (2016) pointed out that individuals shop to follow fashion, visit stores even if they do not need clothes, and shop disproportionately to their income.

In the study, it was determined that the concept of recycling was touched upon through the examples of sharing excess clothes and recycling rainwater. When the results of the research are evaluated as a whole, it can be said that students have knowledge and awareness about saving and are aware of the problems that await our world if resources are not saved. de Rivas et al. (2024) found that secondary school students were willing to take concrete actions such as saving water and energy and sorting waste, but did not make more radical changes in attitudes and daily habits (reducing consumption of goods and services, change in food model, etc.). In this sense, appropriate activities and real life experiences can be created through school-community-family cooperation to transform students' sensitivity and knowledge into behavior. In order to increase students' financial literacy skills, in-class and extracurricular activities that raise awareness about the value of saving can be organized.

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Evaluating “QBL - Question Based Learning", a Question Based Approach to Teach Programming at Tertiary Level of Education

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Abstract

Learning programming is found to be difficult in fundamental programming courses. This paper looks at the gaps proposed by researchers in the teaching/learning processes and as a solution looks at the Theory of Constructivism. With the research question “Does the lecture delivery methodology convert the Theory of constructivism into a process of learning?”, this research proposes a question-based methodology “QBL - Question Based Learning” to convert programming lectures into a series of progressive questions. A fundamental programming course was designed using this methodology and was used in a private university in Bangladesh where students learn the fundamentals of Python programming language. The preliminary results of around 300 students are presented in this paper. The students were asked how much the concepts helped to learn the next course of Data Structures, self-rating of coding skills, level of confidence and perception of the question-based teaching methodology. All results were compared with a control group consisting of all other teachers teaching the same course. Statistical analysis from the survey results point to the effectiveness of QBL in programming teaching. It has been found that students who are taught using this methodology are doing better on the next programming courses like Data Structures, Algorithms, etc., indicating a high retention rate. As programming is a STEAM course, the efficacy of QBL should be tested in advanced courses in Computer Science.

Keywords: programming, programming teaching, questions, theory of constructivism, confidence level, retention rate.

Introduction

For many years, people have been discussing and studying how teaching methods for computer science and coding have changed (Isong, 2014). Historically, the foundation of coding instruction has relied on a sequential approach and the thorough memorization of concepts, which has remained predominant for an extended period (Michaelson, 2015). Although this traditional system has been effective, it has been criticized for not being flexible enough to meet the different learning styles and needs of students. Observations indicate that such traditional techniques do not engage a substantial segment of the student body. This leads to difficulties in understanding, applying, and maintaining knowledge of programming fundamentals over time (Van Doorn & Van Doorn, 2014).

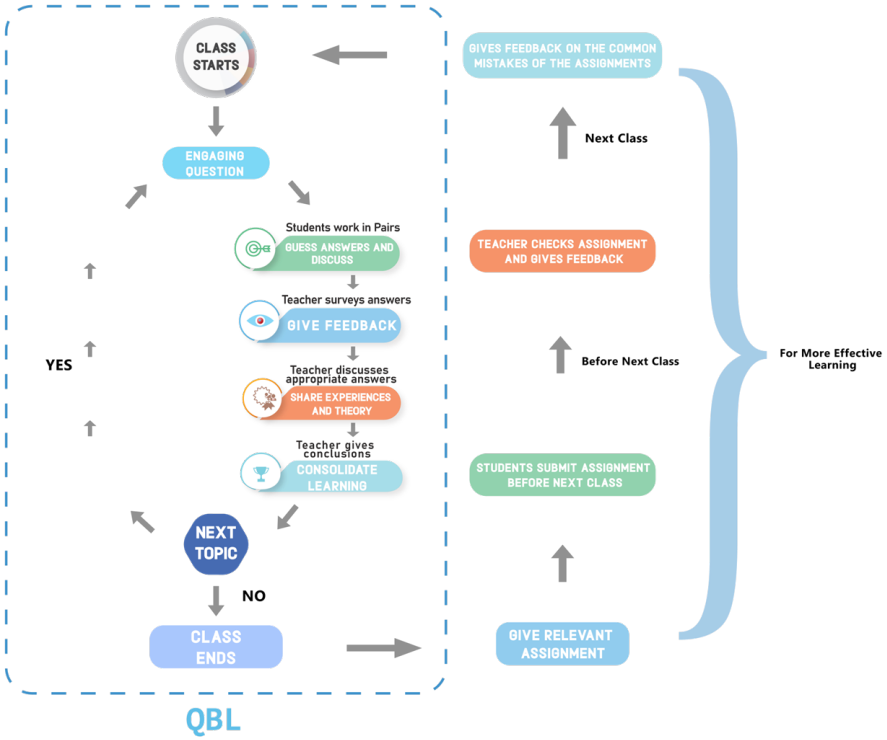


Figure 1. QBL Diagram

To tackle these learning challenges, educational and research groups are looking for new and exciting ways to teach. As humans, it is possible to think about only one idea at a time (Hoffeld, 2017). That's the reason why students often do not understand the class lectures, because their focus is not on lectures. Rather they are talking with classmates or looking at their smartphones. In order to draw students' attention, asking questions can be an effective way. Science says that when a question is asked, the human brain is captivated, and it starts looking for answers (Hoffeld, 2017). In that way, they guess the answers from what they already know. Therefore, students are more focused and ready to learn new information. According to the theory of constructivism, students learn by fitting new information together with what they already know (Bada & Olusegun, 2015). Therefore, asking questions on a topic in class helps students to learn more effectively and new knowledge can be gathered more effectively. As per Figure 01, our proposed QBL model for programming starts with an engaging question related to programming topics. Students then guess answers from their existing knowledge which proves that they are at the correct place in their brain and therefore new information can then be stored effectively. In the QBL method, after students guess answers, the teacher then gives feedback on them and then shows the actual answer alongside sharing experiences and theories. Lastly, the teacher gives conclusions and consolidates learning. If anyone is interested in the QBL method and wants to apply it in their class, please go through the following link to have an idea about how QBL works for a programming topic "Variables", also please download the file to view the PDF if it does not render normally. The link is:

https://github.com/mahbubul-haq39/QBL-Pedagogy/blob/main/Variables%20QBL.pdf

In this paper, the authors evaluate the proposed QBL model by doing surveys on around 300 students in a private university of Bangladesh. In order to evaluate the QBL pedagogy, the "Introduction to Programming course" taught in a private university in Bangladesh was redesigned using this method. The survey gives interesting results related to the retention rate of students, their confidence level in coding and perception on the QBL pedagogy. Also in this work, the authors have shown the gaps in existing programming teaching methods and highlighted how QBL can solve those gaps in tertiary level of education.

Literature Review

There are several research works which show different teaching methods that contribute to programming teaching and learning. The authors in (Chang et al., 2022) showed Problem Based Learning (PBL) combining with collaborative learning in flipped classrooms which enhances motivation and outcomes, while increasing problem solving skills. In another work (Figueiredo & García-Peñalvo, 2021), a predictive machine learning model is introduced, to help teachers and students identify potential problems early and respond promptly in programming courses. Knowledge Discovery Model based on analogies, using machine learning and text mining, for teaching programming concepts was introduced in another research work (Jiménez Toledo et al., 2021). This model was found effective to teach programming concepts and courses (Fundamental of Computer Programming - CS1) and this was validated by professors and students.

From the previous literature studies shown above, some effective teaching methods in programming teaching are seen. Literature also describes some gaps in the conventional methods of programming teaching. The authors in (Brown & Wilson, 2018; Cheah, 2020; Kadar et al., 2021; Othman et al., 2023) discuss the problems in educators' roles in teaching programming, particularly using static teaching materials and focusing on syntax more than developing the problem-solving mindset of students. Particularly, the work (Kadar et al., 2021) discusses the lack of guidance from the instructors in class and outside the class, even the teaching style of the instructor influences the students' interest in the programming class. Another work (Ebrahimi, 1994) shows that students having more challenges in basic design of programs make more errors and show poor performance when writing programs. In the paper (Corney et al., 2012), the authors mentioned that programming strategies, more specifically debugging, are not explicitly taught in introductory programming courses. In a study (Qian & Lehman, 2017), the authors found that identifying and addressing the misconceptions of the students is a mandatory part of an instructor's competence in computer science. But it is unfortunate that a lot of instructors are not guiding students regarding the point mentioned in the previous paper according to the work (Kadar et al., 2021).

Table 1. How QBL addresses the gaps in programming teaching.

Existing Gaps in Programming Teaching	How QBL Addresses the Gaps
Educators' role in teaching programming: Teaching with static materials, focusing on syntax more than developing problem solving mindset (Brown & Wilson, 2018; Cheah, 2020; Kadar et al., 2021; Othman et al., 2023)	In QBL, every topic starts with an engaging question, and students have to guess the answers and submit them in a web-based software named "Mentimeter". In the software, we can see charts and answers based on students' responses which solves the problem of teaching with static materials. As students are guessing answers from their existing knowledge and then trying to solve a problem with peer discussion, their problem-solving mindset gets improved.
Lack of guidance from instructors and conventional teaching pedagogies influence students' interest in programming class (Kadar et al., 2021).	In QBL, the instructor gives feedback on the guessed answers from the students. Then he guides them to the actual answer alongside sharing experiences and theories. Even the instructor gives feedback on assignments regularly and shows the common mistakes to the class. In this way, there is always interactive communication between the students and instructor. As QBL is a different pedagogy that starts with questions and keeps the class engaged using a web-based software, the students are always active in peer

	discussions and guessing answers, therefore there are less chances to lose interest in the class.
Students having challenges in basic design of code make more errors and show poor performance (Ebrahimi, 1994).	QBL starts with basic WH questions on the topic and the course designed using QBL is focused on the very basic concepts of python programming. Therefore, students can easily grasp the fundamentals of programming and show better performance than others learning using conventional teaching methods.
Programming strategies, more specifically debugging, are not explicitly taught in programming courses (Corney et al., 2012).	In QBL, often the class starts with a code and a question "Can you find the error in the given code?" While looking for errors, students at the same time often find ways to fix the code. Therefore, students learn how to debug codes in QBL pedagogy. Ultimately, debugging helps these students to do well in the future courses (shown in results section) and even in Industry exposure in careers.

Methodology

As the purpose of this paper is to evaluate QBL, a survey questionnaire was prepared and circulated among students who had completed the Introduction to Programming course. The survey (first survey) was circulated via email and also using social media. For the evaluation purpose, the students who had completed the course and were taught using QBL are considered as the experimental group and the other students who had completed the course using conventional teaching methods are considered as the control group. The authors got 184 respondents from this survey. The questionnaires were selected for the first survey in a way that retention rate of learning for both groups, their confidence level and self-rating of coding skills can be analyzed and compared. The questions given were mostly close-ended MCQ questions, also a few open-ended questions. The demography of the participants of the first survey can be seen in Table 02.

Table 02. Demography of the participants of first survey.

Parameters	Count
Age	20-23 years
Gender (Male)	117
Gender (Female)	67
University Year	Mostly 1st-2nd Year
Experimental Group (QBL)	62
Control Group (Non-QBL)	122

The experimental group also filled out another survey (second survey) form which was given to evaluate their learning experience and to know their opinions regarding QBL. There were nearly 120 respondents from the

experimental group. It is to be noted that this survey was not given to the control group to participate. The results of this survey are used to further evaluate the findings from the first survey.

Lastly, it should be noted that all of the participants in both of the surveys are from the same university and all of them have completed the Introduction to Programming course. Also, the whole Introduction to Programming course was redesigned using QBL to evaluate this teaching pedagogy by comparing the responses from the two groups (experimental group and control group)

Result and Analysis

From Figure 02 to Figure 05, the responses of the first survey were analyzed. From this survey result, QBL can be compared with other traditional teaching methods in various respects.

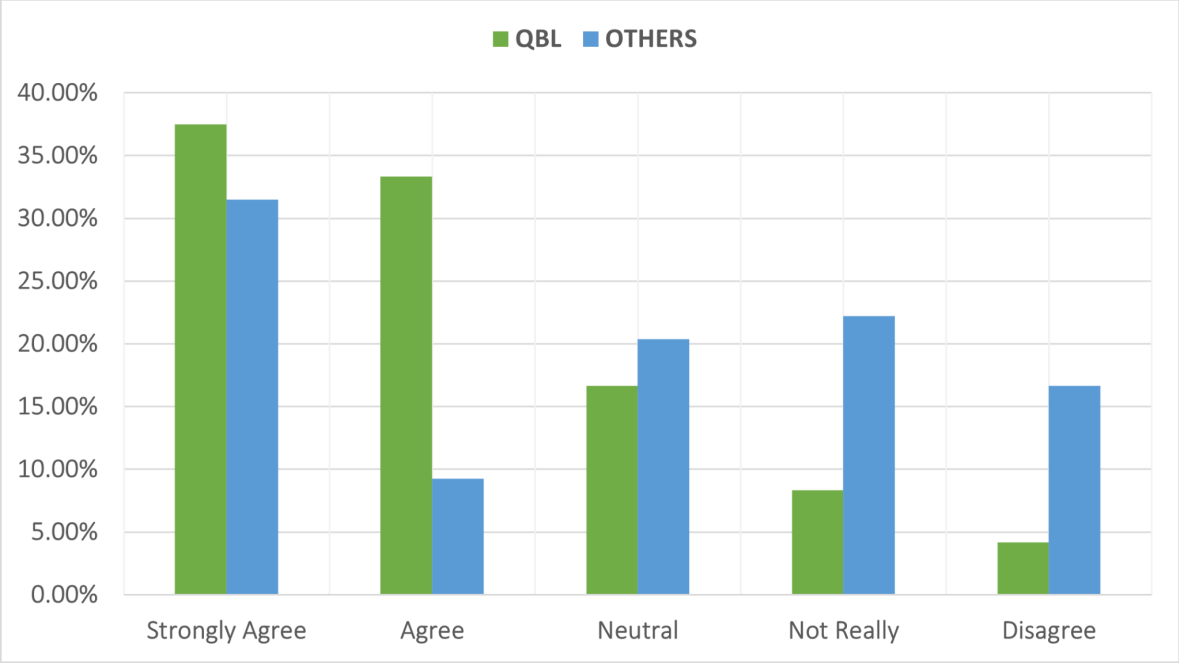


Figure 02. Introduction to Programming course helped to understand the concepts of Data Structure

As shown in Figure 02., it is clearly visible that more than 35% of students in the experimental group strongly agree that the Introduction to Programming course helped them to understand the concepts of Data Structure course better whereas it is only 30% for the control group. More than 30% of the experimental group agreed that the mentioned course was helpful for the next course whereas less than 10% agreed the same on the control group. It is also clearly visible that the control group mostly disagrees with the given statement based on the percentage shown in the chart (Neutral, Not Really, and Disagree). This chart shows the retention rate of the students who are taught by QBL in the Introduction to Programming course is way better than the students of the control group, which proves the long-term effectiveness of the QBL methodology.

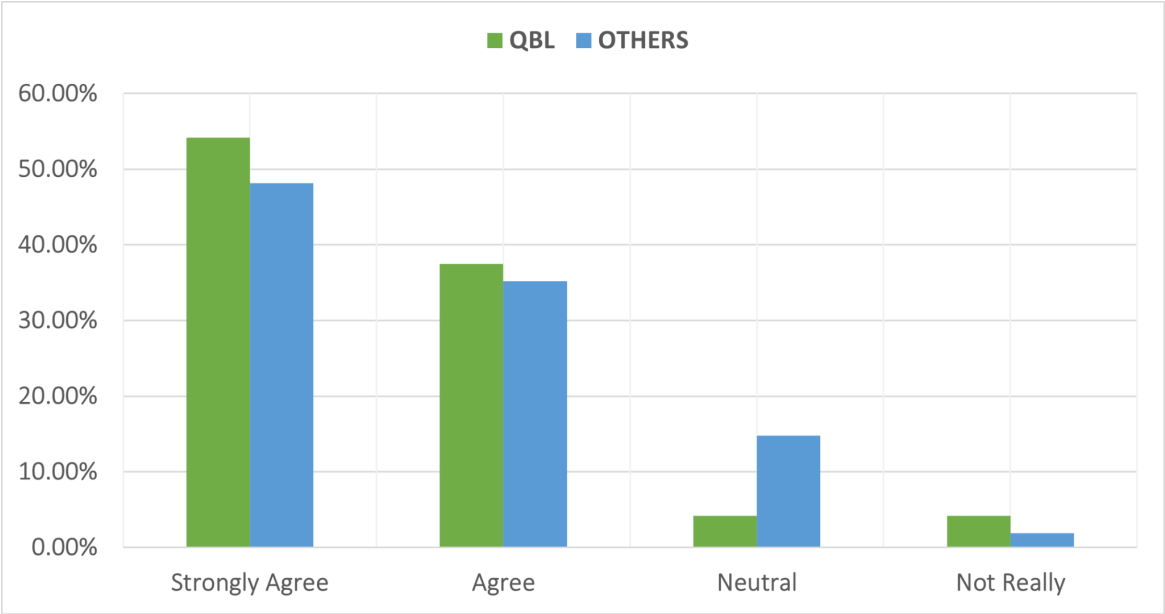


Figure 03. Launching a topic with thinking question may help to start thinking.

In Figure 03., both the control group and the experimental group agree with the opinion that launching a topic with a thinking question may help to start thinking. Launching a topic with a thinking question is the main foundation of QBL. As most of the respondents agree with the statement, it shows that asking questions in class by the instructor is important which supports the necessity of practicing QBL in programming courses.

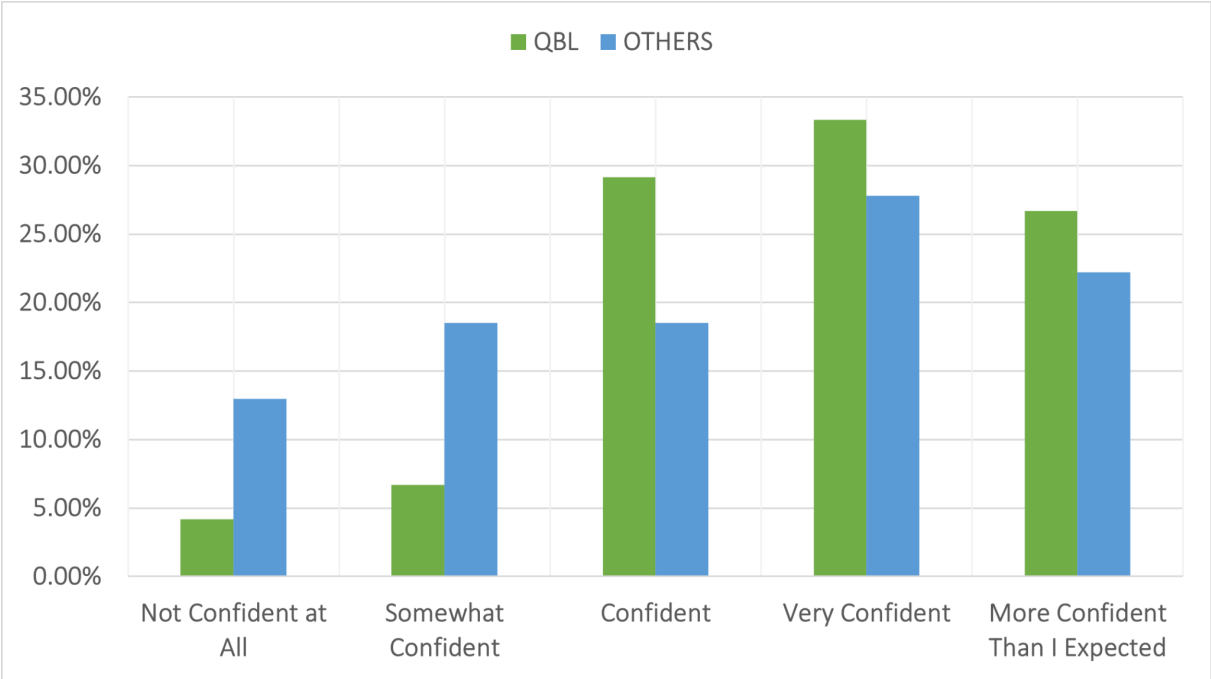


Figure 04.: Confidence level of coding after doing Introduction to Programming course.

According to Figure 04, the confidence level of coding after doing the Introduction to Programming course is evaluated. It can be seen that the control group's confidence level is low, where more than 10% are not confident at all and nearly 20% are somewhat confident. On the other hand, the experimental group shows a positive trend where their confidence level is much higher than the control group in 3 of the evaluation criteria (Confident, very confident and more confident than I expected), showing nearly 30%, nearly 35% and 27% respectively. This chart overall shows an overall better confidence level of coding of the experimental group.

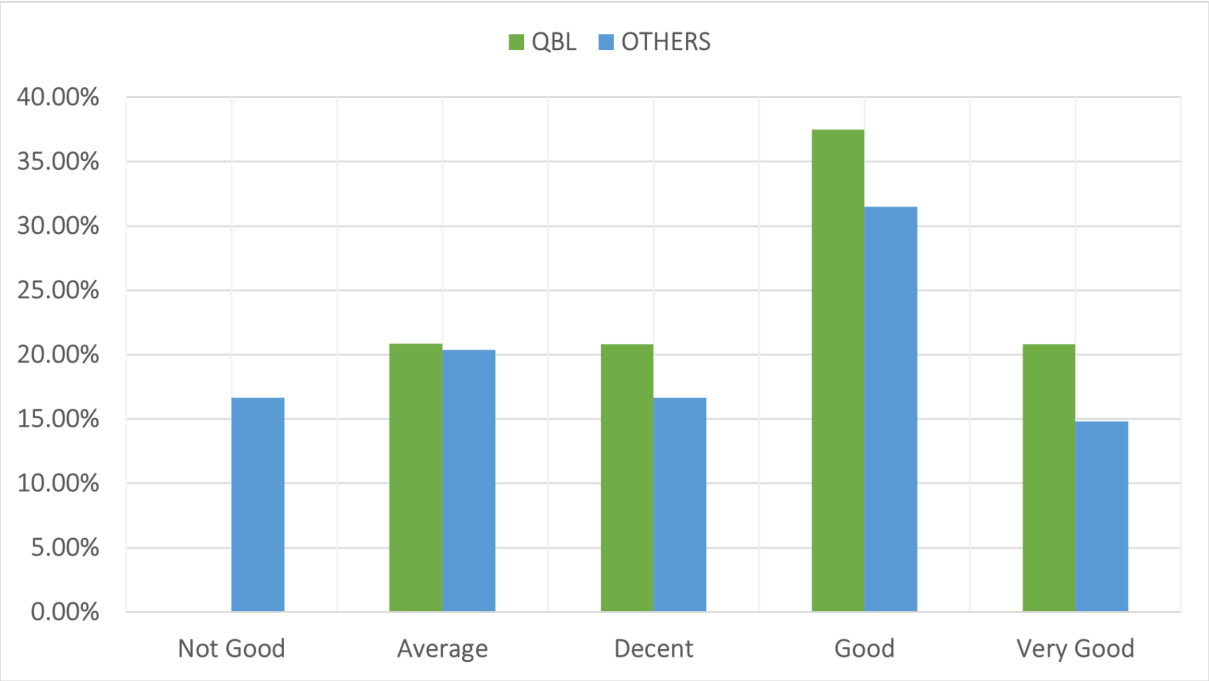


Figure 05. After doing the Introduction to Programming course, how would you rate your coding skill?

As per Figure 05, the continuation of the positive trend of the experimental group in terms of self-rating of coding skill are shown. The percentage of the experimental group is higher on (decent, good and very good) criteria than the control group. Also, more than 15% respondents of the control group rated their coding skill as not good where it is completely none for the experimental group.

Post Survey Analysis for Further Evaluation (Experimental Group):

From here onwards, the analysis of the responses of the second survey which was particularly given to the experimental group who did the Introduction to Programming course in QBL pedagogy are given. Figure 06 to Figure 09 are basically the charts made by analyzing the responses from the second survey.

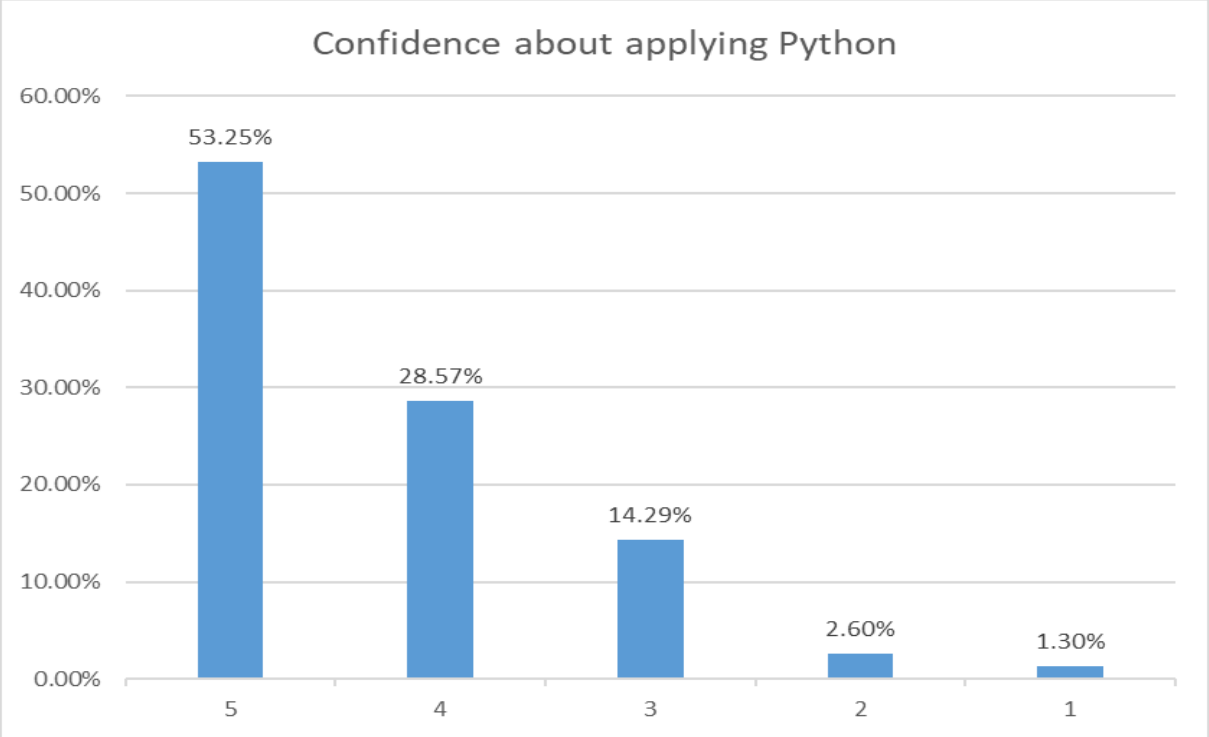


Figure 06. Confidence level of applying python (5 -> Very confident to 1 -> Not confident at all)

Figure 06 represents confidence level about applying python language. 53% of the respondents rated their confidence level as 5 (Very confident) and almost 29% respondents rated 4 (Confident). These two combinedly make nearly 82% of the total respondents. Although Figure 04 showed the confidence level of overall coding for both of the groups, this chart on Figure 06 specifically mentions the confidence level of applying python language in coding for the experimental group.

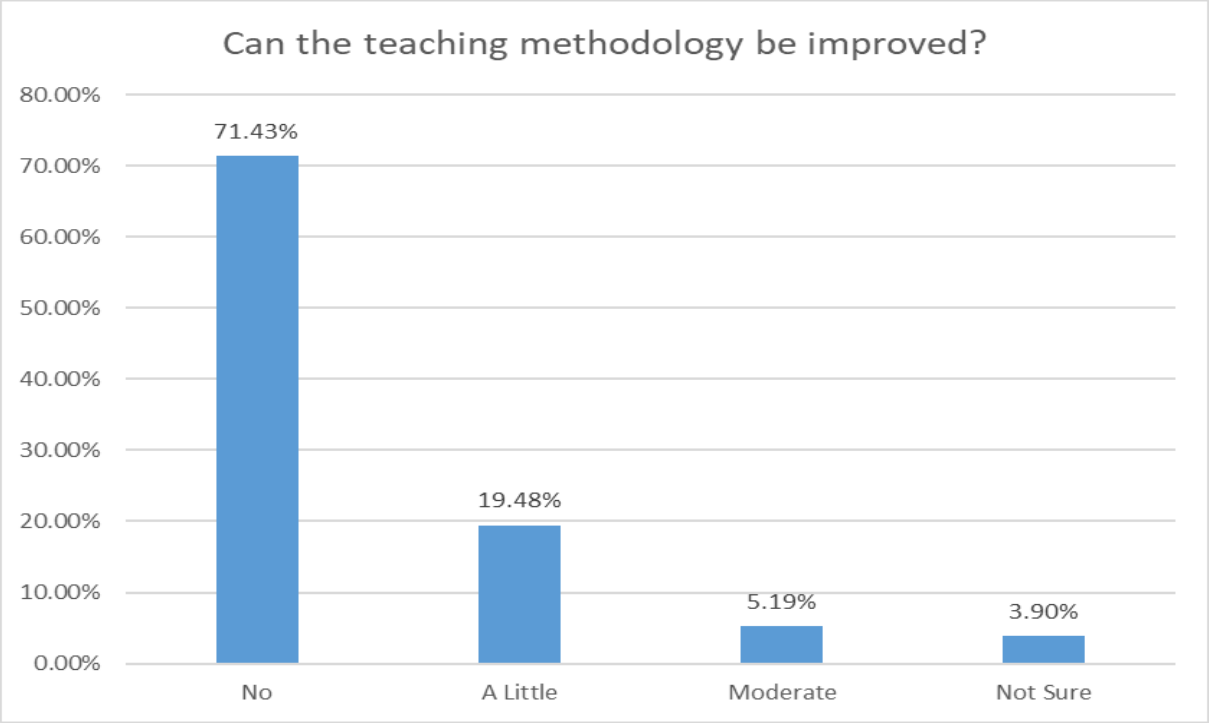


Figure 07. In your opinion, can the teaching methodology be improved in any way?

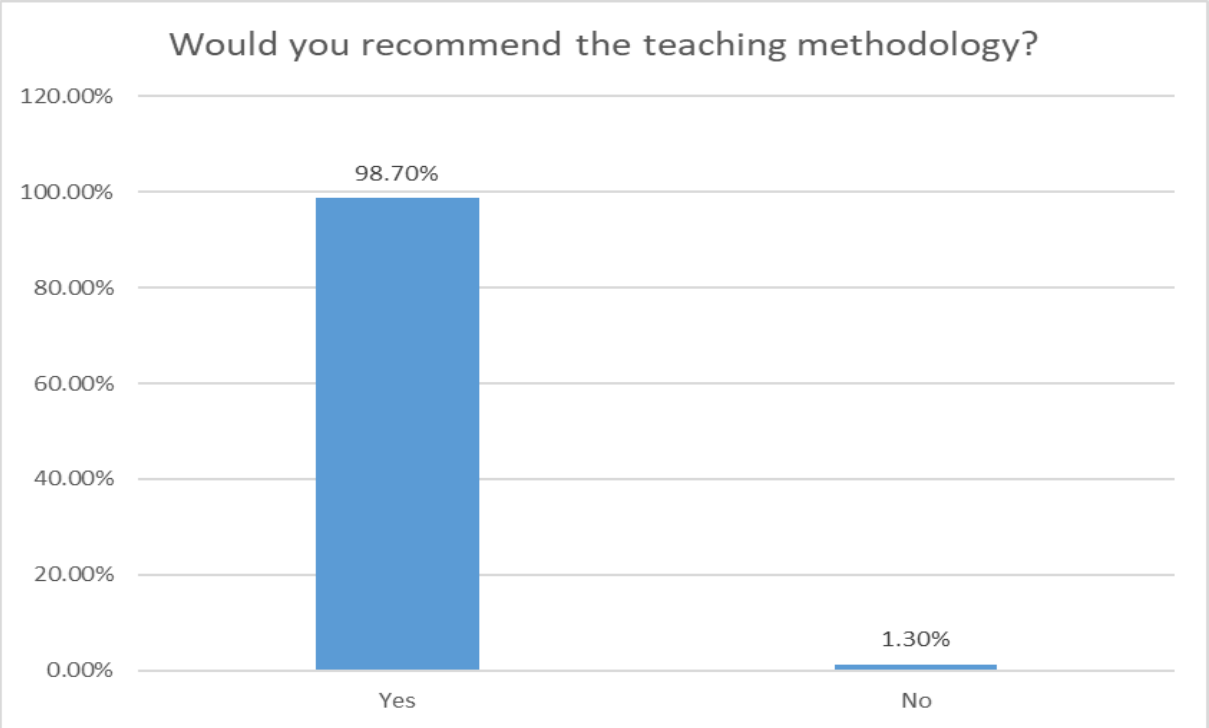


Figure 08. Would you recommend the teaching methodology used or the class Introduction to Programming using QBL to others?

According to Figure 08, almost everyone (99%) of the respondents recommends this teaching method for the next coding courses. Also, the experimental groups were asked whether the teaching methodology can be improved or not. In Figure 07, more than 70% of respondents said that the method is perfect and almost 20% said that it can be a little improved. However, the respondents didn't mention how to improve the method, which indicates the method is good enough for programming teaching.

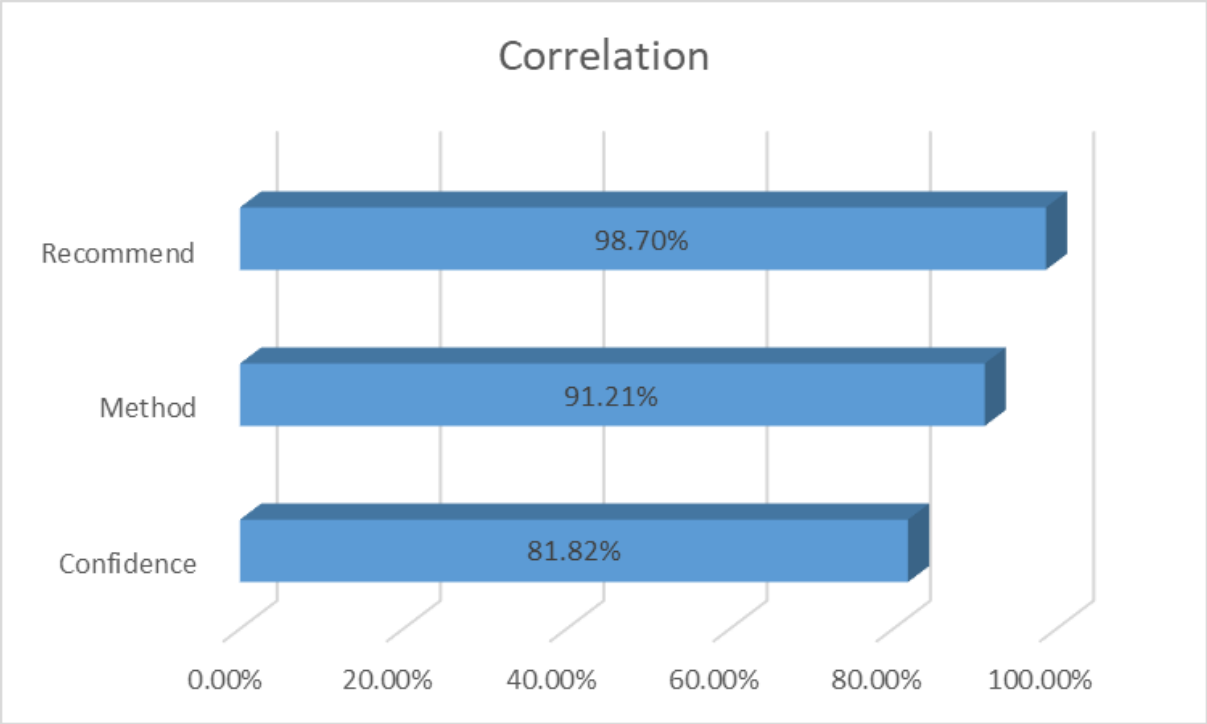


Figure 09: Correlation between post survey data of the experimental group.

As it can be seen from Figure 09, 81.82% (53.25% very confident and 28.57% confident enough) which is the majority of students felt confident about applying the Python programming language after the Introduction to Programming course. Those students alongside some of the students who were not that much confident about applying python voted that QBL methodology used in programming teaching is ideal and effective. That is why 91.21% (71.43% who said QBL doesn't need improvement and 19.48% who said QBL needs a little improvement) of students voted that the QBL methodology was ideal and perfect. Almost all students (98.70%) recommended this teaching method because of its instructiveness and effective teaching process and constant communication between students and the teacher.

Discussion

To answer the research question "Does the lecture delivery methodology convert the Theory of constructivism into a process of learning?"; the authors introduced QBL, which in the following discussions will clearly explain how QBL can convert the theory of constructivism into a process of learning.

According to Surah TaHa verse 17 from Al Quran, Musa (A.S.) was asked "And O-Moses, what is this in your right hand?" This question was not asked for the sake of getting any information, for Allah (SWT) already knew that Moses held a staff in hand (The Qur'an 20:17). The question was asked to get into the correct place of the brain where information related to that staff (stick) is stored. According to Zones of Proximal Development (ZPD) (Negi, 2020), the basic information of the stick can be learned by Moses himself, and there is no doubt that Musa (A.S.) knows the basic information of the stick. Therefore Allah (SWT) asked the question again undoubtedly to take Musa (A.S.)'s attention to the correct place of the brain and then told him to throw the staff in the next verse to show that that stick can be turned into a snake, which was beyond his reach according to ZPD. This was new information regarding the staff.

Now according to the theory of constructivism, new information can be stored and built above the existing knowledge of the human brain (Bada & Olusegun, 2015). An engaging question can be asked to get to the correct place of the human brain where the existing knowledge of information is stored, and then new information can be stored in the brain. Therefore, asking a question and then giving new information can easily be linked with the theory of constructivism and ZPD as per the previous discussion.

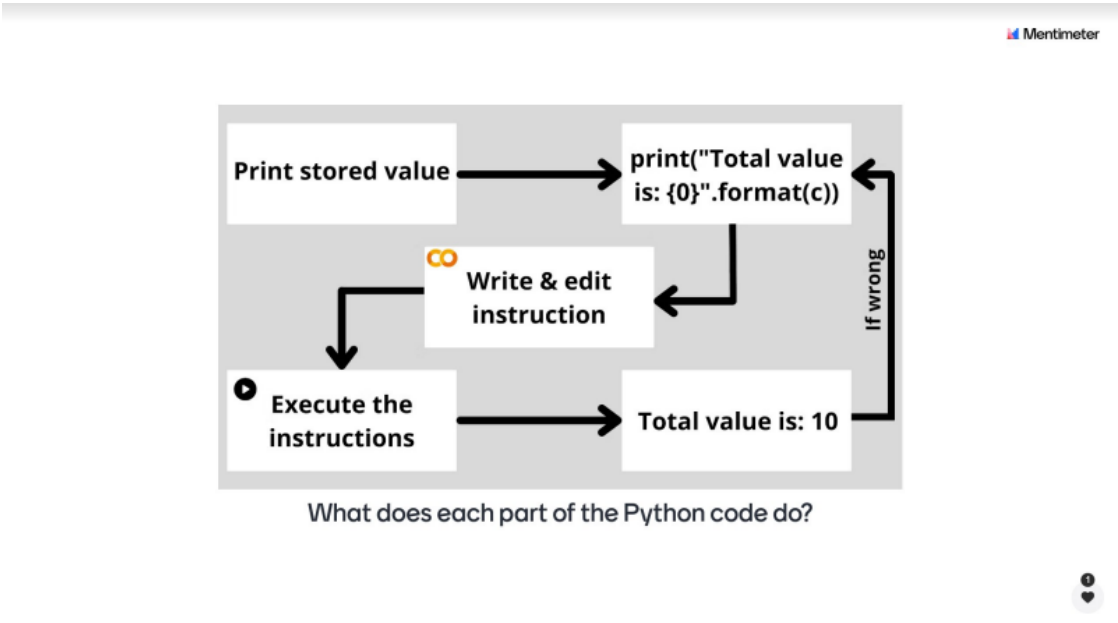
According to the QBL diagram shown in Figure 01, QBL starts with an engaging question. If we look into literature regarding what science says about asking questions, it can be seen that when a question is asked, the human brain is captivated, and it starts looking for answers. At that time, the brain can't contemplate anything else (Hoffeld, 2017). Now, there might be questions on the engaging question asked at the beginning of the QBL pedagogy. It should be clear after seeing Table 03.

Table 03: Methodological Questions Asked on The Basic QBL Method

Methodological Questions	Elaboration	Reasoning Assumed
Why?	Why should a question be asked on a topic or lesson?	To explore and locate in the brain what each student currently knows or perceives about the topic. This also allows the student to retrieve current knowledge on the topic from the appropriate site in the brain and prepare the site to receive new learning.
What if?	What if students insist, they know nothing?	The query question is designed around something that should be known by the student. Even if students insist that they have no knowledge, they are asked to guess. The guess would then have to be retrieved from the appropriate place in the brain.
What?	What type of question should be asked?	A non-threatening general type of question specific and related to the topic, something that the student should be able to relate to. The teacher must then have knowledge of the learning journey of the students.
How?	How should the question be asked?	The students should be comfortable and not have a fear of being rebuked, as the student's emotion should be, "What do I happen to know?"

When?	When should the query question be asked?	The query should be up front, as a means to launch a discussion on the topic. No other distracting ice breakers should be used.
Where?	Where should the subsequent new knowledge be stored or linked?	The newly constructed knowledge should be added at the site of existing/current knowledge be it correct or incorrect.
Who?	Who should ask the question?	In the classroom, it obviously has to be the teacher or facilitator who launches the discussion on the topic. However, the teacher may also ask the students to design basic questions on the topic like the questions in the left column of the table. Furthermore, students may subsequently learn how to easily reach their own relevant "construction" sites.

Table 03 explained everything about the engaging question asked in the beginning of QBL. After the question is asked, students will work in pairs and guess answers. Then the teacher will see the answers and give feedback based on that. The answers will be shown in a web-based software called "Mentimeter". For example, let us see two slides where a question is asked related to python programming and the responses guessed from the students.



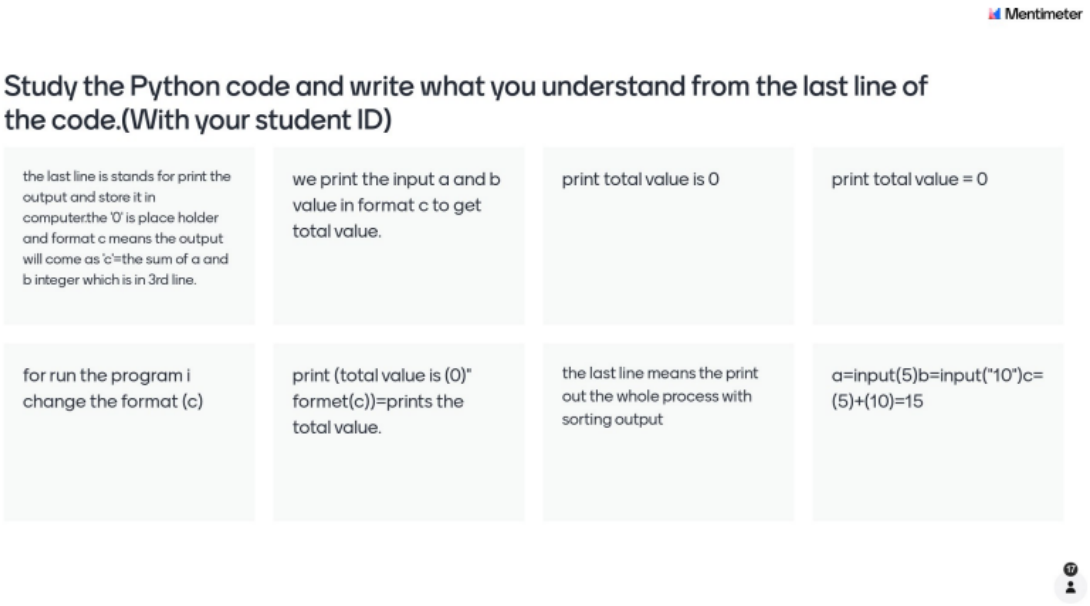


Figure 10. Demonstration of QBL using web-based software "Mentimeter"

As can be seen from Figure 10, after the question is asked, students get into the correct place of the brain and guess the answers. The guessed answers from the students in Figure 10 prove that they are in the correct place of the brain and are ready to learn more information. Theory of constructivism is basically constructing knowledge upon existing knowledge (Bada & Olusegun, 2015). If we carefully look at the QBL diagram in Figure 01, after students guess answers, the teacher reviews them and gives feedback. Then he shares experiences and theories and discusses the correct answer. Therefore, new knowledge is stored in the brain on top of the existing knowledge, which proves that QBL converts the theory of constructivism into a learning process and that answers our research question. Lastly, the teacher concludes the topic and moves into a new topic or ends the class. For further effective learning, the teacher can give assignments which require students to read further documentation and work on the topics learned in the class. It needs to be ensured that the assignments are submitted before the next class and the teacher checks all the assignments and gives feedback before the next class starts. In this way, in the next class, the teacher can give feedback on the common mistakes of the students and then start a new topic.

Conclusion and Future Work

The Query-Based Learning (QBL) technique for teaching programming at tertiary level is thoroughly examined in this work. It demonstrates how QBL is consistent with the way the brain learns, by starting learning with a programming related engaging question encouraging a greater comprehension of programming ideas. The discussions above prove how QBL can convert the theory of constructivism into a learning process. QBL improves student engagement and understanding in programming classes, according to the research done at a private university in Bangladesh. The study shows that, when compared to conventional teaching techniques, QBL is a highly beneficial pedagogical approach in programming teaching. According to the results, QBL helps students learn programming more efficiently while increasing their confidence level and also shows a better retention rate than the control group in higher courses of programming.

Future work involves conducting more surveys, particularly on two sections of Introduction to Programming course, where in one section, QBL will be used and in the other section, traditional methods will be used. Both sections will be taught by the same faculty member. Survey will be conducted 3 times, one at the beginning of the course, one at the middle of the course and one at the end to do further analysis. The authors also plan to use brain signal mapping to see the actual state of students when the mentioned course will be taught by QBL and other teaching methods to further evaluate the QBL model.

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Digital translanguaging against the language gap in Italian schools: the project "L'AltRoparlante" coordinated by the University for Foreigners of Siena.

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Abstract

In the globalized world, people communicate using all the languages they know complemented by multimodal elements, such as images and videos. The idea of using the entire linguistic and semiotic repertoire for communication is called translanguaging. Although there are different definitions of translanguaging, this method can be used especially in schools with a high intensity of foreign students, promoting their enhancement and integration.
From these considerations, the project "L'AltRoparlante" was born, coordinated by the University for Foreigners of Siena, which promotes and disseminates translanguaging teaching practices for the enhancement and use of all languages at school, deconstructing hierarchies on a linguistic basis and any stereotypes.
However, given the large gaps in the literature, researchers will need to investigate this methodology in the future.

Keywords: translanguaging, digital, school, foreigners, children.

Introduction

The concept of language is defined by some scholars as a regulated entity, which has a set of characteristics and structures, like English, and which is linked to specific nations and their identity, and generally created in the context of Foucault's (1972) notion of governmentality by European culture to promote monolingualism (Makoni and Pennycook, 2007; García and Wei, 2018).
Subsequently, the word bilingual word was suggested for one person and the phenomenon of bilingualism for the situation in which someone knows and uses two languages alternately (Weinreich, 1974).
Subsequently, scholars identified two types of bilingualism, subtractive and additive. The first occurs when a person uses a second language and begins to replace his or her first language, producing a monolingual being who uses only the second. The second, on the other hand, refers to the learning and use of a second language that is added to the person's linguistic repertoire without any influence on the first (Lambert, 1974).
In the now digitized world, where people use different ways of communicating in everyday life, interconnected and integrated by media, such as multimodal, linguistic, visual, sound, gestural and spatial, some researchers have found that people use all their linguistic repertoire to understand the world in which they live (Cummins 2005). Therefore, language cannot be conceptualized only as the semiotic way of communicating in a country but is to refer to the ability of people to communicate with each other in any possible way, using every available element of their communicative repertoire, which can include linguistic (words, sounds, structure, etc.) and multimodal (audio, images, videos, gestures, etc.). but also, their combination (Cope & Kalantzis, 2013; García & Wei, 2018).
In this context, bilingualism goes beyond Lambert's types of additive and subtractive, and becomes dynamic, because it concerns the holistic linguistic and multimodal system that a person possesses, and which includes many distinguishable features, which are constantly activated for potential use and are not separated in a formal sense, that is, in a way that corresponds to the naming of languages, such as English or Spanish (García, 2009; García and Wei, 2014, 2018).
Therefore, scholars have created the concept of "Translanguaging" which, in the most widely accepted definition, refers to the construction of a single integrated system that includes formal linguistic features, such as words and linguistic structures, as well as multimodal elements, such as gestures, images, sounds, and more, all of which are used appropriately and according to the person's decision of what is suitable for each situation in order to achieve meaningful communication. success (García, 2009, 2018; García and Wei, 2014, 2018). The effectiveness of translanguaging is not on the characteristics, but on the person, who creates the meaning, because it is the person himself who selects the characteristics to be used from his dynamic repertoire to communicate and make sense of the world (García, 2009, 2018; García and Wei, 2014, 2018).
Other research has demonstrated the idea of code-switching, i.e. the alternative use of languages in speech (MacSwan, 2014), which coordinates with the idea of translanguaging, which must be recognized alongside that of bilingualism, because bilingual and multilingual people possess complex linguistic repertoires and must decide on the selection of functionalities in order to interact in schools and society, in general (García & Wei, 2014).

Translanguaging applied to school teaching succeeds in promoting the linguistic and semiotic repertoire of students in a dynamic and multimodal way from the first day of school, because it respects all the main aspects of language: formal language, also understood as a means of instruction, but also the linguistic and semiotic repertoire of students as a way of giving meaning and being involved (García e Wei, 2018).
The goal of this methodology is to respect and incorporate each student's previous experiences, both cultural and emotional, within the teaching method, increasing self-confidence (Tzirides, 2021).
To implement this methodology, the teacher must have a classroom with multicultural students and must consider them at the center of the instruction, and not as an adjunct to the formal curriculum and formal school language (García and Wei, 2018). The latter idea of translanguaging is in accord with Nieto's (1994) idea of intercultural education, in which diversity is respected and used as the foundation of school activities.
Regarding language learning through translanguage, it should be noted that this is not intended to achieve linguistic competence through simple communication and interaction using targeted language, nor is it intended to learn linguistic structures, also known as the grammatical-translation method. In fact, its aim is to create new linguistic practices that are integrated into the student's linguistic repertoire through complex communication between bi/multilingual learners (García and Wei, 2014).
Translanguaging aids in the extension of the Proximal Developmental Zone, which involves tasks and concepts that students cannot achieve on their own but have the potential to acquire through appropriate social interaction with peers (García and Wei, 2014).
Digital technologies can be used to improve the implementation of this method. In fact, some scholars have created a guide for teachers with strategies on the use of translanguaging in schools, especially through the use of the Internet as a multilingual resource, as it can be used to learn content and conduct research using both the native language of bilingual students, as well as the language of the school, as well as finding images, watching videos and listening to audio in any language related to the topics related to the research activity (Celic and Seltzer, 2012).
In addition, they argue that websites and images on the web can be used as a visual aid in the creation of meaning.
This approach is also reinforced by reflecting on the fact that refugees in recent years are people, often digitally literate, because they use smartphones and are active online, as part of their lives for practical, social and psychological reasons, such as Google Translate's GPS for orientation and translation, which has some flaws slowing down communication (McCaffrey and Taha, 2019). Information tools on the Internet can be used by learners to make sense of words, phrases, phrases, sounds between the first language and the school language and vice versa (Celic and Seltzer, 2012).
In addition, the possibility of using digital tools used in free time at school has a positive impact both on the motivation of students, who are helped to move with mastery in the multiple spaces born from the fusion of real and virtual, in which the artifice of having to use a secondary foreign language to communicate disappears, and on the possibility of supporting the language learning process by pupils with special educational needs, as in the case of autistic children, through personalized paths that consider different learning styles (Coppola, 2013).
For example, some studies in the field of computational linguistics have observed cases in which the teacher has integrated two digital lexical resources into the activities: BabelNet and ImagAct (Coppola and Russo, 2019). BabelNet is a multilingual encyclopedic dictionary that forms a semantic network of concepts, each of which is associated with a representative image and often also the phonetic reproduction of the lemma (Navigli, Ponzetto, 2012). Instead, - ImagAct is a multimodal interlingual ontology, which associates each sense of a verb with prototypical scenes in the form of short videos (Moneglia et al., 2012). The resource includes 791 action verbs for Italian and 858 for English, making it complete for high-frequency verbs. It can be accessed to start with both lemmas and videos.
In these last practical cases, the teacher first clarified the objectives, the limits of use and provided concrete examples of use and, only then, presented these resources to the pupils, guiding them in their use to prevent them from being distracted from the task when using these highly interactive digital tools.
The results showed that the use of BabelNet facilitated the exploration and comparison between the languages used in the videos, stimulating translanguaging and conceptual abstraction of meanings. In addition, the association of multimodal elements has also made the cognitive work of memorizing lexical elements less onerous (Coppola and Russo, 2019).

Methodology

In the globalized world, characterized by global migrations and interconnections, the need for a multilingual teaching approach emerges. An example of this is the "L'AltRoparlante" project, coordinated by the University for Foreigners of Siena since 2016, and carried out by some primary schools and lower secondary schools in northern Italy, with a very high percentage of foreign pupils, which sometimes touches the number of 30 nationalities, often with a migrant background, and which in some cases make up 70% of the pupils enrolled out of the total of the individual school. In detail, for example in 4 years a total of about 800 students and 90 teachers were involved.

In particular, since 2016 foreign pupils in schools had a heterogeneous composition: newly arrived pupils, second-generation pupils, born and raised in Italy, poised between two cultures, pupils with excellent linguistic-communicative skills in Italian and in the language of origin, pupils with poor skills in Italian and others also in the language of origin, both in writing, and in reading and oral communication.
In this context, the confrontation with different languages and cultures has become a necessity, as has the reflection on the themes of hospitality, multiculturalism and multilingualism.
For this reason, the idea of a "translanguaging turn" was adopted, i.e. the need to include in the classroom all the languages of the students' individual and collective repertoires, increasing the empowerment processes of emerging bilingual students and deconstructing hierarchies on a linguistic basis and any stereotypes.
In this context, therefore, the definition of translanguaging elaborated by Ofelia García, which has already been extensively discussed, has been adopted, which deconstructs many already stereotyped relationships. In fact, it is no longer the "foreign" children who conform to the others through the full acquisition of Italian, but it is the Italian children who must try to be "like the others" and, to do so, dialects are also valued.
In addition, the asymmetrical teacher-student relationship undergoes a de-hierarchization, because the teacher in this context plays the role of understanding new languages and cultures. The hierarchy between languages is also deconstructed because all languages in the classroom are valued, overcoming the nationalistic territorialization of language and culture, typical of educational contexts.
The objectives were to promote teaching practices based on translanguaging, in order to enhance the importance of children's linguistic repertoires and the multilingual dimension of the classes involved in the project; to verify the impact that these teaching practices have on teachers, pupils and parents; to encourage the development of multilingual literacy skills and strategies to facilitate processes of empowerment of the native languages of the pupils involved, with the further aim of stemming phenomena of marginalization and stigmatization (Cummins, 2015); as well as to promote language awareness skills and meta-linguistic reflection, together with supporting the creation of a global citizenship identity.
The AltRoparlante is a transformative action-research, which "[...] inverts the power position of researchers and teachers, as each brings their own expertise into the process, becoming co-learners" (García & Kleyn, 2016). The basic idea is that researchers do not do research on teachers, but together with teachers, providing them with the "toolbox" of ethnolinguistic research first, and of multilingual teaching later, constantly negotiating the operational strategies to be implemented in the classroom.
In this program, the instructional design is highly personalized depending on the composition of the class. The teachers are followed individually by the researcher, who offers teaching ideas and translation support, as well as attending or sometimes carrying out the activity directly in the classroom together with the teacher.
The main phases of implementation of the project were: preliminary information meetings with school principals, teachers and students and parents; teacher training on bilingualism and translanguaging as a teaching practice; experimentation of translanguaging activities during regular curricular lessons; data collection through questionnaires and interviews to monitor and evaluate the impact of the project on teachers and students.
These preliminary meetings were aimed at describing the objectives and aims of "L'AltRoparlante", especially in terms of inclusion and enhancement of linguistic plurality inside and outside the school.
Subsequently, a survey was carried out of the languages and dialects spoken or known by the pupils involved. The survey was carried out both using ethnographic methodologies and through playful activities aimed at raising awareness among pupils of linguistic variety within their classes. In order to identify emotions and possible perceptual patterns related to individual and collective linguistic repertoires, students compiled linguistic silhouettes (or biographies).
Subsequently, in a more advanced phase of didactic implementation, work was carried out to enhance the repertoires at a visual level (multilingual schoolscape, cf. Gorter 2017) through the creation of bulletin boards, posters and multilingual dictionaries also concerning disciplinary content. Bilingual storytelling activities or in the different languages of origin have been launched and encouraged, with the involvement of parents and with the translation support of mediators, but also cooperative activities, carried out in small groups heterogeneous from a linguistic point of view, aimed at the management, both in the reception phase and in the production phase, of multilingual texts containing lexical elements, expressions and phrases in the languages and dialects of the classroom, with different levels of mixing, first on input provided by researchers and teachers, then self-produced. These last products have been created using the multilingual digital platforms offered by some textbooks, and students are called upon to collaborate for the solution of lexical comprehension and identification activities in all the languages involved, through laboratory work with the IWB.
The activity of multilingual re-elaboration of disciplinary study topics through conceptual maps was also promoted, as well as the creation of multimedia products by students (power point, Prezi, e-books) and multilingual texts. To design a teaching oriented to tranlanguaging, depending on the composition of the class, texts in Italian are proposed, but accompanying the reading with subsequent and/or supplementary activities of a multilingual type on lexical units or small lexical fields. Alternatively, the analysis of the text through WH-questions in all languages is proposed because it can be a way to create a multilingual space in the lesson, without resorting to

prior translations, but directly inviting students to answer in their native language. It is also possible to use texts entirely in the source language, for example if there is a large community of speakers of a certain language in the class. Even in this case, however, it is necessary to provide for a moment of multilingual synthesis and restitution in which Italian and the foreign language come into contact.
Evaluation, then, is one of the most complex issues of the project. The researchers of the project, in fact, recommend preparing a grid of objectives and skills that the teacher considers important, which do not necessarily have to be all linguistic. Very useful, in this sense, are the skills and knowledge identified by the Framework of Reference for Plural Approaches to Languages and Cultures, CARAP (Council of Europe, 2008-2011), which, depending on the educational contexts, can be declined for different types of students.
At the end of each school year, restitution and dissemination meetings were organized for parents, pupils (including those from other classes), teachers and managers, with the participation of figures involved in training services provided to schools (members of training agencies, mediators) and representatives of local administrations.
In addition to the didactic experiments, observation and data collection activities of various types were carried out, mainly through constant ethnographic work in the field, as well as semi-structured interviews were carried out for the teachers and some of the students involved.
This form of multilingual teaching has followed the approach of school learning suggested by the European Centre for Modern Languages and the Council of Europe precisely to promote multilingualism in the classroom, as well as the FREPA/CARAP (Framework of Reference for Pluralistic Approaches to Languages and Cultures), the "Guide for the development and implementation of curricula for multilingual and intercultural education" (Jean-Claude Beacco et al., 2016) and the recent PlurCur (Council of Europe, 2015).

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Results

During the didactic experimentation phase, semi-structured interviews were carried out for the teachers and some of the students involved. The results of the analysis reveal perceptual changes towards the multilingual dimension of the classes, as well as a general positive impact of the activities, especially in terms of inclusiveness and ordinariness in the promotion of multilingual teaching practices, also through the manifestation of processes of didactic legitimization of the languages and dialects of classmates.
Both the teachers and the pupils involved enthusiastically welcomed the educational activities experienced in the different school contexts. Through their ethnographic survey actions in the field, the researchers observed that, through an explicit involvement of linguistic repertoires in the formal didactic action, on the one hand many of the newly arrived students with poor Italian skills were able to find means to interact effectively and, on the other hand, second-generation foreign children were able to enhance their language of origin at school also, as a resource for disciplinary study.
Observing these positive results, it is fair to ask whether these multilingual teaching practices, adapted to the specificities of individual contexts, can be replicated and made in terms of routine within a training course, and whether they can be adapted in the path of upper secondary school, in which the management of expository texts represented by study manuals and the needs of measuring and evaluating skills in the disciplines are the main cause of school failure. In fact, to verify the success of the translanguaging teaching model at school, it is necessary to expand the number of schools, to compare the data and to involve more teachers involved in subsequent courses.
It is worth mentioning that the "L'AltRoparlante" project has been awarded the European Language Label 2018, and the educational activities that compose it are integrated both in the Educational Offer Plans of the schools and in the curriculum of skills developed by each institution.

Conclusions

The present study shows a literature gap on the search for the most suitable and beneficial way to exploit the digital tools available in the context of translanguage learning. In fact, multimodal media, machine translations, social media and search engines are tools that have not currently been created for language learning and, therefore, may present some challenges in implementation.
As a result, there is a need for technology designers to incorporate translinguistic practices into their applications.
Undoubtedly, the advantages of the didactic use of digital tools are many, not only for the student, in terms of motivation to learn, the opportunity to access linguistic input, opportunities for interaction and sharing of knowledge and the practice of translanguaging, but also for the teacher, to personalize interventions and teaching materials, promote autonomous learning, build a cooperative environment in which students work as a community of practice.
In experimental classes with many foreign students, the coordinated use of digital tools is an important opportunity, because it allows to give visibility also to languages not being taught, favoring their integration, and allows the

involvement of the entire linguistic repertoire of pupils as a cognitive scaffolding resource for learning new languages (Coppola, 2016).
Some detect specific risks, including inappropriate input and incorrect feedback; There may be technical problems with software and hardware; the excessive availability of multimodal stimuli could lead to cognitive overload and, more generally, the pervasiveness of technology could reduce the ability to focus attention on a task and critical thinking (Carr, 2010).
In conclusion, therefore, it is necessary to consider technology only as a means, and not an end, to be modulated in a flexible and creative way according to the learning objectives. After that, digital tools can become a useful support for both the teacher and the student only if they are of good quality and usability, so that they do not unnecessarily complicate the task from a cognitive point of view, and do not create confusion with contradictory, inaccurate or even false information.

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The Potential of Generative Artificial Intelligence in Enhancing English Writing Skills of K12 Students

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Abstract

This study aims to examine the usability and effectiveness of generative artificial intelligence technologies in improving the English writing skills of K12 students. One of the primary challenges in English language learning is enhancing students' written expression skills. Supporting English writing skills at the K12 level is crucial, especially for 5th and 6th grade students whose language skills are still developing. Our research will be conducted with students at the A1-A2 proficiency levels and aims to evaluate the effectiveness of artificial intelligence-supported learning tools designed for use during one semester of English classes structured in a hybrid format. The research process will begin with a pre-test administered to students at the beginning of the semester to determine their initial levels of language proficiency and writing skills. Lessons will be enriched with artificial intelligence-supported interactive writing activities within the framework of a hybrid learning model. These activities aim to actively improve and reinforce students' language use.

At the end of the research, the quality of feedback received by students from the artificial intelligence application, changes in their motivation, progress in language skills, and participation in writing activities will be evaluated. The results will shed light on the role artificial intelligence can play in supporting English writing skills in K12 education and the potential benefits of integrating these technologies into teaching practices. Thus, the research is expected to contribute to the literature by providing a comprehensive overview of the effective use of artificial intelligence-supported teaching tools for designers and administrators in the field of distance education and by offering recommendations for more conscious and effective use of AI applications.

Key words: Open and Distance Learning, Artificial Intelligence, Language Teaching, K12

Üretken Yapay Zekanın K12 Öğrencilerinin İngilizce Yazma Becerilerini Geliştirme Potansiyeli

Özet

Bu çalışmada, K12 düzeyindeki öğrencilerin İngilizce yazma yeteneklerinin geliştirilmesinde üretken yapay zeka teknolojilerinin kullanılabilirliği ve etkililiği incelenecektir. İngilizce öğreniminde karşılaşılan temel zorluklardan biri, öğrencilerin yazılı ifade becerilerini geliştirmektir. K12 eğitim düzeyinde, İngilizce yazma becerilerinin desteklenmesi, özellikle temel dil becerileri henüz gelişmekte olan 5. ve 6. sınıf öğrencileri için kritik öneme sahiptir. Araştırmamız, A1-A2 seviyesinde İngilizce bilgisine sahip öğrencilerle yürütülecek olup, hibrit yapıda tasarlanan İngilizce dersinde bir öğretim dönemi süresince kullanılacak yapay zeka destekli öğrenme araçlarının etkililiğini değerlendirmeyi amaçlamaktadır. Araştırma süreci, öğrencilere öğretim döneminin başında uygulanacak ön test ile başlayacaktır. Bu test, öğrencilerin dil bilgisi ve yazma becerilerindeki başlangıç düzeylerini belirlemek üzere tasarlanacaktır. Dersler, hibrit öğrenme modeli çerçevesinde, yapay zeka destekli interaktif yazma etkinlikleri ile zenginleştirilecektir. Bu etkinlikler, öğrencilerin dil kullanımını aktif bir şekilde geliştirmelerini ve pekiştirmelerini hedeflemektedir.

Araştırma sonunda, öğrencilerin yapay zeka uygulamasından aldıkları geri bildirimlerin kalitesi, motivasyonlarındaki değişim, dil becerilerindeki ilerleme ve yazma etkinliklerine olan katılımları değerlendirilecektir. Sonuçlar, yapay zekanın K12 eğitiminde İngilizce yazma becerilerinin desteklenmesinde nasıl bir rol oynayabileceğini ve bu teknolojilerin öğretim pratiklerine entegrasyonunun potansiyel faydalarını ortaya koyacaktır. Böylece araştırmanın, açık uzaktan eğitim alanında çalışan tasarımcılara ve yöneticilere yapay zeka destekli öğretim araçlarının etkili kullanımına dair kapsamlı bir bakış açısı sunması ve yapay zeka uygulamalarının daha bilinçli ve etkili kullanımı için öneriler oluşturması bakımından alanyazına katkı sağlayacağı düşünülmektedir.

Anahtar Kelimeler: Açık ve Uzaktan Eğitim, Yapay Zeka, Dil Öğretimi, K12

Introduction

Artificial Intelligence is improving every day. Artificial Intelligence eases the people's daily life. Generative Artificial Intelligence is a subset of AI. The term generative artificial intelligence is defined as "models trained on large amounts of text data that can be generate human-like texts, answer questions, and translate or complete other language-related tasks with high accuracy." (Kasneci et al., 2023, p1). In November 2022, releasing of ChatGPT to the public has a great impact on people's life. It has been increasingly integrated into various sectors. Those developments have an impact on education as well. We can see that learning environment is affected by the developments in AI. The incorporation of AI in education aims to personalize the learner's experiences.

There are some fundamental challenges while learning a language. Most of the students have some difficulties while learning English. Besides, some of the students cannot improve their skills on their own. They need a mentor to improve their skills. Especially, most of the students have difficulties to improve their writing skills on their own. The students may find boring to write something in a foreign language. That is the reason why they do not want to work on their writing skills. These difficulties can vary according to students' attitudes, age, language background, and learning environment. The students may have limited vocabulary and grammar knowledge. They generally have spelling mistakes on their writings. Also, their writings sometimes cannot be coherent and cohesive. The other problems that students face with are lack of motivation, lack of confidence, and the limited feedback given by their teachers. The teachers have limited time to give detailed feedback to their students. They have other things to do at the school. Due to the importance of writing skills, helping students is very crucial.

The integration of generative AI in writing classes can have significantly affect students' writing abilities. Combining generative AI with K-12 classrooms can be beneficial. The tools like ChatGPT can generate human-like texts, fix the grammar and spelling mistakes, and give students personalized feedback. They can give grateful prompts to the students as well. The tools can know the student better and leads the students according to their needs. Of course, generative AI only is not enough. The teacher also should be included the writing lessons leaded by generative AI. Generative AI can be able to enhance students' motivations, interests, and literacy skills. Generative AI can improve their language skills, saves time, and reduces the teachers' heavy work. It can generate effective ideas and give the students' personalized feedback. The most effective benefit of generative AI can be enriching the content of writing skills courses. Studies show that these models ensure a continuous flow in second language (L2) writing and improve the overall quality of students' written work (Zhao, 2022) and offer great potential for creating high-quality texts (Guo et al., 2022). Studies also show that "synchronous corrective feedback has become available thanks to generative AI" (Koltovskaia, 2020; Ranalli, 2018; Ranalli and Yamashita, 2022). Studies also shows that the generative artificial intelligence may have time to learn students' reality and finds ways to provide appropriate guidance (Carvalho et al., 2022; Hellmich&Vinall, 2021, Otsuki, 2020). By providing personalized support and leaving traditional methods will have great improvement on students. Additionally, workload of the teacher can be reduced by assessment that is done by generative AI (Holmes, et al., 2019). Generative AI promotes students' motivation. According to the studies, when generative AI is used in the classrooms, the students feel more motivated in the classrooms (Hwang, et al,. 2020). Thus, the teachers can use AI in their classrooms to make the lesson more enjoyable, to improve their skills, and to increase the students' motivations in the class. Generative AI stimulates reflection between the students own writing and AI generated writing. (Tseng & Warschauer, 2023). At this point, there are two important factors. These are the teachers' technological and pedagogical abilities and the students' motivation levels (Sogut, S., 2020). In additional to all of these benefits, studies show that the students prefer feedback from a Generative AI tool to traditional teacher feedback (Vaijala, 2018).

In this research, the usability and effectiveness of generative artificial intelligence technologies in developing English writing skills of K-12 students will be examined. The significance of this study lies in the adoption of an innovative and effective approach to education by using AI-supported learning tools to enhance students' English writing skills, increasing student motivation, and enabling teachers to more efficiently monitor student progress and provide feedback. The use of AI-supported learning tools may be more effective in improving the English writing skills of K12 students compared to traditional methods. AI-supported activities will enable students to write more fluently and accurately by improving language use, structure, and content in their English texts. Furthermore, the use of these AI-supported learning tools will help enhance students' self-efficacy perception, thereby improving their English writing skills and increasing their motivation.

The research aims to evaluate the effectiveness of AI-supported learning tools over a semester with students who have A1-A2 level English proficiency. The goal is to investigate whether generative AI makes a difference in students'

motivation levels, self-efficacy perceptions, and awareness levels. Additionally, the research aims to assess the impact of generative AI on the language use, structure, and content of students' written products. There are four research questions of this study. These are;

1. What is the impact of AI-supported activities on improving students' English writing skills?
2. How do AI applications enhance students' written expression skills, and how is this improvement measured?
3. How does AI improve or affect the grammatical accuracy and expressive abilities of students' written expressions?
4. How do students' awareness levels and motivation towards AI applications affect their English writing skills, and can this effect be measured?

Methodology

In this research, quantitative and qualitative research methods will be used to examine the impacts of Generative AI on K-12 students. The study will adopt experimental research design that includes pre-test, post-test model, interviews with the students, and writing activities enriched by Generative AI. The lessons will be enriched with AI-supported interactive writing activities within the framework of a hybrid model. 60 students will be chosen randomly. The students will be 5th and 6th graders. The students have A1 and A2 English level according to the CEFR. The students will be divided as control group and experimental group. By using interviews, quantitative and qualitative techniques, the differences and changes between the control and the experimental groups will be understood more meaningfully.

Data collection process will include surveys and interviews, AI-supported writing activities, and post tests. A pre-test survey will be conducted to measure awareness levels, followed by interviews with students. Firstly, the interviews will be used to explore students' experiences and expectations regarding AI-supported writing activities in more detail. Secondly, students in the experimental group will participate in AI-supported writing activities through distance education on weekly basis, in addition to face-to-face lessons conducted throughout the semester. Finally, at the end of the semester, all students will take a post-test survey, followed by interviews. The interviews will be used to assess students' attitudes and experiences towards AI-supported writing activities.

After the process is done, the quality of the feedback which students receive from the AI application, changes in their motivation level, progress in language skills, and their participation in writing activities will be evaluated.

This research will reveal the role of Generative AI in supporting English writing skills in K-12 education and the potential benefits of integrating these technologies into teaching practices. The research is expected to provide a comprehensive perspective on the effective use of AI-supported teaching tools and to develop recommendations for more informed and effective use.

Suggestions

Considering research findings, the aim of this study is to provide recommendations to students, teachers, and designers for the more conscious and effective use of AI-assisted writing tools. This will enhance English writing skills in K-12 education and strengthen the role of AI in educational technologies.

Students can develop their writing skills by regularly using AI-assisted writing tools. These tools offer immediate feedback, allowing errors to be quickly corrected and enhancing students' writing proficiency. Carefully examining the feedback from AI will provide students with valuable insights into grammar, vocabulary usage, and sentence structures. Practicing writing with this feedback in mind will lead to significant long-term improvements. AI applications will enable students to evaluate their own writing more objectively, helping them better analyze their strengths and weaknesses and target their writing skill development more effectively.

Teachers can help students improve their writing skills by integrating AI-assisted writing tools into their lesson plans. These tools will reduce the individual feedback burden on teachers, making the teaching process more efficient. Teachers should regularly monitor the quality of feedback provided by AI applications and, when necessary, supplement this feedback with additional explanations. This ensures that students receive more comprehensive and understandable feedback, allowing them to act more consciously in their writing processes. Additionally, teachers should conduct brief training sessions to help students use AI-assisted tools effectively. These training sessions will enable students to use the technology more efficiently and enhance their writing skills.

Designers of AI-assisted writing tools should continuously improve the functionality and user experience of the software by considering user feedback. Making adjustments to meet the needs of students and teachers will ensure more effective use of the software. Designers should provide comprehensive educational materials for the effective use of AI-assisted writing tools. These materials will help users better understand the technology and learn how to use it in their writing processes. AI applications should be designed to support linguistic and cultural diversity. Flexible and adaptive systems should be developed to meet the needs of students from different language levels and cultural backgrounds.

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Review of Microlearning Practices in Online Learning

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Abstract

It's known that mobile smartphones are now a part of our lives. As practice increases, user behavior has changed in all fields with the impact of information and communication technology improved especially. GSM operators, smartphones, and web-based applications coordinate and support each other because of the increasing access to an internet connection (Çankırlı, 2022). In this context, it can be considered that socioeconomic, and cultural information data in production, trade, and education, which somehow harmonized. In Particular, whereas distance education developed as a technological post-pandemic, online learning has been impacted much more. That's why, people usually started to use web-based online learning apps. They are currently still carrying on use and love being interactive. As is this interactivity case can be simulated to peer-learning. Looking at some research, It has been found that users prefer to learn in a short time reaches info. It is known that they often follow and look at each other's posts to learn something on social media applications like Instagram, TikTok, YouTube, etc.

Thus, It can be discussed to present an alternative way of online learning and to have microlearning technology with gamification using harmonized interactive systems to deliver on the learning process. In this paper, microlearning has been defined and is open to evaluation for relevance as an educational approach. Microlearning is an alternative educational approach that delivers, small, pieces of content to learners, typically through digital platforms like mobile apps, websites, or learning management systems. This approach provides learners with concise, focused information that can be easily learned in a short time and self-paced, usually ranging from a few minutes to around 15-20 minutes. The purpose of this paper is to point to the importance of microlearning and its apps. In microlearning, It has been researched how to create a course design, content, and gamification implements with AI support or single. Within the findings discussed will be given a result and suggestion. As a method, this paper focuses on the use of microlearning apps in the scope of online learning. The study, related to documents and applications in literature and open resources within, had been trying to look at the samples of microlearning LMS. In the context of open and distance education, It has been tried to find microlearning applications. The findings of the study will be discussed under the titles of microlearning, and its technology used in web-based. In addition, the originality of the study had tried to pay attention. Technological tools used in microlearning are briefly explained and suggestions are made regarding the scope of microlearning in online learning.

Keywords: Distance Education, Online Learning, Microlearning.

Introduction

It's known, that online apps can easily be used in every environment Hence online infrastructures with web-based positively affected users in the learning processes in the last days and provided their improvement, learning new things. Learners in the learning process are trying to find short courses cause of their limited time. Especially, they search for web-based learning ways and usually use social media channels or learning-based practices like videos, webinars, text, ready courses, and games embedded in websites. It does not matter, whether in education or professional life. All requirements are similar. That is short-time learning on the internet people providing connectivity to each other. In this context software, and for short-time learning LMSs' were developed and these systems continuously try to improve themselves. In this development, new apps are presented for users in the scope of short courses and needs. A learning method that meets these needs is "Microlearning is the delivery of learning content in a short, succinct way. Condensing large quantities of information into bite-sized training drives better engagement and knowledge retention for learners, and saves valuable time and money for employers (Brew, M. 2023)."

Online learners or users who want online courses are searching for shorter and more enjoyable practices. That's why, they wouldn't like to spend time for a long time while learning as self-paced. Hence it is preferred to practice micro courses or micro programs. When It comes to education fields, especially universities use LMS much more, and there are a lot of online course programs in LMS. However, students expect more interaction and gamification in courses, and postcourse studies in a short time. Hence, as a solution, micro course design and applications are looking for which micro-courses are included in the scope of microlearning. In this study, microlearning having micro-courses is reviewed within online learning.

The problem is in regular long-term lessons, learners get bored during learning, and forget some information after the online courses. This situation can negatively affect the learning processes and motivations. "Microlearning theory is the whole concept of microlearning based on the Hermann Ebbinghaus forgetting curve. In the mid-1880s, Hermann Ebbinghaus became the first person to create a scientific approach to study and classify memory and introduce the world to concepts like the learning curve and forgetting curve. During his studies, he tested subjects on their memory of sets of inconsequential, erroneous sounds and syllables. Throughout these trials, he began assessing the capabilities and function of memory in his subjects. Ebbinghaus noted that memory does not stay consistent throughout trials. Memory can increase, decrease, and back again many times. Of course, this also depends on not only the subject matter being learned but also the methods in which it is learned. These methods and studies also correspond to his studies on forgetting, and ultimately his "forgetting curve." This also led to the discovery of memory 'savings.' Memory saving refers to knowledge once held at the top of the mind, incomplete (or at least relatively complete) accuracy, and the retention of the information thereafter. He found that strictly memorized information can be recalled much more easily after learning it again, even after a significant time without using it (Andreev, I, 2024)." People often lose 80% of the information they learn within a month. Microlearning strives to avoid forgetting by breaking down information into smaller chunks and allowing students to review instruction over time, improving retention of key points and allowing them to incorporate it into their daily workflow (Brew, M. 2024). In this context, learners and teachers are looking for fun and repetitive courses for effective learning. Hence It's known, that online apps can easily be used in every environment. Online infrastructures with web-based positively affect users in the learning processes in the last days and provide their improvement, learning new things. Learners in the learning process are trying to find short courses cause of their limited time. Especially, learners search for web-based learning ways and usually use social media channels or learning-based practices like videos, webinars, text, ready courses, and games embedded in websites. It does not matter, whether in education or professional life.

Hence the study's objective is to present microlearning practices within education technology and to point to the importance of microlearning apps. to show how to create a micro course design, content, and gamification implemented with AI support or compose different bite-sized micro course apps. In research, the questions used are What is microlearning? What are the benefits of microlearning? What are the challenges of microlearning? What examples can be used in microlearning? What are the best practices of microlearning? In this context, the importance of Research is that Microlearning helps students achieve learning goals. Provides specific and targeted information. It is suitable for learning in a short time and is accessible from all mobile devices. It can be created in various formats and can be used at different stages of the learning process Modules can be independent In this context, It can be combined and/or synchronized with the whole online learning stage. Also, it can support mobile learning. Hypothesized that learners can implement their lessons better with microlearning and are open to improving themselves, they will be able to meet their learning needs and be more intensively involved in micro lessons with the learning materials and technological opportunities provided for microlearning. The limitation of the research is only microlearning in the context of online learning. These are microlearning applications made by companies and educational institutions that apply educational technology, especially for microlearning on the web. In Summary, the full paper covers an Abstract, Introduction, Methodology, Results, Conclusions, and References. As a result, suggestions have been made within microlearning.

Methodology

The study was only made in online documents, which are discussed and concluded according to the findings. Research Model is a document review/data analysis method in qualitative research. Microlearning studies within the literature have been researched and tried to find practices on microlearning techs in the last 5 years.

Results

Microlearning practices have been searched within the following titles, and the findings are interpreted. Microlearning **is** An educational approach that delivers small, and bite-sized pieces of content to learners, typically through digital platforms like mobile apps, websites, or learning management systems. The idea is to provide learners with concise, focused information that can be easily consumed in a short time, usually ranging from a few minutes to around 15-20 minutes. Microlearning is a strategy of delivering short, stand-alone instruction with one or two knowledge or skill-based objectives as part of or within formal, non-formal, and informal learning environments through any modality (Marcelle, P, & Brahim, A, 2023). Microlearning is regarded as a novel approach to meeting many learning demands, including individual learning, lifelong learning, and work-based learning. A learning strategy called microlearning focuses on giving students enormous amounts of (macro) material in manageable chunks over a short period (Mercan, G, et al, 2023).

It's also an educational approach that delivers small, and bite-sized pieces of content to learners, typically through digital platforms like mobile apps, websites, or learning management systems. As mentioned before the idea is to provide learners with concise, focused information that can be easily consumed in a short time, usually ranging from a few minutes to around 15-20 minutes. It is known that people's attention span is only 8 seconds. Instruction strategies in microlearning need to fit the needs of the target audience, and this can be achieved in a practically shorter time. In this context, today's dominant generations, Generation Y and Z, have short attention levels and want easy access to information. They often access information on their mobile phones and in their spare time. Therefore, microlearning can fill this gap. Microlearning provides a new teaching way and allows information to be reached into small pieces and delivered to students. In online learning, course content can be made easier and more enjoyable through gamification. It presents a flexible course, design, and content for instructors and learners to realize in a short time. The key characteristics of microlearning include; Brevity: Microlearning content is short and focused, covering a single learning objective or concept in each module. This allows learners to quickly grasp the information without feeling overwhelmed. Accessibility: Microlearning materials are often available on-demand, allowing learners to access them whenever and wherever they need. This flexibility makes it convenient for busy learners to fit learning into their schedules. Engagement: Microlearning often utilizes multimedia elements such as videos, interactive quizzes, infographics, or short articles to keep learners engaged. These varied formats cater to different learning styles and help maintain interest. Reinforcement: Microlearning can be used for reinforcement and spaced repetition, where learners revisit key concepts at spaced intervals to enhance retention and long-term learning. Adaptability: Microlearning content can be easily updated and adapted to suit different learning needs and preferences. This flexibility makes it ideal for addressing specific training objectives or catering to diverse audiences. Microlearning is widely used in corporate training, education, and professional development settings due to its effectiveness in delivering targeted learning experiences and addressing the needs of modern learners who prefer shorter, more flexible learning formats. "It can be used for both formal and informal training, with the aim of improving employee performance. No matter what form of training microlearning is used to facilitate, one fundamental holds true every time. A single microlearning module cannot be used to convey a complete lesson (Omer, H.A., 2017)."

Types of Microlearning Content

Microlearning content can take many different forms. The one non-negotiable, unsurprisingly, is that it must be short and succinct (Brew, M. 2024). Some examples of microlearning formats are mobile-based learning, microlearning videos, infographics, eBooks, interactive PDFs, gamification, and social media channels. These infrastructures contain text such as short paragraphs, messages, or tips images, illustrations, photos, or visual aids, such as short and snappy explainers videos. Similar to what you might see on social media, audio such as podcasts, snippets of speech, or music interactive elements contain quizzes, games, flashcards, and other gamification mechanics.

Looking at all microlearning examples: "Microcopy; Short, targeted, highly contextual messages or hints, to help users learn. Microlearning videos: Short, focused videos that are designed to meet a specific learning outcome. Micro-lectures, Whiteboard animations, and Kinetic text-based animations. Microlearning apps or mobile apps; Apps that give you micro-lessons, on-the-go. Micro-challenges and games; Learning that is scored at the end, which can include an award, benefits, badges, notoriety, or other incentives for taking part or achieving a high score. Infographics (and often iconic, focusing on key points and numerical values) are graphic visual representations of information, data, or knowledge. Social Media; Social media can be used as a micro-blogging exercise, and you can learn nuggets of information from the stream of content you subscribe to. One of the biggest myths about microlearning is that it is easy to create and maintain learning materials. Unfortunately, it isn't true (Andreev, I, 2024)."

The Benefits of Microlearning

The main benefits of microlearning boosts engagement, makes the content searchable, offers accessibility, helps with learner motivation, prevents cognitive overload, improves retention, makes getting feedback easy, is cost-effective, and helps keep tracking the topic. Social, economic, and technological everyday changes trigger new concepts and strategies that support learning. Education needs transformations in an appropriate way in which we live, work, and learn. Recent studies indicate that short content may increase information retention by 20 % (Giurgiu, L. 2017). Microlearning is not a new concept, and mobile-based microlearning is an evolution of the approach that has aligned with the prevalence and technological advances of mobile-based devices such as smartphones and tablets. microlearning has apparent effects on knowledge and skills acquisition, increased learner confidence, and increased utilization of microlearning materials beyond their required use (Moore et.al, 2023). Emerging technologies in the field of artificial intelligence can provide support for the development of the proposed system, considering different educational scenarios for students ((Gherman et. al,2021).

The Challenges and Comparison of Microlearning

Some challenges of microlearning may be taking work and resources to maintain scaling personalized content, accessibility problems, and lack of time to learn. "In recent years there has been an important evolution of higher education, by adapting to new generations of students and labor market needs, but also by adopting emerging technologies. The pandemic revealed the gap between digital technologies and digital education, but at the same time gave a boost to digital education. The challenge is to integrate new technologies into current learning contexts and use them to provide high-quality education for all. Consequently, teachers can no longer rely on traditional ways of study. Generation Z has focused more on quickness than accuracy. In order to increase students' efficiency, a solution is to consider microlearning adoption as they can use it to learn anywhere and anytime and on any device. Various publications estimate that in the future microlearning could play an increasing role in the educational process. Although considerable progress has been made, it is still difficult to effectively use microlearning units in higher education (Gherman et. al,2021)." Compared to traditional courses, a microlearning course is easier to start creating and faster to complete, and packs a big punch.(Andiotris, N. 2018). The comparison of formal learning and microlearning is like the following according to practices.

Table 1. The Comparison between Formal Learning and Microlearning

Comparison	Formal learning	Microlearning
Learning context	formal learning	informal learning
Time spent	several hours	from a few minutes to 15 min.
Content type	learning modules, topics, and combining learning objects	micro-content as small chunks of information
Content creation	content created by subject matter experts, usually with authoring tools	content co-created by learners with Web.2.0 and rapid e-learning tools
Content Retrieval	courses or topics retrievable through a unique URL, however, single learning objects are not addressable	microcontent has a unique URL, which makes small chunks of information retrievable
Structure of the learning cycle	hierarchic, sequential, pre-planned structures consisting of several units or lessons, each combining several learning objects, such as text, images, audio, video	dynamic, flexible structures created by learners in the process of learning through syndication, and aggregation, based on such data as social tags, and bookmarks
Target group	learner aiming to gain insight into topics defined by domain experts	learners aiming at exploring concepts or solving practical problems
Learner's role and participation	learners as consumers of content, attempting to build mental structures similar to those of experts; focuses on learner-content interactions	learners as prosumers of content building their mental structures through exploration and social interaction; focuses on social interaction between learners

The Best Practices of Microlearning

Some instructional design practices for instructors: They should make microlearning mobile-friendly. Should provide seamless access, use videos, utilize gamification, keep it short, encourage continuous learning, and use the ready LMS training platforms. They also can generate micro courses with AI apps. Looking at some micro apps contain short content and gamification enjoyable while learning in the mobile environment. Thus some examples are rapidly developed with AI support and It is thought that will impact learning methods. "To ensure the successful application of microlearning, it's essential to follow best practices. These follow help in maximizing the impact of microlearning and ensuring that it meets the learning objectives effectively. Implementing microlearning effectively often hinges on the use of specialized platforms designed for this purpose. These microlearning platforms offer several key features that enhance the microlearning experience (Brown, J. 2024)." Especially this year, some microlearning platforms (Figure 2) are listed among the following applications; iSprigpage, EdApp, eduMe, Talentcards, and Tovuti LMSs.

Table 2. Some microlearning platforms

	Name	Core Futures	Best For
One	iSprigpage	Effortless and fast course creation, SCORM and xAPI export, Easy course export to LMSs, User-friendly, AI-powered content creation, Sequential learning	Sharing expert knowledge with staff
Two	EdApp	Course creation with AI, Personalized learning, Free course library, Offline mode, Gamification, Peer and social learning, AI translation, PowerPoint conversion, Advanced Analytics	Corporate eLearning
Three.	eduMe	Mobile-focused, Integration with popular apps, Course creation with AI, Personalized learning, Real-time analytics, User management automation, Innovative formats, Gamification,	Customer-facing teams
Four	Talentcards	Mobile-focused, Course creation with AI, Gamification, Multiple languages, Offline mode, Advanced Analytics	Workers in the field
Five	Tovuti LMS	Includes gamified micro-assessments, Advanced analytics, AI-generated content, Personalized	Appropriate for any business or audience

"In short: microlearning modules have proven to be an effective learning format to supplement traditional learning. Rather than long-form synchronous training, microlearning is self-paced, just-in-time learning that can help learners develop new skills, upskill, and decrease the forgetting curve that can happen after traditional training. It fosters continuous learning and emphasizes a learning culture, with an added measurement opportunity for training teams to gauge the need for employee performance support (next thought, 2024)."

Conclusion

After reviewing the types and content, benefits, challenges, and best practices of Microlearning. Micro-courses designed within Microlearning Apps used with mobile devices can be recommended to be combined with desk web-based LMS modules. Microlearning course design and other course design practices according to the findings can be useful. It is thought that the Microlearning course design increases interaction and student motivation with gamification in the mobile environment, prevents cognitive overload, increases retention, makes it easier to receive feedback, and helps to follow the topic. Thus, course modules can be compatible with other learning methods. With informal learning, It can be generated micro courses from a few minutes to 15 min. Micro-content such as small chunks of information can be more understandable in the learning process.

Also, content can be co-created by learners with Web 2.0 and rapid e-learning tools. Learners aiming at exploring concepts or solving practical problems can be prosumers of content building their mental structures through exploration. With Social interaction, dynamic, flexible structures created by learners in the process of learning through sharing, and aggregation, can be based on such data as social tags, and bookmarks focus on social interactions between learners. Microlearning is needed for short-term and sustainable learner experience and motivation. Microlearning applications should be incorporated into the online learning process.

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Reality or perception? Evaluating technology readiness index in the attitudes of young adults towards technology usage

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Abstract

Emerging technologies facilitate our access to services in innovative and easy ways, and their constant evolution has a profound influence on our lifestyle. Numerous large companies are prioritising the use of new technologies to enhance productivity and efficiency in our everyday lives. Even so, it is normal for customers to exhibit varying degrees of readiness and resistance towards these emerging technologies. While the implementation of these technologies does not guarantee their utilisation and faces several obstacles, it is crucial to comprehend and assess the preparedness of young individuals to embrace self-service technology. The main objective of this research is to analyse the relationship between the dimensions of readiness and the adoption of new technologies from young adults. It is commonly believed that young people have a greater propensity for utilising technology than other age groups because this stage of life is frequently characterised by significant changes and development, including the completion of education, entry into the workforce, formation of personal relationships, and attainment of independence. Is it a perception or a reality in this context?

The utilised questionnaire includes various sections that cover demographic data, sections dedicated to technology readiness dimensions (optimism, innovativeness, discomfort, and insecurity), and items designed to evaluate their impact on attitudes towards the utilisation and adoption of self-service technologies. The survey is carried out primarily in Vlora, where one of the major public universities in the southern region of Albania is located. In accordance with the study's objective, the questionnaire was designed in both paper and online formats to effectively target a wide demographic of tech-savvy youth. The primary aim of this study is to examine the correlation between preparedness characteristics and the acceptance of new technologies among young adults (18–25) in the Vlora region. The survey comprises several sections, including demographic questions and statements regarding the influence of technology readiness variables (such as optimism, innovativeness, discomfort, and insecurity) on attitudes towards technology adoption and usage. Analyses were performed using descriptive statistics and multiple regression analysis. This study presents a variety of findings and recommendations on the correlation between technological readiness and its significant impact on young people's attitudes towards the adoption of new technology. The specific target group analysis is the major limitation of this study.

Keywords: innovation acceptance, technology readiness, self-service technology, youth

Introduction

Globalisation is one of the most significant environmental changes we are currently confronted with, and it has impacted all countries and almost everyone. This development seriously affects the economic environment of the country and many other factors, such as technological and social ones. Beyond globalisation, internationalisation of markets, and economic dependence between countries, another significant factor that has impacted the functioning of individuals, businesses, and public institutions is the global pandemic. All these factors have accelerated the process of digital transformation, making data an important strategic asset (Curran, 2017; Hess et al., 2020). The development of industries, technologies, and innovation has significantly transformed our daily activities and the way in which we interact with companies providing goods and services. Based on technology, new products and services were created, as well as other services that have been improved in terms of convenience, efficiency, and flexibility, trying to standardise services through the facilitation that technology brings.

Regardless of this evident fact, people's attitudes, levels of acceptance, and resistance to these new technologies are different (Lin & Hsieh, 2006; Mitzner et al., 2010; Durodolu, 2016). It is a fact that the range of services offered through self-service technologies has increased, but this does not automatically increase their use. The attitudes that people have towards change, the level of information they have, and the tendency to use innovations based on technology are different (Mani & Chouk, 2018). At the same time, companies also try to adapt to market segments by understanding their behaviour and their willingness to use technology. Numerous global companies are prioritising the use of new technologies to enhance productivity and efficiency in our everyday lives (Oktadini et al., 2022). Although the adoption of these technologies does not ensure their usage and encounters many challenges, it is essential to understand and evaluate individuals' readiness to accept new technologies. The primary aim of this study is to evaluate the relationship between the characteristics of technology readiness and the level

of acceptance among young individuals in the Vlora region. The paper's other goal is to measure the actual use of technology readiness among young adults using the multicriteria decision-making method. The focus of this objective is to understand the situation of technologies' actual use among the young individuals impacted by technology readiness variables such as optimism, innovation, difficulty, and uncertainty. The target group was selected due to the fact that this life period is frequently marked by notable transformations and growth, such as completing education, joining the job market, forming personal relationships, and gaining independence.

According to Parasuraman (2000), the questionnaire includes items of technological readiness such as optimism, innovativeness, discomfort, and insecurity, as well as items for evaluating their impact on attitudes towards the use and adoption of technology. The survey is conducted in Vlora, where it operates one of the largest public universities in the south of Albania. The data are analysed using descriptive statistics as well as empirical methods to evaluate the impact of each technology readiness dimension. This study presents a variety of findings and recommendations on the correlation between technological readiness and its significant impact on young people's attitudes toward the adoption of new technology.

Literature review

Numerous new information technologies have emerged in recent times. Due to its significance in the exchange between businesses and customers, as well as in the sale of goods and services, technology now plays a significant role in both of these areas. However, we cannot ignore consumers' uncertainty about safety and their degree of technical readiness. The concept of "technological readiness" defines the tendency of individuals to adopt and utilise new technology in order to accomplish personal and professional objectives (Rahardja et al., 2023). People can easily feel the impact of the rapidly evolving technological world in a variety of ways. Companies are using more and more technology to service clients and sell products. Technology enables basic customer service operations, transactions, and the process of learning and accessing information. In other words, technology has changed the face of customer service forever. We have transitioned from providing in-person assistance to telephone-based assistance, then incorporating interactive voice response systems, followed by implementing Internet-based customer support, and currently adopting wireless technology. In this interaction, technology can significantly improve employees' effectiveness and efficiency when delivering services. With immediate access to information, employees may enhance their ability to serve clients. Such information enables them to tailor services according to the customer's requirements. The development of technology has brought about significant changes in service delivery, resulting in improved efficiency and better experiences for both customers and employees.

Technology empowers customers and employees to enhance their efficiency in receiving and delivering service. With the help of self-service technologies, customers can now serve themselves more efficiently (Bitner, 2001). Consumer perceptions have an effect on technology use. They tend to use technology depending on their performance. In addition to increasing the use of technology, high perceived convenience will make consumers feel the benefits of the technology, so that their perceived benefits will increase. Consumers can benefit from the technology in terms of effectiveness, productivity, performance, and overall advantages. Consumer trust includes the perception of convenience and benefits; consumer attitudes towards technology will be the basis of interest in using technology. Technology ready is a mindset, an attitude or a perspective, rather than an indicator of skill or knowledge (Penz et al., 2017). So, the technology readiness index refers to people's propensity to use technology products or services as well as their propensity to interact with technology. (Parasuraman, 2000). The authors categorised the construct of technological readiness into four variables: optimism, innovation, difficulty, and uncertainty (Parasuraman, 2000; Parasuraman and Colby, 2014). The first two relate to factors that prompt action, while the other two relate to factors that hinder it. Optimism is the general perception that innovation and technological advances bring about positive advantages. On the other hand, innovation is linked to the natural tendency to experiment, learn, and discuss technology. Nevertheless, discomfort includes the emotional and psychological barriers people experience towards technology, such as: feeling overwhelmed by technological complexity, concerns or fretting whether there can be system breakdown and any negative results thereafter. According to Lin et al. (2007), uncertainty is characterised by a lack of trust or doubt in technology or the ability to utilise it effectively. The dimensions, particularly the positive and negative dimensions, are relatively independent of one another. In essence, the individual's technology readiness is determined by the balance between the positive and negative beliefs.
The initial research on developing an index to measure technological readiness began in the late 1990s, which involved conducting several pilot studies in consumer and B2B settings. In 2000, Parasuraman published the first index on the measurement of technological readiness which describes people's willingness to use new technology achieving individual and work goals. In addition, Lin et al. (2011) examined technological readiness extended the study focusing on technology acceptability and readiness impacted by perceived usefulness and ease of use.

The first technology readiness index construct comprised of 36 questions, which were categorised into the four dimensions mentioned earlier. This index has been updated to TRI 2.0 to measure the adoption of emerging cutting-

edge technologies (Parasuraman and Colby, 2014). The index offers a comprehensive assessment of technology readiness, including measurements for each of the four dimensions of technology trust, as well as a segmentation classification. The technology readiness index has undergone extensive testing to ensure its reliability and validity. In other words, it offers a reliable gauge for anticipating behaviour in relation to innovative products and services, work-related tasks, and online platforms. It has been seen as a way of providing a more realistic view of behavior. The Technology Readiness Index (TRI) is a valuable tool for assessing the readiness of individuals and organizations to adopt new technologies. The four antecedents of technology readiness index divided in motivators (innovativeness, optimism) and inhibitors (discomfort, insecurity) have been successfully applied in various contexts, including different industries (Kuo, 2013; Pradhan et al., 2018; Caputo et al., 2019; Blut, 2019), different target groups, (Rojas-Mendez et al., 2017; Rosalina, 2020; Sell and Walden, 2021), and different countries (Wiese & Humbani, 2020; Ramírez-Correa et al., 2020; Ekşioğlu & Ural, 2022).

Methodology

This section outlines the methodology used in this study, discusses the validity and reliability tests conducted, and explains the data analysis techniques used. This study evaluates the technology readiness of the young ages from 18-25 years old, using a structured questionnaire based on the variables of Parasuraman, 2000 related to optimism, innovation, difficulty and insecurity. The samples were chosen using a non-probability sampling method based on the criterion that these individuals have to be from 18 to 25 years old. The total sample includes 253 students of bachelor and master programs, and the data was carried out between December 2023 and February 2024. The survey was organized in Vlora, where one of the major public universities in the southern region of Albania is located. The questionnaire was designed in both paper and online formats to effectively target a wide demographic of tech-savvy youth. The primary aim of this study is to examine the correlation between technology readiness characteristics and the acceptance of new technologies among young adults (18–25) in the Vlora region, as well as understand the mediating role of usefulness and ease of use on the young ages intentions to use new technologies. The survey comprises several sections, including demographic questions and statements regarding the influence of technology readiness variables (such as optimism, innovativeness, discomfort, and insecurity) on attitudes towards technology adoption and usage. Analyses were performed using SEM (Structural Equation Modelling) equations. Based on the multi-criteria evaluation method, the real usage of the new technology is evaluated based on the young individuals' perceptions in order to compare with the results of the tested hypotheses.

The hypotheses and the conceptual model are given below:

H_1 The technology use intention of young ages is directly impacted from technology readiness antecedents.

H_2 The relationship between technological readiness and young ages' intentions to use new technology is positively mediated by perceived usefulness and ease of use.

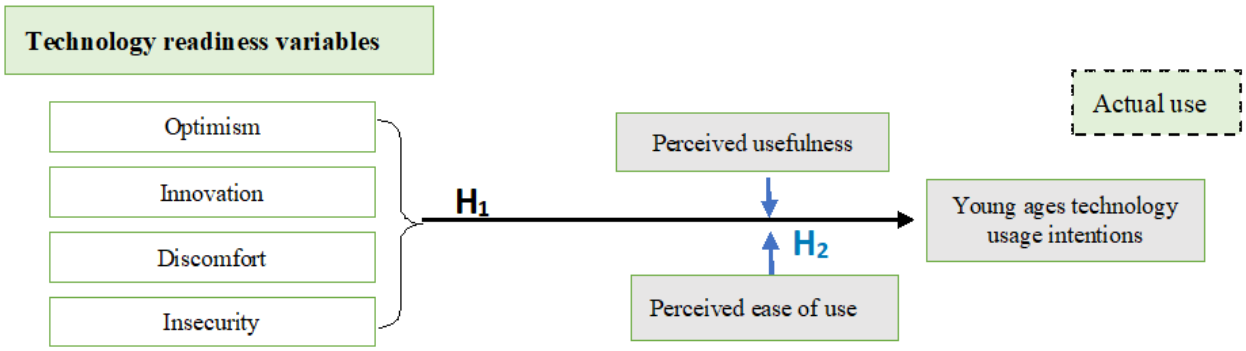


Figure 1. Conceptual model of the research. Source: authors' research.

Before analyzing the data, it was measured the reliability and the validity of the questionnaire. Table 1 shows the results of measuring the reliability and validity for variable constructs. All items' Cronbach's alpha values exceeded the minimum requirement of 0.7, indicating that the scales possessed a high value of internal consistency. It eliminated certain items that did not carry adequate weight in relation to their primary factor to maintain an acceptable level of eligibility for the questionnaire. After removing these components, the model underwent a re-estimation. The composite reliability of the different items ranges above the recommended starting value of 0.70. In addition, the average variance extracted (AVE) for every component is above 0.50. The scales used to measure the impact of optimism (Cronbach's alpha = 0.890), innovation (Cronbach's alpha = 0.764), discomfort (Cronbach's alpha = 0.769), insecurity (Cronbach's alpha = 0.884), were reliable. The data indicates that the

internal composite reliability (CR) of the measures is robust. The range of composite reliability values for the various items exceeds the suggested initial value of 0.70, spanning from 0.8 to 1.0. Additionally, each component has an average variance extracted (AVE) that exceeds 0.50. Optimism component showed AVE of 0,672, innovativeness component showed AVE of 0,554, discomfort AVE 0.836 and insecurity AVE 0.576. According to Hair et al. (2011), rates greater than 0.5 are considered ideal modelling.

Table 1. Reliability and validity test results.

Variable constructs	Cronbach alpha	CR	KMO	Average variance extracted (AVE)
Optimism	0.890	0.890	0.832	0.672
Innovativeness	0.764	0.851	0.735	0.554
Discomfort	0.769	0.917	0.851	0.836
Insecurity	0.884	0.905	0.852	0.576

Results and discussion

The results of the study are organized based on three main variables: the technology readiness components, the mediating variables of perceived usefulness and perceived ease of use and the young ages technology usage. In order to define the relationship between the technology readiness components and intention to use new technologies, the multiple regression analysis was performed to analyse the impact of motivators and inhibitors components of technology readiness. Table 2 describes the overall relationships between dependent and independent variables. The values of R and R square are respectively 0.485 and 0.235, the value of F= 19.098 and the significance of 0.000. According to the model, 23.5% of the variance of the dependent variables is explained from the used independent variables.

Table 2. Reliability and validity test results.

Model	R	R Square	Std. Error of the Estimate	F	Sig.
	.485[a]	.235	.478	19.098	.000[b]

[a] Predictors: (Constant), Optimism, Innovativeness, Discomfort, Insecurity
[b] Dependent Variable: New technologies usage

Table 3 provides an overview of the regression analysis results. This shows the interaction of technology readiness parameters (as variables) and dependent variable measured by the new technology's usage. Regression analysis reveals that all the coefficients have an acceptable p-value ($p< 0.05$), specifically: optimism ($\beta=0.274$, $t=3.876$), innovativeness ($\beta=0.180$, $t=2.604$), discomfort ($\beta=-0.294$, $t=-3.564$), and insecurity ($\beta=-0.312$, $t=-3.718$). The coefficients indicate the positive relationship between optimism and innovativeness parameters with the new technologies' usage. On the other side, there is a confirmation of the negative relationship that exist between discomfort and insecurity with the new technology usage.

Table 3. Coefficients[a]

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	2.141	.258		8.303	.000
Optimism	.208	.054	.274	3.876	.000
Innovativeness	.172	.066	.180	2.604	.010
Discomfort	-.200	.056	-.294	-3.564	.000
Insecurity	-.186	.050	-.312	-3.718	.000

[a] Dependent Variable: New technologies usage

Before testing the effect of the mediating role of perceived usefulness and ease of use on young adult technology usage, it is necessary to fulfil the four requirements specified by Baron and Kenny (1986). The authors assert that a mediating effect is present when the following four requirements are satisfied:

First, prior to considering the mediator variable, it is important that there be a significant relationship between the independent variables and the dependent variable. We have already checked the significant relationship between the independent variables and the dependent variable, as tested by the first hypothesis. Secondly, there should be a significant relationship between the independent variables (technology readiness components) and the mediator variable (perceived usefulness and perceived ease of use). The regression model summary shows the value R and R2 are 0.481 and 0.231, respectively, the value of F = 71.134 [F (1, 252), and the significance is 0.000< 0.05. The direct path results reveal a statistically significant relationship between the variables (βU = 0.469*** and βE = 0.358***).

The third condition focuses on the significance of the relationship between the mediator variable and the dependent variable. We tested the direct path between the mediating variables (perceived usefulness and perceived ease of use) and found a significantly positive relationship between the variables. After confirming the significance of the direct and indirect effects, testing the strength of the mediating construct is the last requirement. Finally, we tested the model and found that the significant relationships between the independent variables and the dependent variable, which were previously observed, have changed. The values of direct, indirect, and total effects are given in Table 4.

Table 4. Structural model results (direct, indirect and total effects)

Effect of	On	Direct Effects[a]	T	Indirect Effects[b]	t	Total Effects	Result
Optimism	New technology usage	0.247**	3.960	0.2846**	5.957	0.533***	Supported
Optimism	Perceived usefulness	0.326***	4.519				
Optimism	Perceived ease of use	0.368***	5.296				
Innovativeness	New technology usage	0.194***	3.223	0.145**	2.544	0.505**	Supported
Innovativeness	Perceived usefulness	0.157**	2.227				
Innovativeness	Perceived ease of use	0.198***	2.906				
Discomfort	New technology usage	-0.040†	-0.716	-0.0502†	-	-0.0902†	Not supported
Discomfort	Perceived usefulness	-0.046†	-0.546				
Discomfort	Perceived ease of use	-0.080†	-0.992				
Insecurity	New technology usage	-0.120**	-2.164	-0.0503†	-	-0.1703†	Not supported
Insecurity	Perceived usefulness	-0.073†	-0.850				
Insecurity	Perceived ease of use	-0.045†	-0.556				
Perc. usefulness	New technology usage	0.469***	8.434				Supported
Perc. ease of use	New technology usage	0.358***	6.091				Supported

** p < .05, *** p < .001, †p > .05
[a] Without mediator variable and [b] with mediator variable

After controlling the paths between technology readiness components and perceived usefulness and perceived ease of use, the first model's previously significant relationships between technology readiness components and usage of new technologies changed. For the first two components, optimism and innovativeness the direct effect of these variables was absorbed by the indirect influence, which has been found to be significant. The strength of the mediation was calculated using Variance Accounted For (VAF). The values of VAF for the optimism component is calculated from the ratio of indirect effect and total effect, specifically 0.2846/0.533=53.4%. For the innovativeness component the VAF value resulted 28.7% (indirect effect/total effect=0.145/0.505). It can be concluded that the mediation effect exists since the VAF values belong to the interval of 20% to 80% and signifies the presence of partial mediation (Hair et al., 2011). On the other hand, it has no mediating effect on technology usage considering the effect of discomfort and insecurity. As to conclude, the adoption and usage of new technologies at young adults is enhanced and facilitated when they perceive a high level of usefulness and ease of use.

Measuring the actual level of technology usage through Multi-Criteria Evaluation (MCE)

Beyond testing the raised hypotheses, another object of the research study is to measure the actual use of technology from young ages related to their actual perceptions of optimism, innovativeness, discomfort and insecurity dimensions. For this reason, it was used the multicriteria evaluation method. The methodology of multi-criteria evaluation (MCE) combines information from various criteria to create a single evaluation index based on

the analysis of factors that influence a dependent variable (Keeney & Raiffa, 1976). To implement this method, it is necessary to find the specific values and weights of each variable included in the study. Figure 2 shows the graphic conception of the MCE method.

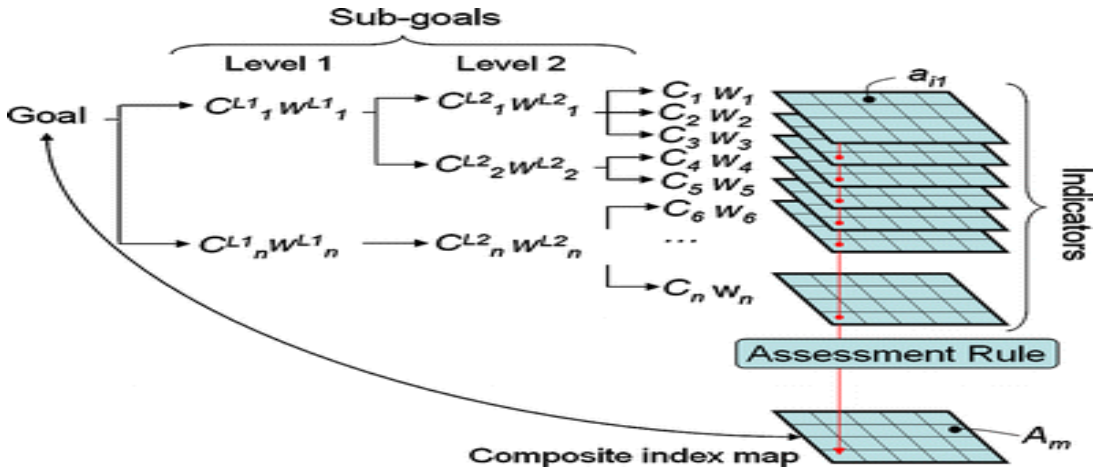


Figure 2. The conceptual model of technology readiness index evaluation according to MCE

The mathematical expression that describes this method is:

$$\textit{Evaluation of actual technology usage (TR)} = \sum_{i=1}^{n} [W_i x V(P_i)] \qquad (1)$$

Where TR = is the evaluation of actual technology readiness or technology usage
W_i = the specific weight of each component (i= 1, 2, 3, 4)
V(Pi) = the value of each component Pi (optimism, innovation, discomfort, insecurity)

Each of the components (optimism, innovation, discomfort, insecurity) is composed of several units; so, another necessary step is to find the value of each component V(Pi). The component`s value calculation is realised by the formula presented below:

$$V(P_i) = \sum_{i,j=1}^{N} [W_{ij} x V(P_{ij})] \qquad (2)$$

Where $V(P_i)$ = the value of each component Pi, i=(1,2,3,4)
W_{ij} = the specific weight of each item j of the component i, j=(1,2,3.....10)
V(Pij) is the value (sum) of each item j of the main component i, (i=1,2,3,4, j=1,2,3.....10)

To compute formulae (1) and (2), it is essential to determine the values for each item Pij and the corresponding weight provided to each of them. Specifically, the total of each item, Pij, was computed based on the SPSS result table. The aggregate value is obtained by adding together the estimates provided by the respondents for each item under each main component. The formula (3) calculates each of the specific weight.

$$\textit{The specific weight of each item j of the component i } P_{ij} = \frac{\textit{The sum Pij}}{\textit{Total value of the component } P_i} \qquad (3)$$

[e.g W_{11}=671/6781=0.099, W12=696/6781=0.103, W23=514/4301=0.120]

Based on the formula (3), we calculated the values of each component, respectively $V(P_1)$ =687.02, $V(P_2)$ = 620.70, $V(P_3)$ =585.24, $V(P_4)$ =666.13

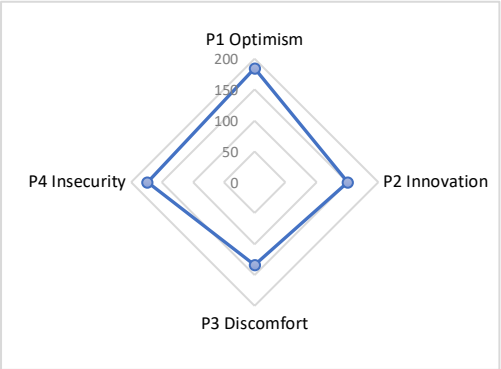
Table 5. Second level index calculation (items calculations)

Components	Items	(1) The sum P_{ij}	(2) W_{ij}	(3) V(Pi) $V(P_1)$	Components	Items	(1) The sum P_{ij}	(2) W_{ij}	(3) V(Pi) $V(P_2)$
Optimism	Opt1	671	0.099	66.40	Innovation	Innov1	615	0.143	87.94
	Opt2	696	0.103	71.44		Innov2	553	0.129	71.10
	Opt3	489	0.072	35.26		Innov3	514	0.120	61.43
	Opt4	714	0.105	75.18		Innov4	603	0.140	84.54
	Opt5	779	0.115	89.49		Innov5	710	0.165	117.21
	Opt6	773	0.114	88.12		Innov6	674	0.157	105.62
	Opt7	653	0.096	62.88		Innov7	632	0.147	92.87
	Opt8	641	0.095	60.59					
	Opt9	713	0.105	74.97					
	Opt10	652	0.096	62.69					
Total value of the component 1		**6781**		**687.02**	**Total value of the component 2**		**4301**		**620.70**
				$V(P_3)$					$V(P_4)$
Discomfort	Dis1	484	0.085	40.95	Insecurity	Insec1	618	0.104	64.06
	Dis2	530	0.093	49.10		Insec2	617	0.103	63.85
	Dis3	546	0.095	52.11		Insec3	608	0.102	62.00
	Dis4	603	0.105	63.56		Insec4	645	0.108	69.78
	Dis5	552	0.096	53.26		Insec5	700	0.117	82.19
	Dis6	607	0.106	64.40		Insec6	703	0.118	82.89
	Dis7	638	0.112	71.15		Insec7	687	0.115	79.16
	Dis8	616	0.108	66.33		Insec8	760	0.127	96.88
	Dis9	740	0.129	95.72		Insec9	624	0.105	65.31
	Dis10	405	0.071	28.67					
Total value of the component 3		**5721**		**585.24**	**Total value of the component 4**		**5962**		**666.13**

Based on the values of each component: optimism, innovation, discomfort and insecurity, another step in the multicriteria evaluation method is the first level calculation of technology readiness index (expression 1). The calculation order is the same as the second level calculation. The summarized calculations are given in the Table 6.

Table 6. First level index calculation

Components	V(Pi)	Specific weight	Ponderation
P_1 Optimism	687.02	0.27 [687.02/2559.1]	184.44
P_2 Innovation	620.70	0.24	150.55
P_3 Discomfort	585.24	0.23	133.84
P_4 Insecurity	666.13	0.26	173.39
Total	**2559.1**	**1.00**	



From the graphical illustration, it is clear that two of the components featuring the highest values are the level of optimism about using new technologies and the high level of insecurity. It means that young individuals have come to hesitate in providing the sensitive information needed by various applications that deliver the numerous services that young individuals get frequently. Although these young individuals indicate a high degree of optimism, the amount of innovation is lower. Furthermore, the low level of discomfort associated with embracing new technologies contributes to a positive impact on both the use rate and the ease of use of these technologies.

Conclusions

The study aims to analyse the influence of the Technology Readiness Index (TRI) in the attitudes of young adults towards new technology usage. The research was based on structural equation modelling using SEM (Structural Equation Modelling) equations, and the sample is comprised of 235 individuals from 18 to 25 years old. Each parameter is evaluated to find out what is needed to improve the readiness of the young adults related to new technology usage in order to take the right strategies using these ones to help and facilitate our daily life activities. Some of the strategies are:

Promoting digital literacy through educational programs, and online resources can empower young adults to feel more confident in their use of technology.

Educating about the protection of personal information and data privacy (Marston, 2019) and encouraging them to use tools that enhance online privacy.

Foster a culture that encourages learning from mistakes and provides accessible customer support. It is crucial to provide user-friendly interfaces and clear instructions to reduce the probability of errors.

Provide user-friendly interfaces, tutorials, and step-by-step guides to help users navigate and understand new technologies. Encourage gradual adoption and learning.

Promote a healthy understanding that technology adoption is a personal journey. Encourage open discussions about the benefits and drawbacks of different technologies.

It is important to prioritise accessibility in technology design, considering factors such as usability for individuals with disabilities and different levels of technological proficiency.

Promote digital well-being practices, cultivating a healthy balance between tech-based activities.

Addressing these insecurities involves a combination of education, user-friendly design, and supportive communities. By promoting digital literacy, providing clear information, and creating technologies that prioritise user needs, developers and educators can contribute to building a more secure and confident user experience for young adults.

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Investigation of Primary School Mathematics Teacher Candidates' Use of Chat Robots in The Mathematical Modeling Process

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Abstract

The purpose of this research is to examine primary school mathematics teacher candidates' use of chatbots in the mathematical modeling process. For this purpose, two teacher candidates who participated in the process voluntarily were asked to solve two different mathematical modeling problems by taking help from chat robots. A total of three interviews were held with teacher candidates. Teacher candidates were expected to report in detail where they used chatbots while solving these problems, what questions they asked, what they paid attention to when writing questions, how they decided that the answers they received were correct, how they compared the answers given by different chatbots during the solution process, and the impact of this situation on their solutions. Written documents obtained with a qualitative paradigm and interviews with teacher candidates were analyzed with the help of content analysis. Based on the findings of the research, teacher candidates; It has been determined that they consider the following topics: to learn the available information, to determine the variables and the appropriate chatbot, to decide on the chatbot to be used, to perform the modeling process, to check the chatbot and the model, to compare the solutions of different chatbots, and to decide which one gives the more accurate result.

Keywords: Chatbots, mathematics education, mathematical modelling

Introduction

A mathematical process that includes observing a phenomenon, predicting about relationships, applying analyses (equations, symbolic structures, etc.), deriving conclusions, and reinterpreting the model is known as mathematical modeling (Swetz & Hartzler, 1991). When students model physical events, such as calculating the speed of light in water, figuring out how much medicine to take, or strategically placing fire stations in woods, connections between mathematics and the sciences frequently become clear. (National Council of Teachers of Mathematics, 1998). Discussing and evaluating the models to be put forward in this context will make mathematics teaching more qualified. The cycle of the mathematical modeling process with the inclusion of technologies in the process can be seen in Figure 1. Another visual developed from a different perspective has been revised as in Figure 2.

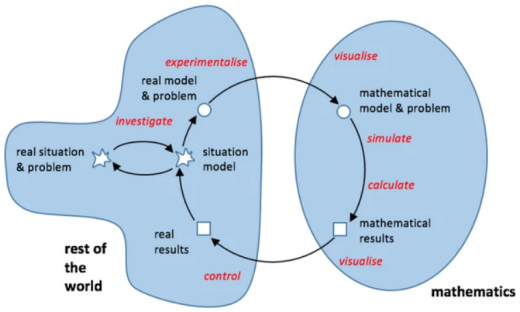

Figure 1. Usage of digital tools when modelling (Greefrath, 2011)

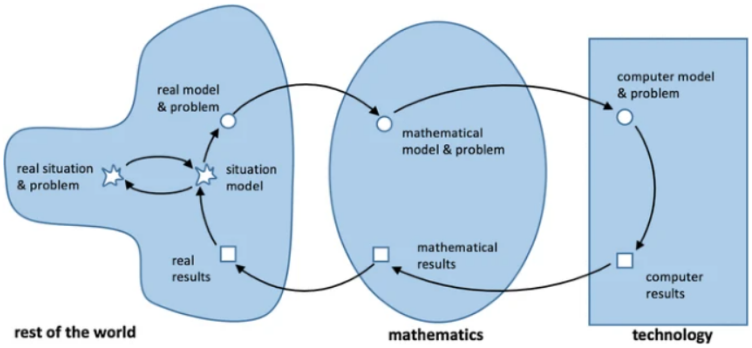

Figure 2. Extended modelling cycle (Siller and Greefrath, 2010)

Through interactive techniques and user-friendly interfaces, chatbots offer a variety of information and knowledge. They can also be used as a tool for in-person consultations. But one of the most often debated themes in academia is the possibility that integrating chatbots into the classroom may negatively affect students' capacity for ethical inquiry, critical thinking, and questioning (van der Berg & du Plesis, 2023). Thanks to artificial intelligence, pre-service instructors can experience the simulation of real-world, free-form conversations using chatbots.

With the rapid entry of artificial intelligence technology into our lives, its applications in mathematics education and training environments have become a very remarkable topic. In this sense, it was desired to conduct an examination of the integration of chat robots into the mathematical modeling processes. In line with this motivation, the aim of this research is to examine primary school mathematics teacher candidates' use of chatbots in mathematical modeling processes.

Methodology

In the study, which aimed to examine the use of chatbots by primary school mathematics teacher candidates in the mathematical modeling process, two teacher candidates who voluntarily participated in the process were asked to solve two different mathematical modeling problems by taking the help of chatbots. A total of three interviews were held with teacher candidates. Teacher candidates were expected to report in detail where they used chatbots while solving these problems, what questions they asked, what they paid attention to when writing questions, how they decided that the answers they received were correct, how they compared the answers given by different chatbots during the solution process, and the impact of this situation on their solutions. The data started by sharing two modeling questions with the teacher candidate. ("Traffic Flow Problem" and "Lake Erie Problem" were used as data collection tools.). Two face-to-face interviews were held with the teacher candidate and the methods he followed during the modeling process were followed. Written documents obtained with a qualitative paradigm and interviews with teacher candidates were analyzed with the help of content analysis. The results obtained in the content analysis method are expected to guide future studies planned on the targeted topics (Lune and Berg, 2017).

Results

When the data obtained from teacher candidates were examined in detail, seven themes were identified. These themes;

- to learn the available information
- to determine the variables and the appropriate chatbot
- to decide on the chatbot to be used
- to perform the modeling process
- to check the chatbot and the model
- to compare the solutions of different chatbots
- to decide which one gives the more accurate result.

Participants first received help from chatbots to obtain basic information about problem situations. K1 explains this situation as: "*In this question, I will try to estimate the size or area of Lake Erie with the help of Google Earth. I will record the many methods I use when making predictions and point out where there are mistakes*." with sentences.

Participants received help from chatbots in the process of determining variables, which are an important component for the modeling process. On this subject, K2 said, "*First of all, I researched the concepts of area and size by using ChatGPT, Gemini, Perplexity and Copilot*.".

«*When I looked at the answers, 3 different answers emerged, two of which were the same in length and the other two were different. The first thing that came to my mind was that the size of the lake changed periodically and since these data were in different years, artificial intelligence gave different answers. For example, the data Chatgbt receives is up to 2021. That's why it's not up to date. This breaks my trust in artificial intelligence. Although there is common information in the answers, there are also people who give different information. I think this is better. It helps me to have more control over the subject, I liked the copilot's answer.*» K1, who included the following sentences, revealed his tendency to decide between the suggestions of different chatbots. A similar situation was observed during the working process of K2.

It was determined that K2, who included the following statements,«*I put forward my own model based on the information I obtained. I think it works fine*.", later built his own model.

Later, it was seen that the participants wanted the model they built to be controlled by chatbots. The screenshot of K1 in this context is shared below.

Figure 3. K1's screenshot

It was observed that participants compared the solutions of different chatbots. In this sense, K1 used the following sentences: «*Factors such as map scale and photo resolution may affect the results. Therefore, for more accurate results, I recommend that you get professional map measurement equipment or help from an expert geographer.However, your action does not contain any errors. The procedure is correct and logical*.»

Finally, it was seen that they decided which chatbots support would be the more accurate solution. In this regard, K2 explained the process with the following expressions, "*He didn't give me a full answer unless I asked different questions again." This broke my trust in Chatgbt. When I asked again, he came to me with a different solution and it was a more satisfactory answer. I realized that the answers he gave were different. I don't know which one is correct. Since he doesn't have a chat feature, he doesn't realize that he answers differently and this broke my trust in Perplexity. Copilot mentioned the same data types again. As an extra, he gave a mathematical example. This helped me understand better*."

Conclusions

Based on the findings of the research, the following conclusions can be drawn.

- As expected, teacher candidates do not fully trust the solution after meeting chatbots.

- Different chat robots were used by teacher candidates. Instead of transferring the entire solution to chatbots, prospective teachers created a healthier model by deepening their existing knowledge by using these chatbots.

- Teacher candidates also used the chatbot to control their own model.

Considering this situation, the modeling cycle; it can be said that chatbots are of critical importance in terms of research, testing, visualization, interpretation, simulation, calculation and control.

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Navigating the ODL Landscape: Challenges, Innovations, and Regulatory Solutions

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Abstract

The mode of education was terribly reshaped and disrupted during and aftermath of COVID-19 pandemics. It was forced by the nature to adopt and adapt to Open and Distance Learning (ODL) as a primary mode of instruction. Now, educational institutions and edutech companies throughout the world are exploring and exploiting the ODL in various ways both for the development of the learning community and also for enhancing their financial positions. Thanks to 4G and 5G technology innovations, massive reduction in the price of internet bandwidth and digital devices, everything seems to be possible except for some qualities expected from educational institutions and learning community. The issues that were settled down due to emergence of ODL include bridging/eliminating the digital divide, increased engagement and motivation, Integrity in assessment and evaluation, training of the trainers and breaking the monopoly of few leading institutions. On the other hand, the new issues that have cropped up are unimaginable number of online courses and degrees offered both by leading educational institutions and also edutech companies which are not vetted or approved by higher education authorities, which is alarming and dangerous if not controlled. This paper summarizes the various forms of explorations and exploitations made by educational institutions and corporate companies and proposes some regulatory mechanisms. The regulatory mechanisms are likely to be a major boost in the offering of ODL courses.

Keywords: ODL Adaptation, Educational Innovation, Regulatory Frameworks

Introduction

The COVID-19 pandemic precipitated a seismic upheaval in the realm of education, thrusting institutions worldwide into uncharted territory and compelling a radical revaluation of conventional instructional paradigms. Faced with unprecedented challenges posed by widespread lockdowns and social distancing mandates, educational stakeholders were forced to recalibrate their approaches, leading to the widespread adoption of Open and Distance Learning (ODL) as the linchpin of instructional delivery. This tectonic shift, driven by necessity, catalyzed a transformative metamorphosis in the educational landscape, ushering in an era characterized by digital innovation, remote connectivity, and unprecedented pedagogical experimentation.

The convergence of technological advancements, including the ubiquity of 4G and 5G networks, coupled with significant reductions in the cost of internet bandwidth and digital devices, served as the catalyst for the rapid proliferation of online learning modalities. In this unprecedented era of connectivity and accessibility, ODL emerged as a potent force for democratizing education, transcending geographical barriers, and extending the reach of learning to previously underserved populations. The once-insurmountable digital divide began to narrow as learners from diverse socioeconomic backgrounds gained access to high-quality educational resources and opportunities.

Amidst this backdrop of transformative change, educational institutions and corporate entities alike seized upon the potential of ODL to not only navigate the exigencies of the pandemic but also to capitalize on newfound opportunities for growth and innovation. From prestigious universities to nimble edutech startups, the landscape of education became increasingly populated with a dizzying array of online courses, programs, and credentials, each vying for attention in an increasingly crowded marketplace.

However, amidst the promise and potential of this brave new world of digital learning, a host of challenges and complexities have emerged, threatening to undermine the integrity and efficacy of ODL offerings. The proliferation of online courses and degrees, often devoid of rigorous oversight or accreditation, has raised

concerns about the quality and authenticity of educational credentials, exacerbating fears of credential inflation and academic devaluation. Moreover, the rapid commodification of education has raised questions about equity, access, and the privileging of profit over pedagogy in the educational marketplace.

In light of these developments, there is an urgent need for robust regulatory mechanisms to safeguard the integrity and credibility of ODL offerings, ensuring that learners are equipped with the knowledge, skills, and credentials necessary to thrive in an increasingly digital and interconnected world. This paper seeks to explore the myriad forms of exploration and exploitation of ODL by educational institutions and corporate entities, while also proposing potential regulatory frameworks aimed at addressing the emergent challenges and complexities of this rapidly evolving educational landscape. Through a comprehensive analysis of the opportunities and pitfalls inherent in ODL, this paper aims to provide insights into the dynamic interplay between technological innovation, educational enterprise, and regulatory oversight, charting a course towards a more equitable, inclusive, and accountable educational ecosystem.

Exploration of ODL by Educational Institutions

Open and Distance Learning (ODL) has emerged as a transformative force in education, enabling traditional educational institutions to extend their reach, diversify their offerings, and adapt to the evolving needs of learners in the digital age. In response to the growing demand for flexible and accessible learning options, many universities, colleges, and schools have embraced ODL as a means of enhancing their educational offerings and reaching new audiences. Traditional educational institutions, including universities and schools, have increasingly recognized the potential of ODL to complement and augment their existing programs. By leveraging digital technologies and innovative instructional methods, these institutions have been able to create a diverse array of online courses, programs, and degrees that cater to the needs and preferences of a diverse student body.

One way in which traditional educational institutions have embraced ODL is through the development of online degree programs. Universities and colleges around the world have launched fully online degree programs in a wide range of disciplines, allowing students to earn accredited degrees from the comfort of their own homes. These online degree programs often mirror their on-campus counterparts in terms of curriculum, faculty expertise, and academic rigor, providing students with a high-quality education that is both flexible and accessible. In addition to online degree programs, many traditional educational institutions have also integrated ODL into their existing courses and programs through the use of blended learning approaches. Blended learning combines traditional face-to-face instruction with online learning activities, allowing students to engage with course materials and collaborate with their peers both in the classroom and online. By incorporating ODL into their teaching practices, educators are able to create more dynamic and interactive learning experiences that cater to the diverse needs and learning styles of their students.

Furthermore, traditional educational institutions have embraced ODL as a means of extending their reach beyond their physical campuses and reaching new audiences. Through the development of Massive Open Online Courses (MOOCs) and other online learning platforms, universities and colleges have been able to share their expertise and educational resources with learners around the world. These online courses often attract tens of thousands of participants from diverse backgrounds, offering them the opportunity to engage in self-paced learning and acquire new skills and knowledge. Overall, the exploration of ODL by traditional educational institutions has opened up new possibilities for teaching and learning, allowing institutions to expand their reach, diversify their offerings, and adapt to the changing needs of learners in the digital age. By embracing ODL, universities, colleges, and schools are able to create more flexible, accessible, and inclusive learning environments that empower students to succeed in an increasingly interconnected and dynamic world.

Exploitation of ODL by Corporate Edutech Companies

The proliferation of Open and Distance Learning (ODL) has not only attracted traditional educational institutions but has also spurred the rise of corporate entities in the online education space. Edutech companies, fueled by technological innovation and entrepreneurial zeal, have capitalized on the opportunities presented by ODL to establish lucrative business ventures that cater to the growing demand for flexible and accessible learning options. The rise of corporate edutech companies in the online education space can be attributed to several factors. Firstly, advancements in digital technology, including high-speed internet connectivity, cloud computing, and mobile devices, have democratized access to educational content, creating a fertile ground for

innovation and entrepreneurship. This has enabled edutech companies to develop and deploy innovative learning platforms, interactive multimedia resources, and personalized learning experiences that cater to the diverse needs and preferences of learners worldwide.

Moreover, the COVID-19 pandemic has further accelerated the growth of corporate edutech companies, as traditional educational institutions were forced to pivot to online learning in response to lockdowns and social distancing measures. This sudden shift towards remote learning created a surge in demand for online educational resources and solutions, providing edutech companies with a captive audience and unprecedented growth opportunities. To capitalize on the opportunities presented by ODL, edutech companies employ a variety of strategies aimed at maximizing their financial gain and market share. One such strategy is the development of proprietary learning platforms and content libraries that offer a wide range of courses, programs, and credentials across diverse subject areas. These platforms often leverage data analytics and machine learning algorithms to personalize the learning experience for each student, providing targeted recommendations and feedback based on their individual learning preferences and performance.

Furthermore, edutech companies often partner with traditional educational institutions to offer online degree programs and certifications that are accredited and recognized by industry stakeholders. By leveraging the credibility and reputation of established educational brands, these companies are able to attract students and generate revenue through tuition fees and subscription-based models. In addition to developing and offering online courses and programs, edutech companies also monetize their platforms through various revenue streams, including advertising, sponsorship deals, and partnerships with corporate sponsors. By strategically aligning themselves with industry partners and advertisers, these companies are able to diversify their revenue streams and maximize their profitability in the competitive online education market. Overall, the exploitation of ODL by corporate edutech companies represents a paradigm shift in the way education is delivered and consumed in the digital age. While these companies have played a significant role in democratizing access to educational resources and expanding the reach of online learning, they also raise questions about equity, access, and the commodification of education. As the online education market continues to evolve, it will be essential to strike a balance between innovation and accountability to ensure that all learners have access to high-quality educational opportunities that empower them to succeed in an increasingly digital and interconnected world.

Challenges and Complexities of ODL

Open and Distance Learning (ODL) has revolutionized the landscape of education, offering unprecedented flexibility and accessibility to learners worldwide. However, along with its many benefits, ODL also presents a host of challenges and complexities that must be addressed to ensure its effectiveness and sustainability.

Quality Control and Accreditation:

One of the primary challenges facing ODL is ensuring the quality and credibility of educational offerings. With the proliferation of online courses and programs, there is a growing concern about the lack of oversight and regulation, leading to variability in the quality of instruction and content. Accreditation, a process of external review and validation, plays a crucial role in ensuring that educational institutions and programs meet established standards of quality and rigor. However, the accreditation process for online education can be complex and time-consuming, leading to disparities in accreditation status among different providers. Moreover, the rapid expansion of ODL has raised concerns about credential inflation, whereby the value of online degrees and certifications may be diminished due to perceived lower standards or lack of recognition by employers and academic institutions.

Equity, Access, and Inclusion:

Despite its potential to democratize education, ODL also exacerbates existing disparities in access and opportunity. The digital divide, characterized by disparities in access to technology and internet connectivity, remains a significant barrier for many learners, particularly those from underserved communities or rural areas. Additionally, learners with disabilities may face accessibility challenges when navigating online learning platforms that are not designed with their needs in mind. Furthermore, concerns have been raised about the commodification of education, whereby ODL is increasingly driven by profit motives rather than a commitment to educational equity and social justice. As a result, marginalized groups may be further marginalized in the online education space, exacerbating existing inequalities in access to educational resources and opportunities.

Commercialization and Marketization:

The commercialization of education presents another challenge for ODL, as corporate entities vie for market share in the increasingly competitive online education landscape. Edutech companies, fueled by venture capital

investment and profit motives, may prioritize revenue generation over educational quality and student success, leading to the proliferation of low-quality or exploitative online courses and programs. Moreover, the marketization of education may incentivize educational institutions to prioritize recruitment and enrollment numbers over academic integrity and student support, leading to concerns about the commodification of knowledge and the erosion of academic standards. In summary, while ODL offers tremendous potential to expand access to education and promote lifelong learning, it also poses significant challenges and complexities that must be addressed to realize its full potential. By addressing issues such as quality control, accreditation, equity, access, and commercialization, stakeholders can work towards creating a more inclusive, equitable, and sustainable ODL ecosystem that empowers learners to thrive in the digital age.

Regulatory Mechanisms for Ensuring ODL Quality and Integrity

As Open and Distance Learning (ODL) continues to evolve and expand, there is a growing need for robust regulatory mechanisms to safeguard the quality and integrity of online educational offerings. By establishing clear standards and guidelines, regulatory frameworks can help ensure that ODL programs meet established benchmarks of excellence and provide learners with high-quality educational experiences. In this section, we propose potential regulatory frameworks to address emergent challenges and discuss the role of higher education authorities in accrediting online courses and programs.

Establishment of Accreditation Bodies:

One potential regulatory mechanism is the establishment of accreditation bodies specifically tasked with evaluating and accrediting online courses and programs. These bodies would be responsible for assessing the quality and rigor of ODL offerings based on established criteria, such as faculty qualifications, curriculum design, instructional delivery, assessment methods, and student support services. Accreditation would provide learners with assurance that the online courses and programs they enroll in meet recognized standards of quality and are worthy of academic credit or recognition.

Development of Quality Assurance Guidelines:

In addition to accreditation, regulatory frameworks could include the development of quality assurance guidelines that outline best practices and standards for ODL delivery. These guidelines would serve as a roadmap for educational institutions and edutech companies, providing them with clear benchmarks to strive for in the design and delivery of online courses and programs. Quality assurance guidelines could cover various aspects of ODL, including course design, instructional materials, assessment strategies, learner support services, and technological infrastructure.

Oversight by Higher Education Authorities:

Higher education authorities, such as ministries of education or accreditation agencies, play a crucial role in ensuring the quality and integrity of ODL programs. These authorities can establish regulations and standards for ODL delivery, monitor compliance with accreditation requirements, and conduct periodic reviews and evaluations of online courses and programs. By exercising oversight and accountability, higher education authorities can help maintain the credibility and reputation of online education and protect the interests of learners.

Collaboration and Partnership:

Effective regulation of ODL requires collaboration and partnership among various stakeholders, including educational institutions, accreditation bodies, government agencies, industry associations, and learner advocacy groups. By working together, these stakeholders can develop consensus-based approaches to quality assurance and accreditation, share best practices and resources, and foster a culture of continuous improvement in ODL delivery.

Results

Open and Distance Learning (ODL) has transformed the educational landscape, enabling traditional institutions to extend their reach and diversify offerings, while also sparking the rise of corporate edutech companies. However, ODL poses challenges including quality control, equity issues, and commercialization. Regulatory mechanisms such as accreditation bodies and quality assurance guidelines are essential to ensure the integrity of ODL offerings. Collaboration among stakeholders is key to fostering a sustainable ODL ecosystem that promotes equity, quality, and student success in the digital age.

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Artificial Intelligence in Education and Ethics

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Abstract

Artificial intelligence applications in education have many benefits for improving learning experiences. However, it is crucial to understand its limitations, potential risks and ethical drawbacks. This study was conducted to understand the scope of the ethical use of artificial intelligence in education and to determine the ethical concerns that arise with the use of artificial intelligence in education. In line with the reviewed studies, it was investigated which ethical concepts were discussed in the studies on artificial intelligence, education and ethics, which concepts were emphasized the most in keywords and abstracts, how scientific production varies according to years and how the trend subject distribution is according to years. In this context, qualitative and quantitative analysis methods were used in the study. A systematic search was conducted in the Scopus database using the keywords 'artificial intelligence, education and ethics'. A total of 22 studies in which these keywords were found together in the title of the research and 906 studies in the title, keywords or abstract were listed. 22 studies were analyzed through qualitative content analysis. 906 studies were examined with the bibliometric analysis technique, aiming to obtain richer insights by synthesizing the research topic quantitatively; Biblioshiny program was used. According to the findings of the qualitative content analysis of the 22 articles included in the study, the most emphasized ethical concepts in the use of artificial intelligence in education were biased artificial intelligence algorithms (justice, equality and inclusiveness concerns etc.), confidentiality and privacy, transparency and accountability, responsibility, academic integrity, security, autonomy and nonmaleficence. In the text analysis of the keywords obtained by bibliometric analysis of 906 studies, it was found that privacy, academic honesty, transparency were the most frequently emphasized ethical issues; in the text analysis of abstracts, the terms AI ethics, ethics education and ethical concerns were frequently repeated. It is understood that the highest scientific production related to the research topic belongs to the years 2022, 2023 and 2024. In the trend topic distribution, it was seen that in 2024, studies on large language models, medicine, politics, plagiarism; in 2023, studies on artificial intelligence, ethics, education, chatgpt, artificial intelligence ethics were concentrated. Emphasizing the ethical aspects of the use of artificial intelligence in education is of great importance in guiding both educational stakeholders and technologists who will develop AI-supported applications and in raising awareness of the society about the ethical issues of these technologies. This study, which aims to provide an overview of the ethical use of artificial intelligence in education, is thought to contribute to the conceptualization and implementation of ethical elements.

Keywords: Artificial intelligence, education, ai in education, ethics

Introduction

Artificial intelligence applications are increasingly used in educational settings in many different areas such as personalized learning systems, automated assessment systems, face recognition systems, predictive analytics and chatbots. The potential benefits of AI applications in education such as improving learning experiences, addressing instructional challenges, and deepening student-teacher relationships have been emphasized. However, it is crucial to understand the limitations, potential risks and ethical drawbacks of AI in education, and for teachers and students to be aware of the ethical issues related to AI in education.

Ethical principles are one of the most important factors to be considered in the use of AI in education, and the results obtained from research on this topic cover a wide range of perspectives. Data transparency includes obligations to ensure that data itself, where it is collected, its nature, what will happen to it, and how it will be used are communicated openly and honestly (Hong et al., 2022). While consent to access personal data has been granted, organizations with access rights do not always make clear their reasons for collecting and analyzing data and their responsibilities to implement measures to protect the integrity and security of the data (Holmes et al., 2022). Violations of personal data access, data security and privacy by AI systems also raise privacy concerns (Murphy, 2019), and while obtaining users' consent is important to help address these concerns, many people consent to information sharing without knowing and considering the scope of the information being shared (Remian, 2019). This can lead to ethical concerns about privacy, confidentiality, transparency, and accountability. In addition, possible racial, gender, or other value biases embedded in the design algorithms of AI-based platforms (Stahl & Wright, 2018) may cause these platforms to provide biased results and thus raise ethical issues. While AI tracking

students' actions and preferences and using this information to determine their future actions provides many advantages to make education more effective, there are arguments that this may raise ethical concerns in terms of student privacy and autonomy (Remian, 2019). Similarly, it is emphasized that basic ethical values such as transparency, honesty, care, fairness and respect, protection of privacy and confidentiality, accountability and responsibility, and contributing to the ethical climate should be taken into account in the use of productive artificial intelligence (YÖK, 2024). In this context, it is important to investigate different perspectives and application areas related to "ethics, education and artificial intelligence" and to gain insights into the ethical issues and applications of artificial intelligence in the field of education.

This study was conducted to understand the scope of the ethical use of artificial intelligence in education and to determine the ethical concerns that arise with the use of artificial intelligence in education. In line with the studies analyzed, the following research questions were sought to be answered:

1- Which ethical concepts are discussed in the studies on artificial intelligence and education?

2- Which concepts were mostly emphasized in the keywords and abstracts of the studies on artificial intelligence, education and ethics?

3- How has scientific production on artificial intelligence, education and ethics changed over the years?

4- How is the trend topic distribution of scientific studies on artificial intelligence, education and ethics according to years?

Methodology

In this context, qualitative and quantitative analysis methods were used in the study. A systematic search was conducted on the Scopus database in April 2024 using the keywords 'artificial intelligence, education and ethics'. As a result of this search, 22 studies in which the words 'artificial intelligence', 'education' and 'ethics' were found together in the "research title" and 906 studies in the "research title, keywords or abstract" were listed. The 22 studies in which these keywords were found in the research title were examined through document analysis, and the abstracts and full texts of these studies (those that were accessible) were subjected to qualitative content analysis, and it was investigated which concepts were addressed in terms of ethics in the use of artificial intelligence in education. The 906 studies in which the words 'artificial intelligence', 'education' and 'ethics' were found in the title of the research, keywords or abstract were examined by bibliometric analysis technique, thus it was aimed to obtain richer insights by synthesizing the research topic quantitatively. The Biblioshiny program was used in the data analysis phase, and the most repeated concepts in the keyword and abstract sections were examined. In addition, the distribution of scientific production and trending topics by year were analyzed.

Results

According to the findings of the qualitative content analysis of the 22 articles included in the study, the most emphasized ethical concepts in the use of artificial intelligence in education were biased artificial intelligence algorithms (in this context, fairness, equality and inclusiveness concerns), confidentiality and privacy, transparency and accountability (e.g. transparency of the resources and algorithms used), responsibility (e.g. taking responsibility for information and errors), academic integrity (plagiarism, identity theft, etc.), security, autonomy and nonmaleficence. In addition to these, ownership of artificial intelligence outputs, lack of originality in artificial intelligence outputs and lack of copyright protection, accessibility and sustainability were also emphasized in different studies. The ethical concepts and the studies emphasizing these concepts are summarized in Table 1.

Table 1. Ethical concepts emphasized in studies on artificial intelligence, education and ethics

Biased artificial intelligence algorithms (in this context, fairness, equality and inclusiveness concerns)	Bartlett & Camba, 2024; Ghotbi, 2024; Zhang vd., 2023; Slimi & Carballido, 2023; Mouta vd., 2023; Dakakni & Safa, 2023; Memarian & Doleck, 2023; du Boulay, 2023; Yu & Yu, 2023; Jang vd., 2022; Holmes & Porayska-Pomsta, 2022; Cowley vd., 2023; Hong vd., 2022; Sanusi, 2022; Adams vd., 2021
Confidentiality and privacy	Bond vd., 2024; Ghotbi, 2024; Jabar vd., 2024; Gartner & Krašna, 2023; Tulgar vd., 2023; Gallent Torres vd., 2023; Dakakni & Safa, 2023; du Boulay, 2023; Yu & Yu, 2023; Jang vd., 2022; Hong vd., 2022;Adams vd., 2021
Transparency and accountability (e.g. transparency of the	Slimi & Carballido, 2023; Gallent Torres vd., 2023; Memarian & Doleck, 2023; Yu & Yu, 2023; Jang vd., 2022; Cowley vd., 2023; Hong vd., 2022; Adams vd., 2021

resources and algorithms used)	
Responsibility (e.g. taking responsibility for information and errors)	Gartner & Krašna, 2023; Tulgar vd., 2023; Gallent Torres vd., 2023; Yu & Yu, 2023; Jang vd., 2022; Hong vd., 2022; Adams vd., 2021
Academic integrity (plagiarism, identity theft, etc.),	Bartlett & Camba, 2024; Ghotbi, 2024; Jabar vd., 2024; Gallent Torres vd., 2023; Dakakni & Safa, 2023
Security	Jabar vd., 2024; Gartner & Krašna, 2023; Gallent Torres vd., 2023; Hong vd., 2022
Autonomy	Gartner & Krašna, 2023; du Boulay, 2023; Adams vd., 2021
Nonmaleficence	Jang vd., 2022; Holmes & Porayska-Pomsta, 2022; Adams vd., 2021
Ownership of artificial intelligence outputs, Lack of originality in artificial intelligence outputs, Lack of copyright protection	Bartlett & Camba, 2024
Accessibility & sustainability	Gallent Torres vd., 2023

The keyword text analyses obtained by examining 906 studies with bibliometric method to understand which concepts are most emphasized in keywords in studies covering artificial intelligence, education and ethics are presented in Figure 1. It was found that privacy (21), academic integrity (15), and transparency (12) were the most frequently emphasized keywords related to ethical issues; however, artificial intelligence (375), ethics (243), education (102), chatgpt (74), machine learning (58), higher education (34), medical education (28), generative ai (21), technology (17), and deep learning (16) were also among the most frequently repeated keywords.

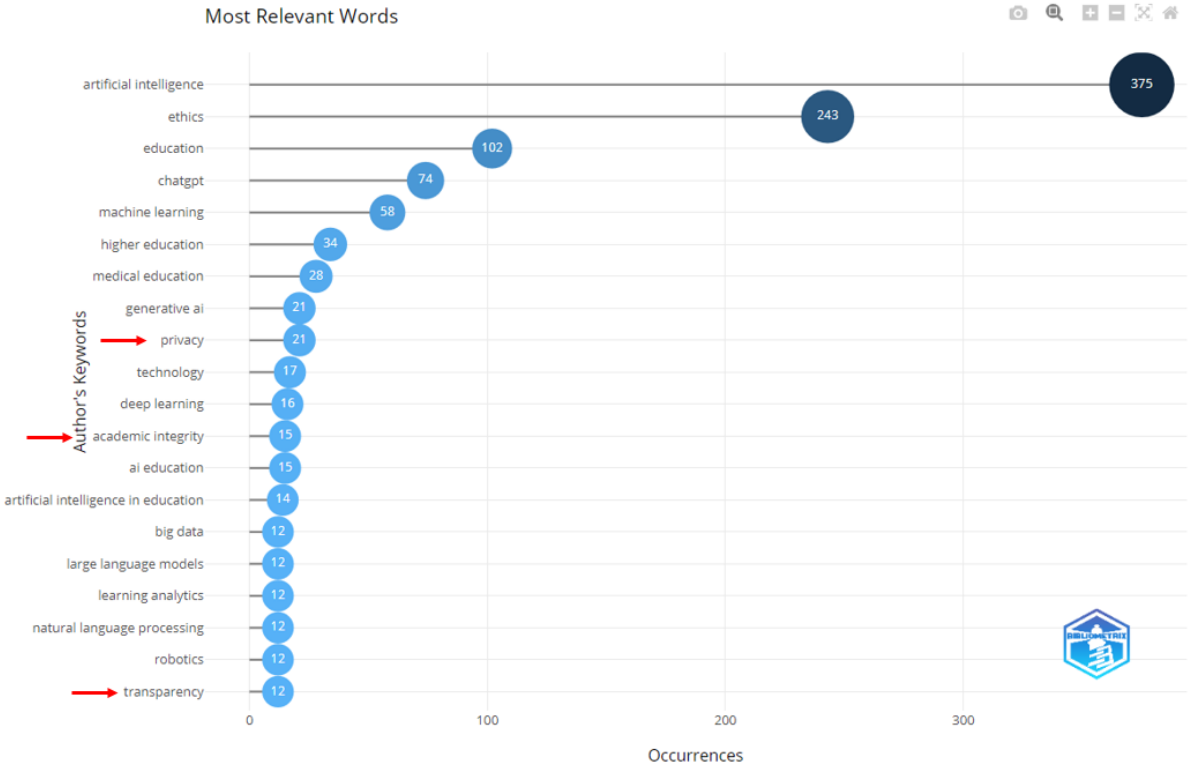


Figure 1. Text analysis of keywords

In the text analysis of the abstracts, it was found that the terms AI ethics (157), ethical issues (136), ethics education (56) and ethical concerns (52) were the most frequently repeated terms related to ethical issues; however, artificial intelligence (972), machine learning (124), generative ai (85), ai technologies (82), healthcare (79) were also among the most frequently repeated terms (Figure 2).

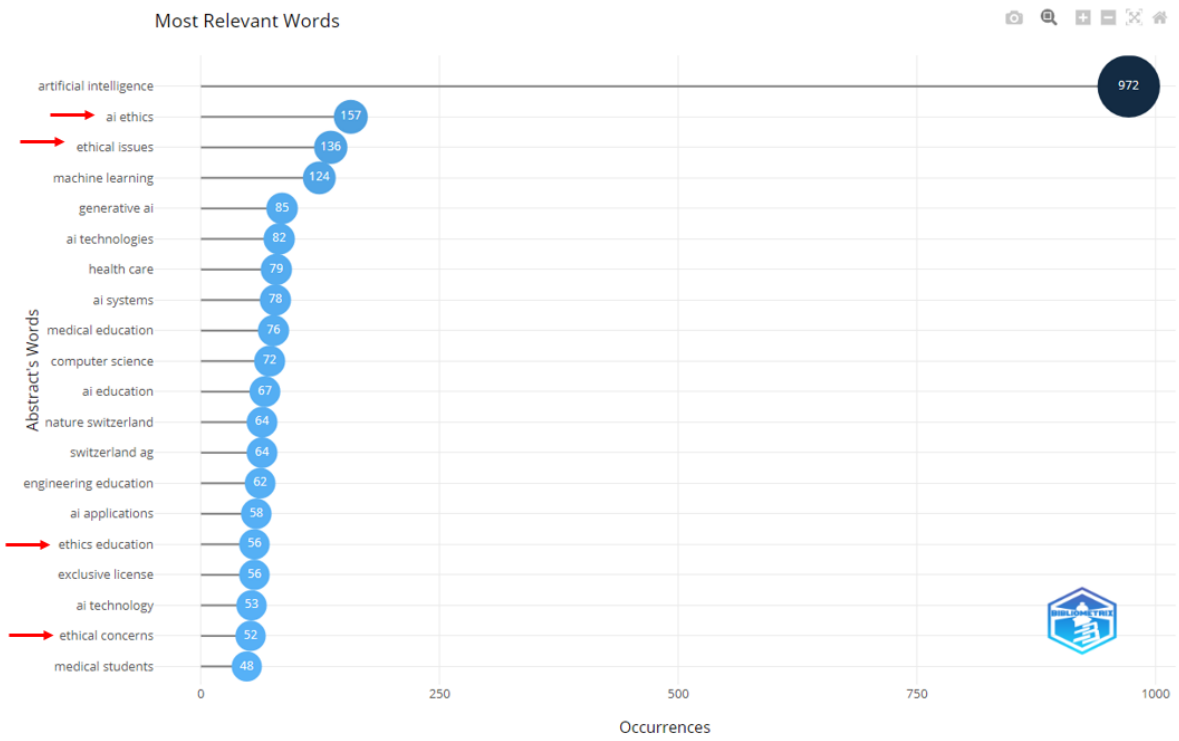
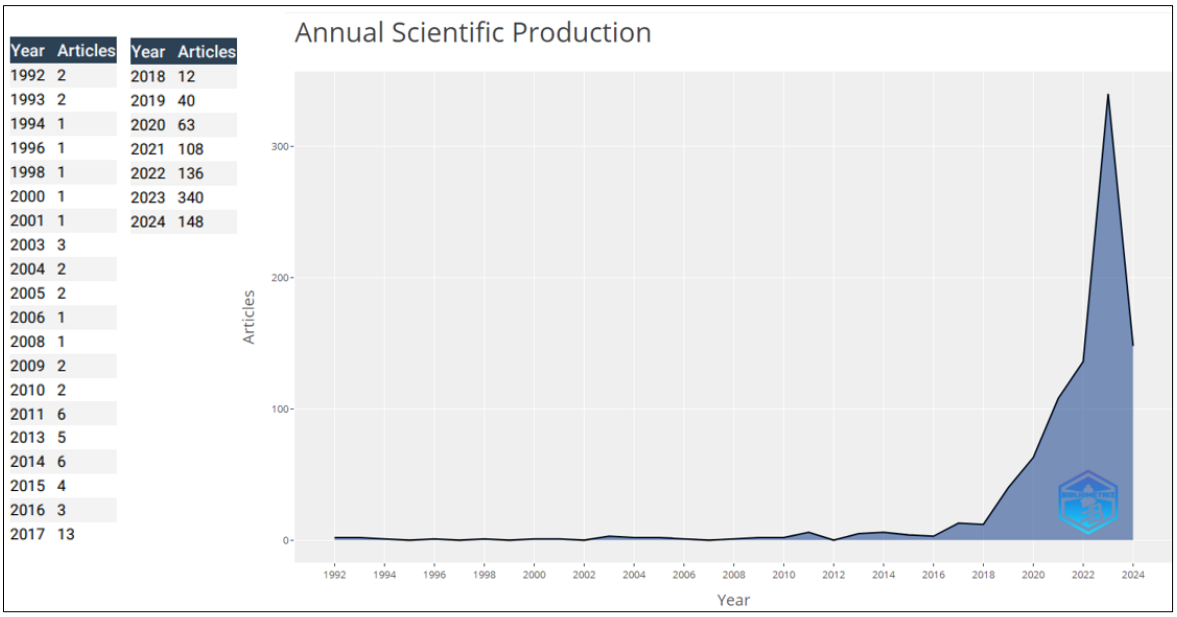


Figure 2. Text analysis of abstracts

The distribution of scientific production related to artificial intelligence, ethics and education by years is shown in Figure 3. It is understood that scientific production related to the research topic shows an increase starting from 2017, with the highest scientific production belonging to the years 2022 (136), 2023 (340) and 2024 (148).



Year	Articles
1992	2
1993	2
1994	1
1996	1
1998	1
2000	1
2001	1
2003	3
2004	2
2005	2
2006	1
2008	1
2009	2
2010	2
2011	6
2013	5
2014	6
2015	4
2016	3
2017	13

Year	Articles
2018	12
2019	40
2020	63
2021	108
2022	136
2023	340
2024	148

Figure 3. Distribution of scientific production by years

Figure 4 and Table 2 show the trend topic distribution of studies on artificial intelligence, ethics and education by year. In the trend topic distribution, it is seen that in 2024, studies on large language models, medicine, policy,

plagiarism; in 2023, studies on artificial intelligence, ethics, education, chatgpt, ai ethics; in 2022, studies on machine learning, transparency, robotics, learning analytics and big data are concentrated.

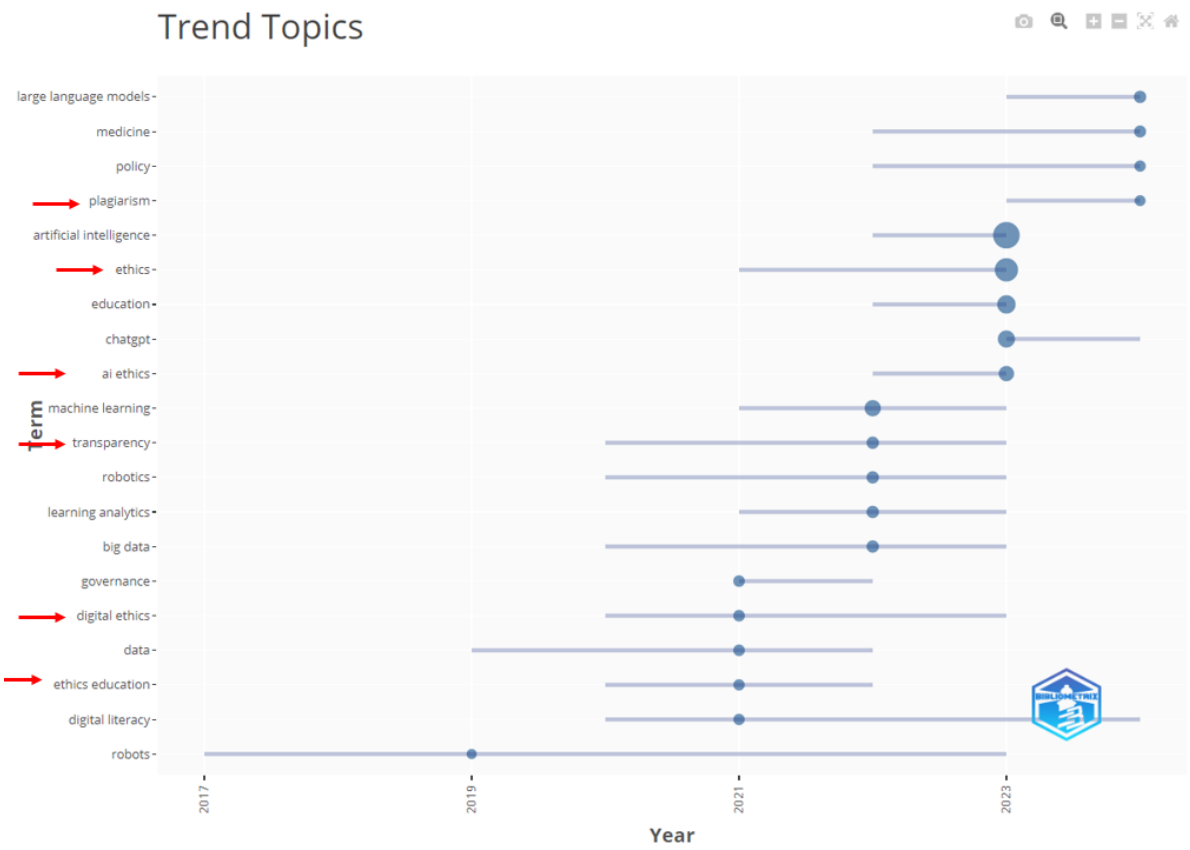


Figure 4: Distribution of trending topics by year

Table 2. Distribution of trending topics by year

item	freq	year_q1	year_med	year_q3
artificial intelligence	375	2022	2023	2023
ethics	242	2021	2023	2023
education	102	2022	2023	2023
chatgpt	74	2023	2023	2024
machine learning	58	2021	2022	2023
ai ethics	43	2022	2023	2023
big data	12	2020	2022	2023
learning analytics	12	2021	2022	2023
robotics	12	2020	2022	2023
transparency	12	2020	2022	2023
large language models	12	2023	2024	2024
medicine	10	2022	2024	2024
data	8	2019	2021	2022
digital ethics	8	2020	2021	2023
governance	8	2021	2021	2022
digital literacy	7	2020	2021	2024
ethics education	7	2020	2021	2022
policy	7	2022	2024	2024
plagiarism	6	2023	2024	2024
robots	5	2017	2019	2023

As can be seen from Figure 4 and Table 2, ethics, ethics education and ethics-related concepts such as plagiarism and transparency have maintained their importance among research topics, especially since 2021, and ethics-related fields have continued to be trending topics.

Conclusions

The integration of artificial intelligence (AI) into educational settings is becoming increasingly widespread and offers many different advantages, such as creating adaptive learning environments, improving student-teacher relationships with the help of chatbots, and providing effective, fast and accurate feedback through automated assessment systems. While the potential benefits of AI in education are vast, it is necessary to acknowledge and address the limitations, risks and ethical concerns associated with AI in education to ensure responsible and ethical use (Zawacki-Richter et al., 2019). The responsibility of educational institutions to maintain data transparency, access permissions to personal data, data integrity and security is of utmost importance. In this study, it was observed that biases embedded in AI algorithms, privacy, transparency and accountability, responsibility, academic honesty, security concerns are among the ethical dilemmas that AI can pose in its use in education. While AI monitoring student actions can increase educational effectiveness, it also raises ethical concerns about student privacy and autonomy (Guan et al., 2023; Murphy, 2019; Remian, 2019; Yu & Yu, 2023). Privacy concerns regarding the use of artificial intelligence in educational applications have also been emphasized in other studies, and it has been stated that people may be prevented from expressing their emotions due to these concerns (Bozkurt et al., 2021; Mouta et al., 2019). Biased artificial intelligence algorithms, which are among the most frequently discussed ethical concepts in the context of artificial intelligence in education, are also among the most obvious ethical problems in the use of artificial intelligence in education (Murphy, 2019; Nichols & Holmes; 2018; Stahl & Wright, 2018). In addition, concerns about ownership of AI outputs, lack of authenticity, copyright protection, accessibility and sustainability have been emphasized in various studies (Jobin & Ienca, 2019). As a result, with the intensification of artificial intelligence studies in education in recent years, ethical issues are frequently raised. It is essential to ensure equality, confidentiality, transparency, responsibility, honesty, integrity, security, justice, privacy protection and accountability in the ethical application of AI technologies in educational settings. Emphasizing the ethical aspects of the use of AI in education is of great importance in guiding both educational stakeholders and technologists who will develop AI-supported applications and in raising public awareness about the ethical issues of these technologies. AI in higher education should be approached from an ethical perspective, and all stakeholders should guide the use of AI in a responsible, just and fair manner that minimizes risks and maximizes benefits. This research, which aims to provide an overview of the ethical use of AI in education, is expected to contribute to the conceptualization and implementation of ethical elements.

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Exploring the Relationship Between Gamification User Type and Online Learning Readiness: An Exploratory Study

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Abstract

Online learning has become increasingly prevalent in recent years, necessitating a thorough understanding of factors that influence learner success in this environment. Online learning readiness, encompassing the skills and attitudes required for effective online learning, plays a crucial role in determining learner outcomes. Gamification, the application of game-like elements to non-game contexts, has garnered increasing attention as a potential tool to improve engagement and motivation within online learning environments. However, the interplay between online learning readiness and gamification user types remains largely unexplored. This exploratory study delves into the relationship between online learning readiness and gamification user types, aiming to identify patterns and insights that can inform the development of effective gamified online learning experiences. The participants comprised 150 students enrolling at a vocational college during the spring semester of the 2023-2024 Academic Year. Gamification User Types Hexad questionnaire and Online Learning Readiness Scale were utilized for data compilation. The Kruskal-Wallis test was conducted to examine whether online learning readiness differs significantly among the dominant gamification user types of participants. To assess the relationship between Hexad user type scores and online learning readiness subscales, Pearson's correlation coefficient was calculated for each subscale and the overall Hexad user type score. The study revealed significant differences in online learning readiness scores among the dominant gamification user types of students. Moreover, a consistent pattern emerged, with Pearson's correlation analysis revealing a positive and statistically significant relationship between online learning readiness and all Hexad user type scores except for the disruptor user type. The results suggest that students with different gamification user types may have varying levels of preparedness for online learning environments. This information can be particularly valuable for educators and instructional designers when developing targeted online learning interventions. As previous research has shown, each gamification user type is driven by unique motivational preferences and finds a sense of accomplishment in different aspects of gamification design.

Keywords: Gamification user type, online learning readiness, Hexad

Introduction

The rapid advancement of technology and the widespread adoption of the internet have revolutionized the educational landscape, giving rise to a plethora of innovative learning modalities (Xu, Zhang, & Wang, 2024). Among these, online learning has emerged as a prominent force, offering students the flexibility and convenience to pursue knowledge from anywhere and anytime (Du, Zhang, Shelton, & Hung, 2022). However, for online learning to be truly effective, students must possess a fundamental set of skills and dispositions that enable them to thrive in this dynamic environment (Archambault, Leary, & Rice, 2022). This concept is known as *online learning readiness* (Engin, 2017; Wang, Xia, Guo, Xu, & Zhao, 2023; Wei & Chou, 2020).

Online Learning Readiness (OLR)

According to Liu & Kaye (2017), OLR refers to the knowledge, skills, and attitudes that students need to be successful in an online learning environment and take advantage of the benefits served by online learning contexts. It is a multidimensional construct that encompasses a variety of factors, including motivation, self-regulation, technology, and communication skills (Yu, 2018; Yurdugul & Demir, 2017). A growing body of research suggests that OLR is a critical factor influencing student success in online learning environments (Lin & Dai, 2022; Torun, 2020). Studies have linked OLR to positive outcomes such as increased engagement, participation, interaction, satisfaction, and ultimately, achievement (Liu & Kaye, 2017; Yu, 2018). This highlights the importance of developing targeted strategies to enhance OLR skills among online learners (Chung, Subramaniam, & Dass, 2020; Cigdem & Ozkan, 2022; Ilic, 2022).

Gamification & Gamification User Types

Gamification refers to the strategic application of game design elements and principles within non-game environments (Deterding, Dixon, Khaled, & LeBlanc, 2011; Huotari & Hamari, 2012). This approach aims to enhance user engagement, motivation, and participation through the incorporation of mechanics commonly found in games (Hamari, Koivisto & Sarsa, 2014; Khaldi, Bouzidi, & Nader, 2023). These mechanics can encompass various aspects, including *point systems, badge systems, leaderboards, level progression*, and *challenges*. By integrating these elements, gamification seeks to transform traditionally non-engaging activities into more intrinsically motivating experiences (Bai, Hew & Huang, 2020; Saleem, Noori, & Ozdamli, 2022), thereby promoting desired behaviors and fostering positive learning outcomes (Deterding et al., 2011; Ding, 2019; Nacke & Deterding, 2017).

Literature suggests that inter-individual variability exists in the efficacy of gamification interventions (Hamari et al., 2014). This heterogeneity is likely attributed to learners' distinct motivational profiles and preferred interaction styles (Koivisto & Hamari, 2019). To address this, Marczewski (2015) proposed the Hexad Gamification User Types framework, which aims to elucidate user motivations and engagement patterns within gamified environments (Tondello et al., 2016). It categorizes users into six distinct types, each driven by different core needs:

1. *Socializers*: exhibit heightened engagement in social interaction and collaborative activities within gamified environments.
2. *Free Spirits*: demonstrate a preference for autonomy, self-expression, and exploration within the gamified system's boundaries.
3. *Achievers*: strive for goal attainment and demonstrate increased engagement with challenges, reflecting a mastery-oriented motivational profile.
4. *Philanthropists*: derive satisfaction from contributing to positive outcomes and helping others within the gamified activity, suggesting an intrinsic motivation driven by purpose.
5. *Players*: exhibit a preference for extrinsic rewards, as evidenced by increased engagement in behaviors associated with point and badge collection.
6. *Disruptors*: engage in behaviors that deviate from established norms within the gamified system, potentially demonstrating a novelty-seeking motivational profile.

The Hexad framework provides a valuable scientific lens for understanding user motivations in gamified systems (Krath, Altmeyer, Tondello, & Nacke, 2023). By integrating hexad with adaptive gamification design, user experiences can be personalized and dynamically adjusted to cater to individual needs and preferences (Oliveira et al., 2023). This approach has the potential to significantly improve user engagement, learning outcomes, and overall system usability in various contexts (Hassan, Habiba, Majeed, & Shoaib, 2021; Mora, Tondello, Nacke, & Arnedo-Moreno, 2018; Roosta, Taghiyareh, & Mosharraf, 2016).

The Purpose of the Study

This study endeavors to illuminate the intricate relationship between variations in participants' gamification user types and the multifaceted construct of OLR. By understanding this interplay, a foundation for the development of more personalized and effective educational strategies can be established.

Research Questions

The study intends to answer the following questions:

1. Is there a significant relationship between participants' gamification user type scores and OLR dimensions?
2. Do participants' OLR skills significantly differ according to their dominant gamification user types?

Methodology

This exploratory study investigated the relationship between online learning readiness (OLR) proficiencies and participant gamification user types.

Data Collection Tools

The participants were determined using the convenience sampling method. The data was gathered through two data collection tools: *(I)* the Online Learning Readiness Scale (OLRS) and *(II)* the Gamification User Types Hexad Scale. All data was collected using Google Forms.

The Online Learning Readiness Scale (OLRS), developed by Hung et al. (2010) and adapted to Turkish by Yurdugul and Alsancak Sarıkaya (2013), comprises 18 items categorized into five dimensions: s*elf-directed learning (SDL), motivation for learning (ML), computer/internet self-efficacy (CIS), learner control (LC), and online communication self-efficacy (OCS).* Participants responded using a 5-point Likert scale. The instrument demonstrated good internal consistency in the current study, with Cronbach's alpha coefficients exceeding .77 for all sub-dimensions: .82 for CIS, .79 for SDL, .77 for LC, .78 for ML, and .81 for OCS. The internal reliability coefficient for the whole scale was calculated as .92.

The Gamification User Types Hexad Scale (Tondello et al., 2019), adapted to Turkish by Taskin and Kiliç Çakmak (2020), was employed to classify participants' user types within the gamified system. This 24-item, 7-point Likert scale assesses six player types: *socializers, philanthropists, disruptors, players, free spirits*, and *achievers*. The achiever type exhibited the highest mean score (M = 24.8, SD = 4.54), followed by free spirit (M = 23.8, SD = 4.42), player (M = 23.7, SD = 5.04), philanthropist (M = 23.0, SD = 4.68), and socializer (M = 21.9, SD = 4.81). Disruptor emerged as the least represented type (M = 12.3, SD = 5.78). Internal consistency coefficients (Cronbach's alpha) for each user type scale demonstrated good reliability in the current study, ranging from .70 (disruptor) to .90 (achiever): .90 for achiever, .84 for free spirit, .85 for player, .80 for philanthropist, and .77 for socializer.

Results

Relationship Between OLR Skills & Gamification User Types of Participants

Pearson's correlation analysis was conducted to examine the relationships between OLR dimensions and hexad scores for 150 participants (Table 1). The analysis revealed statistically significant positive correlations ($r \geq .26$, $p < .05$) for 25 out of 30 correlations, indicating a generally positive association between OLR skills and hexad user types. However, the disruptor type displayed a distinct pattern. Unlike other user types, disruptor scores exhibited statistically significant negative correlations with *self-directed learning* ($r = -.219$, $p < .01$), *learner control* ($r = -.231$, $p < .01$), and *motivation for learning* ($r = -.183$, $p < .05$). Non-significant negative correlations were observed between disruptor and *online communication self-efficacy* ($r = -.091$, $p = .27$) and *computer/internet self-efficacy* ($r = -.033$, $p = .69$). In conclusion, the findings suggest a consistent positive association between OLR skills and user types, with the disruptor type being the notable exception, showcasing negative correlations with specific OLR dimensions.

Table 1. Correlations for OLR Dimensions and Gamification User Types

	CIS	SDL	LC	ML	OCS
Philanthropist	.446**	.594**	.437**	.671**	.560**
Free Spirit	.445**	.683**	.387**	.719**	.616**
Player	.326**	.469**	.259**	.533**	.549**
Achiever	.452**	.663**	.424**	.679**	.527**
Socializer	.425**	.564**	.429**	.631**	.599**
Disruptor	-.033	-.219**	-.231**	-.183*	-.091

**. Correlation at .01(2-tailed)
*. Correlation at .05(2-tailed)

CIS: computer/internet self-efficacy, SDL: self-directed learning, LC: learner control, ML: motivation for learning, OCS: online communication self-efficacy

OLR Skills, & Dominant Hexad Type

To explore the relationship between participant hexad player types and their OLR skills, dominant gamification user types were initially determined. Following the calculation of hexad scale scores, a single dominant type was identified in the majority of the sample (58.7%, N=88). Further analysis revealed the co-dominance of two types in 28% (N=42) of participants. Dominance across three, four, and five hexad types was observed in 7.3% (N=11), 4.7% (N=7), and 1.3% (N=2), respectively. Table 2 shows the distribution of dominant hexad types of participants. Notably, the achiever type exhibited the highest prevalence of single dominance (35.23%, N=31), while the Socializer type had the lowest (3.41%, N=3).

Table 2. The distribution of dominant hexad player types

Hexad Type	N	%
Achiever	31	35,23
Player	30	34,09
Philanthropist	12	13,64
Free Spirit	7	7,95
Disruptor	5	5,68
Socializer	3	3,41

Following the identification of dominant hexad types, a substantial proportion of participants (41.3%) exhibited co-dominance with two or more dominant types. This finding prompted an investigation into the intercorrelations between hexad types. Due to the ordinal nature of the Likert-based hexad questionnaire, Kendall's tau-b correlation coefficients were employed to assess these interrelationships. The results, presented in Table 3 and interpreted using criteria outlined by Schober et al. (2018), revealed partial overlap between hexad types, which aligns with previous validation studies (Krath et al., 2023; Tondello et al., 2019). Notably, a large overlap was observed between the achiever and free spirit scales (tau-b = .513), indicative of a strong positive association. Additionally, most of the remaining scale pairs exhibited moderate positive correlations. However, the philanthropist and disruptor scales (tau-b = -.168) and the player and disruptor scales (tau-b = -.031) displayed weak negative correlations, suggesting limited and potentially opposing tendencies.

Table 3. Bivariate correlation coefficient (Kendall's) between the Hexad types (** p < .001).

Hexad Type	Philanthropist	Free Spirit	Player	Achiever	Socializer	Disruptor
Philanthropist	—					
Free Spirit	.430**	—				
Player	.240**	.364**	—			
Achiever	.455**	.513**	.348**	—		
Socializer	.486**	.423**	.317**	.469**	—	
Disruptor	-.168*	-.166**	-.031	-.246**	-.218**	—

Following the exploration of participant dominant hexad types and their intercorrelations, mean and standard deviations of dominant hexad types were calculated (Table 4) and a Kruskal-Wallis H test was conducted to investigate potential variations in OLR skill scores across different hexad types. This non-parametric test was chosen due to a violation of the assumption of homogeneity of variances, as indicated by a statistically significant result ($p < .05$) in Levene's test. The analysis revealed statistically significant differences in OLR skills for all dimensions except *computer/internet self-efficacy*, suggesting that the dominant hexad type may influence online learning readiness skill profiles (Table 5).

Post hoc comparisons were conducted using Mann-Whitney tests. The results of the statistical analysis revealed significant differences between the disruptor and other hexad player types in several OLR dimensions. Learners classified as dsruptors exhibited lower *self-directed learning* (U = 23.000, z = -2.53, p = .010) and *learner control* (U = 9.500, z = -3.145, p = .000) compared to achievers. Additionally, significant differences were observed in *motivation for learning* (U = 12.500, z = -2.99, p = .001 for achievers; U = 1.000, z = -2.71, p = .005 for free spirit) and *online communication self-efficacy* (U = 12.000, z = -3.02, p = .001 for achievers; U = 3.500, z = -2.81, p = .002 for philanthropists) between the disruptor and other groups.

Table 4. Mean and standard deviations of the hexad types

Dominant Hexad Type	Dimensions of Online Learning Readiness									
	CIS		SDL		LC		ML		OCS	
	M	SD	M	SD	M	SD	M	SD	M	SD
Philanthropist	10.59	2.06	18.59	2.66	10.67	2.22	10.16	2.33	12.25	2.40
Free Spirit	11.00	2.44	19.14	3.53	9.71	2.81	17.29	3.09	11.86	3.39
Player	10.75	2.22	19.19	2.91	10.31	2.32	16.17	2.48	11.86	2.50
Achiever	10.65	2.35	19.41	2.28	10.78	2.06	16.52	2.20	11.70	2.34
Socializer	8.33	2.16	15.67	2.74	9.10	2.07	14.52	2.29	10.45	2.52
Disruptor	6.8	2.77	8.8	3.88	7.00	1.00	3.8	5.17	5.4	3.20

CIS: computer/internet self-efficacy, SDL: self-directed learning, LC: learner control, ML: motivation for learning, OCS: online communication self-efficacy

Table 5. Kruskal-Wallis test results (p-value and chi-square)

	CIS		SDL		LC		ML		OCS	
	p	x^2	p	x^2	p	x^2	p	x^2	p	x^2
Dominant Hexad Type	.143	8.255	.042*	11.507	.020*	13.411	.004*	17.195	.030*	12.358

CIS: computer/internet self-efficacy, SDL: self-directed learning, LC: learner control, ML: motivation for learning, OCS: online communication self-efficacy

(* $p < .05$).

Discussion & Conclusions

The contemporary educational landscape has witnessed a significant shift towards online learning environments, particularly in the wake of the global pandemic (Otto et al., 2024; Salta, Paschalidou, Tsetseri, & Koulougliotis, 2022; West, Hill, Abzhaparova, Cox, & Alexander, 2024). This necessitates the need for student success in online learning settings to ensure the efficacy of educational institutions' and instructors' efforts. A multitude of factors influence student success in online learning, with online learning readiness being a key determinant (Bubou & Job, 2022; Wang et al., 2023).

This exploratory study aimed to explore the relationship between OLR skills and hexad user types of participants. The study specifically examined the five OLR skill dimensions: *computer/internet self-efficacy, self-directed learning, learner control, motivation for learning,* and *online communication self-efficacy*. Additionally, it investigated potential variations in OLR dimension scores based on the participants' dominant hexad types. The research involved 150 students enrolled at a state college in Turkey during the spring semester of the 2023-2024 academic year. While no prior research has explored the relationship between OLR and gamification user types, the current study's findings offer novel interpretations that can be evaluated within the context of educational implications.

The study's findings revealed a generally positive correlation between OLR skills and hexad user types, except for the disruptor type. This correlation offers valuable insights for educational designers and instructors. Given the potential for individual differences in learning styles and motivations, personalized approaches tailored to students' hexad types may foster greater success in online learning environments.

In contrast to the positive correlations observed with other user types, disruptor scores displayed statistically significant negative correlations with *self-directed learning*, *learner control*, and *motivation for learning*. Additionally, non-significant negative correlations emerged for *online communication self-efficacy* and *computer/internet self-efficacy* skills. While online learning environments provide flexibility, they also necessitate a high level of self-regulation and time management skills (Cao, Zhang, Chen, & Shu, 2023; Mou, 2023). Disruptors might encounter challenges with this level of autonomy, potentially favoring a more structured approach. Their preference might lie in structured learning environments with clear instructions and deadlines, as online learning often emphasizes self-directed learning and learner control, potentially creating a mismatch with their learning style.

A noteworthy finding of the study involved the differential influence of dominant hexad types on OLR skills. Especially, learners classified as disruptors exhibited lower *self-directed learning* and *learner control* compared to achievers. Furthermore, significant differences were observed in *motivation for learning* between achievers and free spirits, and in *online communication self-efficacy* between achievers and philanthropists.

While statistically significant differences in OLR dimensions emerged across hexad player types, no such distinction was observed for *computer/internet self-efficacy*. This finding aligns with the broader scope of OLR, encompassing personal characteristics beyond technical skills, such as motivation, self-regulation, and learning strategies (Chung, Noor, & Mathew, 2020; Mou, 2023; Wei & Chou, 2020). The widespread availability of computers and internet access in today's society (Kaddoura & Al Husseiny, 2023) might suggest a relatively homogenous level of computer/internet self-efficacy among students, potentially explaining the absence of significant differences in this domain.

Despite its valuable insights, this study acknowledges several limitations. The exclusion of the disruptor type from the significant findings suggests a potentially more intricate relationship with OLR, influenced by factors beyond this study's scope. In addition, further research is needed to explore the specific needs and preferences of distinct hexad types within online learning environments to gain a deeper understanding. However, these findings hold promise for tailoring online learning environments and student support services based on hexad profiles.

An additional limitation of this study pertains to the investigated group, where a substantial portion did not exhibit a single dominant hexad type. While over half of the students displayed a single dominant type, the intercorrelations observed between hexad types, which align with findings from previous research (Krath et al., 2023; Tondello et al., 2019; Yildirim, Ozdener, Ar, & Geris, 2021), pose challenges to the generalizability of the study's results. Furthermore, the study's exploratory nature and reliance on self-reported data introduce potential biases. Employing longitudinal designs and experimental approaches in future research could offer more robust evidence of causal relationships and further illuminate the interplay between OLR and hexad types. Additionally, the sample size and selection methods employed in the analyses may have influenced the results. The lack of a representative distribution across hexad types or a sufficiently large sample size could limit the generalizability of the findings.

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Level of Learning (LoL) based approach for Online Learning to prevent student attrition

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Abstract

While online learning has its roots over forty years ago, it has been in the recent decade that online education has made rapid advances. Today, literally online learning has replaced offline learning to a large extent and with the advent of Education 4.0, there is little doubt that soon online education will completely take over. Owing to the benefits of reduced fee, travel, logistics expenses and flexibility in schedules, online distance education is also gaining a wide popularity, with many universities offering a multitude of vocational courses as well as professional certifications. Inspite of its popularity, online distance learning has its own challenges, the primary among them being student attrition and his ability to complete the enrolled courses. Several factors contribute to this, including the lack of simulation of a 'class-room like' experience for the student, personal guidance to the student, laxity in assignment submissions resulting in missing deadlines.

However, all these reasons boil down to improper tracking of the student adaptability and progress at an early stage and taking corrective actions. In this work, the concept of Level of learning (LoL) is proposed that includes the percentage of tasks completed successfully in a given time after a certain number of attempts. When the LOL fall below a threshold, the student is transferred to the next Learning Level, with some penalty in his percentage that correlates to his grade. This requires the instruction as well the assessment process to be designed at varied levels, considering the levels of the students. This adaptable, flexible mode of instruction and assessment tailored to meet the student's level will ensure that a student while given an opportunity to perform at a highest level, can also be allowed to continue at the next level should he fall short of expectations. This proactive strategy would certainly reduce student attrition and allow more students to complete a course without the fear of having to forgo it all together.

Keywords: Online learning, Level of Learning, Student attrition

Introduction

As distance learning is a form of persistent online learning, the challenges in online learning also apply to distance learning. Legarde, Michael Angelo measured the Pearson Product Moment Correlation between the perceived ease of use and the perceived usefulness vs the users attitudes obtained through surveys and point out that there is a high degree of correlation in both the cases, as is also confirmed by the p-value. Koi-Akrofi *et al.* in bring out a paradigm that combines Distance, Online and blended learning (DBOL) where in a student will find lesser interaction with the tutors. Although authors do not define OB, it can be understood as Online Blended, which means a few guided face to face sessions (which are online too) combined with online learning where student needs to do most of the self-learning.

Tiwari, Vinita & Tiwari, Abhay bring out the students and teachers perception of online learning during the pandemic. Results show that more students (84%) actually understand concepts taught to them in online mode than the number of teachers who actually perceive them to have understood (64 %).

This study brings out an important observation that more students actually benefit through online learning than the teachers perceive them to be. Availability of immediate student feedback was mentioned to be one of the factors for the teacher apprehension. However, both students and teachers are on a common page when it comes technological challenges in online learning which were Internet connectivity issues, interruptions, student teacher interactions. The most convenient aspect for students was that they could record or have access to recordings at a later point of time.

Amemado, Dodzi & Manca, Stefania present several challenges in the MOOCs and pedagogical methods. Authors discuss the Community of Inquiry (CoI) framework that is composed of the social presence, cognitive presence and teaching presence. While social presence allows participants to express themselves socially and emotionally, Cognitive presence is the extent to which the learners can reflect, understand in a community. Teaching presence is designing effective means to facilitate Social and Cognitive presence in order to achieve the learning outcomes. Authors conclude that the CoI framework could serve as an effective benchmark for Pedagogy which could serve in improving the design of instruction, particularly in a setting of large volumes of students. It may be added that while cognition refers to the learning abilities, Metacognition refers to the ability of learner to plan, monitor, evaluate, and to make changes to their own learning behavior in order to confront challenges more effectively. Thus the role of a teacher is to impart not only cognitive skills to his pupils, but also the much needed metacognitive skills that they can adapt, to suit their particular learning style.

Li, R., Cheung *et al.* propose a very interesting way of dealing with the challenges in MOOCs against the conventional classroom teaching. He first points out that since instant student reactions/feedback are not available in MOOCs to a teacher, the teacher would be unable to adjust his level of explanation or the pace of his teaching. The author points out that since the first few minutes of a course would enable or disable the interest of a student to continue further, a Fable-based technique that starts with an animation setting the context of a problem to be solved is suggested.

The contexts of the problem to be solved are adapted as scenes from popular video games in Asia which most of the students might relate to. The animation is followed by the regular lecture and would end with the lecturers discussing how they would relate the AI techniques they have discussed to solve the problem using the techniques they have taught. For the assignments, students had to solve the problems using computer programming using the techniques they have learnt.

This technique sounds very promising and exciting and might be applied across a number of domains, with the challenges still being whether all students would be aware of the fables, the intricacies, the characters etc., Also based on student polls, surveys etc., the instruction level and pacing might be customized to some extent.

Šimonová et al. describe student engagement categorized in four levels: Cognitive engagement refers to deep understanding of the concepts, problem solving, knowledge acquisition etc., Emotional engagement reflects on the student's emotions while learning concepts and performing activities. Behavioural engagement is about observable traits that include attendance, level of participation, persistent efforts etc., Academic engagement consummates all the above dimensions to facilitate holistic learning.

Chaka, Chaka *et al.* advocate MSTeams as a platform for promoting increased student engagement in the form of posts, replies and reactions. Authors have collected these student responses and analyzed them to be in the descending order of cognitive, emotional and the academic and behavioural dimensions.

However, this analysis leaves us with the need to improve on the behavioural dimension, which in a way, is the most essential engagement for other forms of engagement to succeed.

Fidalgo, P., Thormann, J., Kulyk, O. *et al.* bring out the results of their survey on Distance Education conducted with participants of three countries where DE is still at a nascent state. Apart from some of the inhibitions expressed by the participants that include motivation, time management, help, preparation and difficulty reaching out instructors, they mentioned interest in Blended learning with an open schedule. Inspite of these apprehensions, many students have indicated their preference for MOOC courses.

Elibol, Sevgi & Bozkurt, Aras. bring out their observations on the current research trends in student drop out in distance education. They performed text mining, conducted Social Network Analysis and identified three themes driving current research viz., non-human factors identified by the dropout rates in MOOCs, Analytics, machine learning, predictive analytics etc., and Interaction, engagement, personalization and satisfaction to reduce the dropout rates. The last theme invokes our interest as it doesn't just point out to the reasons but suggests corrective measures as well.

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Methodology

In this work, the Level of Learning is predicted based on certain observable characteristics of students for online courses.

The attributes for a course include the Date, time spent per day(x), minimum time expected to be spent(y), the number of concepts learnt(p), minimum concepts expected to be learnt(q), any exam score(m), quizScore(n),number of attempts(t), assignment scores(s).

Level of Learning = =((((p/q) + (m/100) + (n/(100*t)) + (s/100)) * (x/y)) /4)

Once the Level of Learning of a student over a period of time is determined, then the student is automatically transferred to the next learning level.

The thresholds are defined as:

0.75 and above Level 1, 0.7 to 0.74 Level 2, 0.65 to 0.69 Level 3, 0.6 to 0.64 Level 4, 0.55 to 0.59 Level 5 and 0.5 to 0.54 Level 6, 0.45 to 0.49 Level 7, 0.4 to 0.44 Level 8

The representational scores of a student over a period of time and their Level of Learning is given in the table below.

Table 1. Student characteristics for calculating the Level of Learning.

Date	Time spent online(x)	Threshold time(y)	No of concepts covered(p)	in Threshold concepts(q)	Exam Score(m)	QuizScore(n)	No of attempts(t)	AssignmentScore(s)	LevelofLearning
01-01-2023	129	120	5	4	17	72	5	1	0.4230125
02-01-2023	120	119	3	4	2	1	5	33	0.277815126
03-01-2023	182	130	6	5	48	100	1	59	1.1445
04-01-2023	88	181	6	10	15	4	5	52	0.155337017
05-01-2023	25	156	6	10	45	26	4	5	0.046674679
06-01-2023	216	155	1	7	87	42	2	2	0.432995392
07-01-2023	230	211	3	7	28	51	1	55	0.481956669
									0.423184483

In the above case, the average LoL in the first week was found to be 0.423184483, so the student is can be identified as a slow learner and can be assigned to Level 8. This early identification and dynamic level assignment of slow learners would certainly prevent attrition, also the dynamics of the level assignment are completely non-obvious to the learner. The learner would only observe that he needs to improve if he were to reach a higher level. This also prevents the student from manipulating in certain areas to improve his LoL score in order to be promoted to a higher level.

Results

For evaluating the efficiency of our model, 60 random students were drawn across several sections. The LoL was calculated based on the observed characteristics and the attrition status of the students was noted. The attrition was characterized as a binary value indicating ‘0’ for no attrition and a ‘1’ in case the student dropped out from the course. Testing was done to predict the attrition status of 20 students based on the observations from the trained model and results were observed to be consistent and satisfactory. The results of training and testing are plotted below for prediction of the student attrition based on the Level of Learning. It can be clearly observed that the student attrition increases with decrease in the Level of Learning.

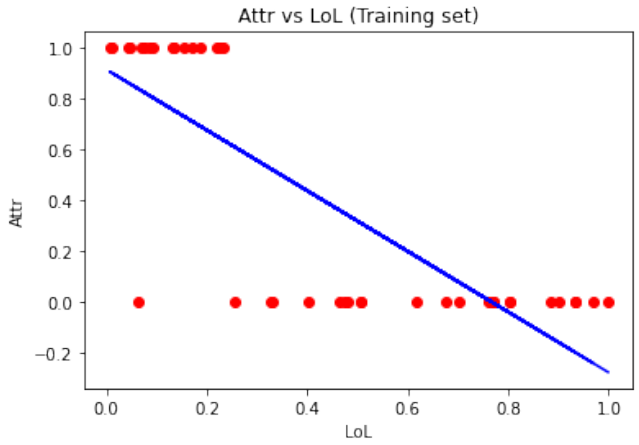

Figure 1. Student attrition vs Level of Learning training results

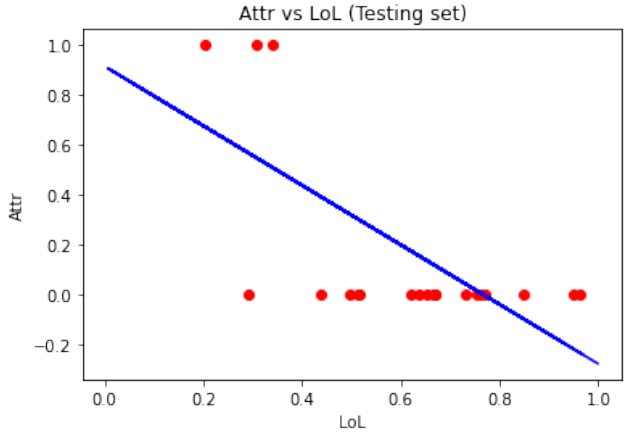

Figure 1. Student attrition vs Level of Learning testing results

The predicted and observed attritions are printed.

y_pred

array([-0.10124638, -0.00767163, 0.04108763, 0.5462479 , 0.39028998,
0.29779079, 0.56799835, 0.67149227, -0.23485631, 0.1347819 ,
0.00643032, 0.11267292, -0.22051535, 0.01288375, 0.17469756,
0.11434603, 0.50860288, 0.12008241, 0.15175203, 0.32049731,
0.30292964])

y_test

array([0, 0, 0, 1, 0, 0, 0, 1, 0, 0, 0, 0, 0, 0, 0, 0, 1, 0, 0, 0, 0],
dtype=int64)

The observed test results were found to be consistent in predicting the student attrition, indicating the efficiency of our model.

Conclusions

The proposed method evaluates students of different levels based on their characteristics of online learning. It was observed that only students who consistently perform satisfactorily on all the characteristics would be achieving a higher LoL score, that in turn translates into higher grades. The primary benefit of this method is that it helps to predict student attrition at an early stage ,that in turn helps to provide personalized learning based on the level of the learners instead of adopting the 'one-size fits all' approach. Future work might include developing models that observe the correlation between changes in learning levels, the attrition rates, and customized learning along with predictions that will further help cut down the student attrition rates.

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E-mentorluğun Yaşam Döngüsü

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Özet

Geçmişi oldukça eski zamanlara dayanan mentorluk ilişkilerinin amaç, süre, kurumsallık gibi farklı kriterler dikkate alınarak sınıflandırıldığı bilinmektedir. Bunun sonucunda ortaya çıkan mentorluk türlerinden birisi de elektronik mentorluktur. Elektronik mentorluğu diğerlerinden ayıran en önemli özelliği, etkileşimde tamamen veya çoğunlukla bilgi ve iletişim teknolojilerinin kullanılıyor olmasıdır. Farklı sektörlerdeki uygulamaları hızla yaygınlaşan elektronik mentorluk, eğitim çevrelerince de kabul görmüştür. Amerika ve Avrupa ülkeleri ile kıyaslandığında Türkiye'deki uygulamalar nispeten daha yenidir. Bu bağlamda bilimsel bilgiler üzerine yapılandırılmış 'yol haritası' işlevi görmeye yönelik çalışmaların, etkili elektronik mentorluk ilişkilerinin tasarlanması sürecinde ülkemizdeki eğitimciler ve araştırmacılar için faydalı olacağı düşünülmektedir. Bu araştırma, 'formal bir elektronik mentorluğun yaşamsal döngüsü nedir?' sorusundan yola çıkarak gerçekleştirilmiş bütünleştirici bir literatür taramasıdır. Bu kapsamda mentorluğa dair metaforlardan ışığında formal bir elektronik mentorluk ilişkisinin aşamaları ortaya konulmuştur.

Keywords: Mentorluk, elektronik mentorluk, e-mentorluk, formal mentorluk

Giriş

Mentorluk yüzyıllardır varlığını sürdüren bir olgudur. En genel anlamda mentorluk, bir bireyin kişisel ve mesleki gelişimine yardımcı olma süreci (Verboven ve Schramme, 2023) olarak açıklanabilir. Bu yapı içinde destek sağlayan konumdaki kişi 'mentor', onun desteğine ihtiyaç duyan kişi ise 'menti'dir. Mentinin beklentisi mevcut bilgilerini artırmak, kişisel olarak gelişmek, yeni şeyler öğrenmek ve somut tavsiyeler almaktır (Kisić ve Jevtić, 2023). Mentorluk ilişkisi aynı zamanda mentorun da gelişimini destekleyen, çok boyutlu (Johnson vd., 1999) ve karmaşık bir süreçtir (Ambrosetti, 2012; Jones, 2009). Yönlendirme ve danışmanlık gerektirmesi yönüyle koçluk ve danışmanlığı kapsamaktadır (Landsberg, 2015). Tüm bunlara ek olarak her mentorluk ilişkisinin benzersiz (Kisić ve Jevtić, 2023) olduğu da bilinmektedir.

Mentorluk ilişkilerini adlandırmak için kullanılan farklı kriterler vardır. Mentorluğun amacı, mentor-menti eşleştirme yöntemi, mentorun niteliği veya kimliği, mentorluk ilişkisinin süresi ve etkileşimde tercih edilen ortamlar (Montgomery ve Page, 2018; Scutelnicu Todoran, 2023; Öngöz, 2019); bunlar içinde öne çıkanlardır. Bu sınıflandırmalar kapsamında iki üst kategori vardır. Bunlar informal (resmi olmayan) ve formal (resmi) mentorluktur. Informal mentorluk, mentor ve mentinin doğal ortamlarında kendiliğinden gelişen, karşılıklı takdir ve tercih sonucunda oluşan bir ilişkiyi ifade etmektedir (Holt vd. 2016). Formal mentorlukta ise mentorlar ve mentiler arasındaki ilişki kurumsal bir yapı tarafından başlatılmaktadır (Ehrich ve Hansford, 1999; Holt vd., 2016; Ragins ve Cotton, 1999).

Kitle iletişim araçlarının yaygınlaşması ve özellikle internet teknolojilerinin gelişimiyle beraber mentorluk etkileşimlerinde önemli dönüşümler yaşanmış ve elektronik mentorluk (e-mentorluk) kavramı ortaya çıkmıştır. Argente-Linares vd. (2017) e-mentorluğu, *"elektronik medyanın mentor ve menti arasındaki temel iletişim kanalı olarak kullanıldığı mentorluk süreci"* şeklinde tanımlamaktadır. İlk e-mentorluk ilişkilerinin temelini e-posta ve asenkron iletişim oluştururken, Web 2.0 sonrasında pek çok yeni teknoloji sürece dahil edilmiştir (Shpigelman, 2014). Günümüz e-mentorluk ilişkilerinde hem senkron hem de asenkron teknolojiler kullanılmaktadır (Mutiarin vd., 2023; Owen ve Whalley, 2017). Çevrimiçi araçlar sayesinde farklı coğrafyalardaki mentor ve mentilerin işbirliği içinde birbirini geliştirmesi mümkün olabilmektedir (Nyugen vd. 2024). Gerçekte yüz yüze (geleneksel) ve elektronik mentorluk birbirinden kopuk iki ayrı kavram değildir. Miller ve Griffiths (2005), e-mentorluğun yüz yüze mentorluk ile elde edilenleri tamamladığı ve genişlettiğini ifade etmektedir. Verboven vd. (2023) tarafından yapılan çalışmaya göre ise geleneksel mentorluk çerçevelerinin çevrimiçi kullanıma uyarlanması mümkündür. Bu yönüyle mentorluğun sahip olması beklenen temel nitelikler bir mentorluk türü olan e-mentorluk için de geçerlidir.

Yöntem

Bu araştırma, *'e-mentorluğun yaşamsal döngüsü nedir ve bu döngü neyi gerektirir?'* sorusundan yola çıkarak gerçekleştirilmiş bütünleştirici bir literatür taramasıdır. Bütünleştirici literatür taraması, bir konu hakkındaki temsili literatürü gözden geçirmek, eleştirmek ve sentezlemek amacıyla kullanılan, araştırma sonucunda konuyla ilgili yeni bakış açıları üretmeye imkan veren bir yöntemdir (Torraco, 2005). Bu çalışmada geçmişi oldukça eskilere dayanan mentorluk felsefesi ve nispeten daha yeni bir kavram olan e-mentorluk modelinin ayırt edici özellikleri üzerine yoğunlaşan yayınlar incelenmiş, bilhassa mentorluk sürecini gerçek yaşamsal olaylarla ilişkilendiren metaforik çalışmalara odaklanılmıştır. Ulaşılan bilgilerin eleştirel ve bütüncül bir bakış açısıyla değerlendirilmesi sonucunda formal bir e-mentorluk ilişkisinin aşamaları ortaya konulmuştur.

Mentorluk Kavramı ile İlgili Metaforlar

Mentorluk konusundaki literatür incelendiğinde; bir mentorluk sürecinin gerektirdiği aşamaların adı, sayısı ve süresi ile ilgili farklılıklar bulunsa da genel anlamda ilişkilerin benzer yollardan geçerek ilerleme eğiliminde olduğu anlaşılmaktadır. Her şeyden önce mentorluk, birçok farklı türde yaşam konusunu kapsayabilen (Visagie, 2011), uzun vadeli hayati bir döngü (Hay, 1995) olarak nitelendirilmektedir. Tablo 1'de verildiği üzere, bu döngü açıklanırken evlilik (Hay, 1995), bahçıvanlık (Mentoring Complete, 2014) ve başkalaşım (Edwards vd., 2011) gibi gerçek hayata dair olaylarla bağlantı kurulmaktadır.

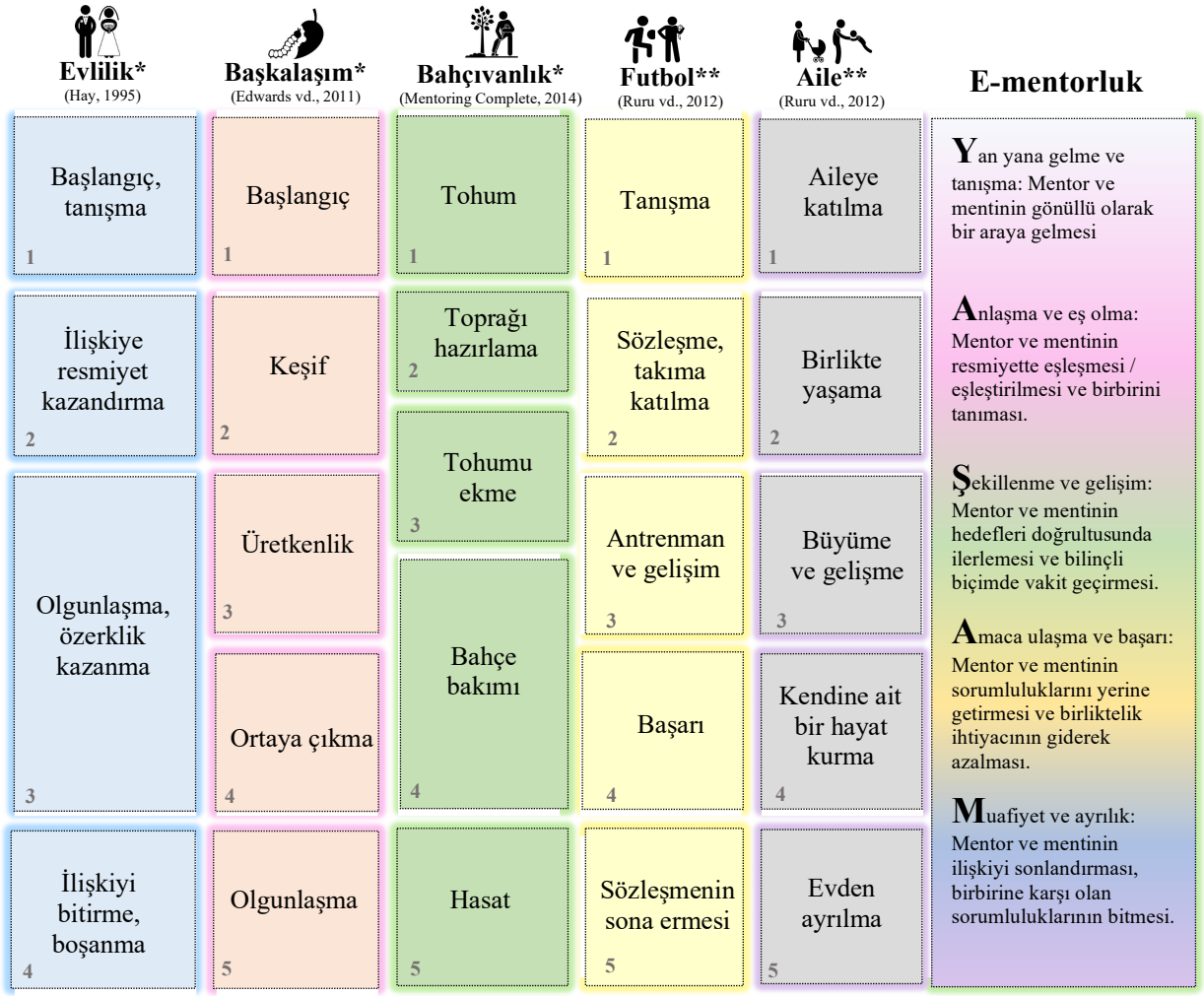
Tablo 1. Literatürde mentorluk süreci ve temel kavramlarıyla ilgili yapılan metaforlar

Kavram	Metafor / Benzetim	Kaynak
Mentorluk	Evlilik	(Hay, 1995)
	Metamorfoz	(Edwards vd., 2011)
	Ağacın büyümesi	(Simpson vd., 2017)
	Bitkinin büyümesi	(Ruru vd., 2012)
	Ev / Aile hayatı	(Ruru vd., 2012)
	Kuş yuvası	(Ruru vd., 2012)
	Bahçıvanlık	(Mentoring Complete, 2014; Simpson vd., 2017)
	Futbol	(Simpson vd., 2017)
Mentor	Bahçıvan	(Mentoring Complete, 2014; Simpson vd., 2017)
	Dağ	(Ruru vd., 2012)
	Bitki tırmanma iskelesi	(Ruru vd., 2012)
	Ebeveyn	(Ruru vd., 2012)
	Anne kuş	(Ruru vd., 2012)
	Agaç (ağacın kökleri)	(Simpson vd., 2017)
	Teknik direktör	(Simpson vd., 2017)
Menti	Dağda yaşayan canlılar	(Ruru vd., 2012)
	Bitki	(Ruru vd., 2012)
	Çocuk	(Ruru vd., 2012)
	Yavru kuş	(Ruru vd., 2012)
	Tohum	(Mentoring Complete, 2014)
	Ağaç	(Simpson vd., 2017)
	Ağacın gövdesi, dalları, yaprakları	(Simpson vd., 2017)
	Futbol takımı oyuncusu	(Simpson vd., 2017)

Mentorlukta ilişkinin gidişatını her zaman mentinin beklentileri, gereksinimleri ve hedefleri belirlemektedir (Kisić ve Jevtić, 2023). Bu bağlamda Tablo 1'deki bazı metaforlar mentor ve menti arasındaki ilişkinin 'simetrik' olmama durumunu tam anlamıyla yansıtmamaktadır. Tohumun filizlenmesi ve sağlıklı bir şekilde büyümesi için bahçıvanın sergilediği çaba bunu açıklasa da evlilik metaforu için aynı durum her zaman mümkün değildir. Başkalaşım metaforunda ise bu durumu yorumlamaya imkan verecek bir 'karşı taraf' kimliği öne çıkmamaktadır. Her evliliğin boşanmayla sonuçlanmıyor olması ve evliliklerin ne kadar süreceğinin bilinmeyişi, mentorluğun süre bağımlı doğasıyla çelişmektedir. Üstelik gerçek hayatta çiftler ömür boyu birlikte yaşamak niyetiyle bir araya gelmektedir ve boşanma olayı önceden planlanmamış olumsuz bir eylemdir. Buna karşın mentorluk ilişkilerindeki ayrılık, hedeflere ulaşıldıktan sonra gerçekleşen mutlu bir uzaklaşmayı temsil etmektedir. Sözü edilen boşluklara rağmen Tablo 1'deki metaforların her biri çok değerlidir. Çünkü mentorluğun 'yaşayan bir süreç' olduğuna vurgu yapmaktadırlar.

Yaşayan Bir Süreç Olarak E-mentorluk

Bütüncül olarak ele alındığında, mentorlukla ilgili metaforların genellikle biyolojik büyüme ve beslenme benzeri organik olaylarla veya canlılara özgü çeşitli gelişimsel süreçlerle ilişkilendirilerek açıklandığı görülmektedir. Bu durum mentorluğun kendi içinde yaşayan bir süreç olmasından kaynaklanmaktadır. Bu metaforların tüm mentorluk ilişkileri için geçerli olduğu göz önünde tutularak, bir e-mentorluk ilişkisinin YAŞAM döngüsünü Şekil 1'deki gibi beş aşamalı bir yapıyla açıklamak mümkündür.



* Aşamalar kaynak çalışmadan aynen alınmıştır. **Aşamalar yazar tarafından oluşturulmuş ve adlandırılmıştır.

Şekil 1. E-mentorluğun yaşam döngüsü aşamaları

Formal bir e-mentorluk programının kurum, mentor ve mentiler açısından hedeflerine ulaşabilmesi için nelere dikkat edilmesi gerektiği alt başlıklar halinde aşağıda açıklanmaktadır:

Yan Yana Gelme ve Tanışma

Bir e-mentorluk ilişkisinde ilk aşama mentilerin mentor adaylarıyla bir araya getirilmesi veya mentor adayları hakkında gereksinim duydukları bilgilere erişebilecekleri bir ortamın kendilerine sunulmasıdır. Bu amaçla farklı yöntemler kullanılabilir. Mentilerin programa kayıtlı tüm mentorlarla ilgili bilgilere erişebilecekleri bir mentor havuzu oluşturulabilir. Mentor ve mentilerin görüşebileceği çevrimiçi bir toplantı düzenlenebilir. Eğer katılımcıların tamamı aynı şehirde veya bölgede yaşıyorsa bu toplantı yüz yüze de yapılabilir. Çünkü e-mentorluk modeli katılımcıların yüz yüze görüşmesine engel teşkil etmemekte, yüz yüze görüşmeyi de kapsayacak şekilde farklı ortam ve teknolojilerin kullanımına izin vermektedir (Akin ve Hilbun, 2007; Ensher vd., 2003; Stokes, 2001). Bir diğer seçenek yüz yüze yapılan tanışma etkinliğinin aynı zamanda çevrimiçi katılıma da olanak vermesidir. Hangi tür tercih edilirse edilsin bu aşamada program koordinatörünün işlevi yalnızca tanışma etkinliğinin türüne, yerine ve süresine karar vermekten ibaret değildir. Mentorların kişisel ve mesleki anlamda

mentilere en iyi nasıl tanıtılabileceği sorusu üzerinde titizlikle çalışılması gerekmektedir. Tanışma toplantılarında bir mentinin tüm mentor adaylarıyla etkileşimde bulunabileceği türden bir planlama yapılması önemlidir.

Anlaşma ve Eş Olma

E-mentorluğu, yüz yüze mentorluktan niteliksel olarak farklı kılan ve onu avantajlı hale getiren iki temel özelliği vardır. Bunlar sınırsız ve eşitlikçi olmasıdır (Dorner ve Misic, 2000). Öte yandan her mentorluk türünde olduğu gibi e-mentorlukta da zayıf noktalar bulunmaktadır. Bunlar içinde ilk akla gelenlerden birisi mentor ve menti arasındaki 'temasa' süreklilik kazandırma konusudur. Çünkü elektronik ortamlar aracılığıyla gelen bilgi ve yönergelerin göz ardı edilme olasılığı yüz yüze mentorluğa kıyasla daha yüksektir (Mutiarin vd., 2023). Bu bağlamda mentor ve menti arasındaki etkileşimin amaçlı, tutarlı ve sürekli olması önemlidir (Wright vd., 2024). Bu sebepledir ki, tüm mentorluk türlerinde olduğu gibi (Allen vd., 2006; Hansman, 2001) e-mentorlukta da hedeflere ulaşmanın hayati gereksinimlerinden birisi, uygun mentor-menti çiftlerinin bir araya getirilmesidir. İyi planlanmış bir tanışma etkinliğine rağmen mentiler her zaman kendileri için en uygun mentoru seçemeyebilir. Bu sebeple resmi mentorluk programlarında eşleştirmeler genellikle program koordinatörleri tarafından yapılmaktadır (Bell ve Treleaven, 2011). Katılımcılar hakkındaki bilgilere ve biyografik verilere dayanarak yapılan bu eşleştirmelerden mentor ve mentilerin oldukça memnun olduğu (D'Abate ve Eddy 2008) bilinmektedir. Ancak bu tür bir eşleştirmede mentilere kendi mentorlarını seçme konusunda hiç söz hakkı tanınmamış olacaktır. Kararın bütünüyle mentiye bırakılması temeline dayanan eşleştirme yöntemlerinin de bazı zayıf yanlarının olduğu bilinmektedir. Ne kadar nitelikli olsalar da bazı mentorların hiç tercih edilmeme riski vardır (Bell ve Treleaven, 2011). Ayrıca koordinatörün deneyimleri de bütünüyle göz ardı edilmektedir. Bu bağlamda karar verme sürecinde teknolojik olanakların ve koordinatörün destekleyici olduğu ama son kararın mentiye bırakıldığı bir yöntem daha iyi bir tercihtir. Mentinin 'ideali bulma' yolunda yalnız bırakılmadığı bu yöntemle program süresince ortaya çıkma olasılığı olan çeşitli sorunların önüne geçmek mümkündür (Bell ve Treleaven, 2011).

Şekillenme ve Gelişim

E-mentorluğun bu aşamasındaki anahtar kelime 'etkileşim'dir. Etkileşimde tercih edilen yöntem, e-mentorluk ilişkisini daha kolay veya zor hale getirme gücüne sahiptir. Örneğin yalnızca dijital metin aracılığı ile sürdürülen bir mentorlukta duygusal eksiklikler yaşama riski her zaman vardır. Çünkü gönderen duygularını metin içinde açıkça ifade etmedikçe alıcı onun gerçek hislerinden habersiz kalacaktır (Shpigelman, 2014). Bu yönüyle etkileşimli ilişkilerin kurulması ve sürdürülmesi e-mentorluk sürecinin kritik faktörleridir (Tenhunen ve Leppisaari, 2010). Gafni-Lachter vd. (2021) tarafından yapılan çalışmaya göre eşzamansız e-posta veya kısa mesajla birlikte eşzamanlı yüz yüze bir video konferans sisteminin kullanılması, e-mentorluk ilişkisini daha yararlı hale getirmektedir. Bir başka araştırmanın (Murphy, 2011) sonuçlarına göre; e-postanın yanı sıra telefonda konuşma veya yüz yüze görüşme şeklinde tasarlanan harmanlanmış mentorluk uygulamaları, hem mentiler hem de mentorlar için istendik sonuçlara ulaşma ihtimalini artırmaktadır. Bu bağlamda e-mentorluk etkileşimlerinin birden fazla kanalın sürece dahil edilerek planlanması gerekmektedir. Ayrıca bir teknoloji birden fazla amaca hizmet ediyor olmalı ve mentor-menti işbirliğini desteklemek için çevrimiçi araçlardan yararlanılmalıdır (Verboven vd., 2023). Tercih edilen etkileşim kanallarının çeşitli olması önemlidir ancak tek başına yeterli değildir. Koordinatör, mentor ve mentinin teknoloji kullanım becerileri de hayati önem taşımaktadır. Bu konudaki yetersizliklerin e-mentorluk sürecinin etkililiğini zayıflatabileceği (Shpigelman, 2014) bilinmektedir. Tüm bunlara ek olarak koordinatör, mentor ve mentilerin rollerinin gerektirdiği sorumlulukları özümsemiş olmaları beklenmektedir. Çünkü bu konuyla ilgili kafa karışıklıkları ve ihmaller, tarafların birbirine fayda sağlama potansiyelini azaltmaktadır (Verboven ve Schramme, 2023).

Amaca Ulaşma ve Başarı

Bir e-mentorluk programının hedefleri katılımcı rollerine göre değişmektedir. Bu durum mentorluk ilişkisinin başarısında farklı kriterlerin dikkate alınmasını gerektirmektedir. Bazı araştırmacılara (Christiansen ve Busenbark, 2023) göre bir mentorluk programının başarısı veya başarısızlığı büyük ölçüde programın koordinatörüne bağlıdır. Bu bakış açısı, koordinatör rolünün önemine vurgu yapması yönüyle önemlidir. Ancak koordinatörün bilgisi, deneyimi, çabaları ve süreci çok iyi şekilde planlamış olması, başarı için tek başına yeterli olmayabilir (Kisić ve Jevtić, 2023). Etkileşimlerin tamamının veya önemli bir bölümünün çevrimiçi yapılıyor olması, teknik konuları ve çevrimiçi ortam tasarımını da başarının belirleyicileri haline getirmektedir. İnternet bağlantısının yavaşlığı ve uyumsuz yazılımların iletişimi kesintiye uğratması, tüm taraflar için hayal kırıklıklarını beraberinde getirebilir (Volkova, 2023). Bu durumda e-mentorluğun en büyük gücü olarak gösterilen teknoloji, onun en önemli engeline dönüşebilir. Nitelikli kurumsal teknik destek hizmetlerinin sağlanması süreci olumlu yönde etkileyecektir. Chong vd. (2020) tarafından yapılan çalışmada bu duruma dikkat çekilmekte ve kurumsal anlamdaki sorumluluklar ayrıntılı şekilde açıklanmaktadır. Bir e-mentorluk programında mentor ve menti arasındaki iletişimin kalitesi kadar sıklığı da programın beklenen sonuçları üzerinde etkilidir (Mineva vd., 2023). Her ne kadar genel eğilime işaret eden bilimsel bilgiler ve deneyimler olsa da amaca ulaşma ve başarı göstergelerinin program özelinde ele alınarak belirlenmesi gerektiği unutulmamalıdır.

Muafiyet ve Ayrılık

Tüm resmi mentorluk ilişkilerinde olduğu gibi (Kisić ve Jevtić, 2023) e-mentorluk modelini kullanan programlarda da önceden belirlenmiş bir sürenin olması gerekmektedir. Bu karar çoğu zaman kurum veya koordinatör tarafından verilse de bazı mentorluk programlarında resmi etkileşim süresine mentiler veya mentor-menti çiftleri karar vermektedir (Öngöz ve Xu, 2024). Resmi bir e-mentorluk programının ne kadar sürmesi gerektiği ile ilgili soruya cevap vermek için dikkate alınması gereken birçok faktör vardır. Bu sebeple bu sorunun cevabı programdan programa değişiklik gösterecektir. Ancak literatürde çevrimiçi ilişkilerin ve e-mentorluk programlarının süresi ile ilgili konulara odaklanan çalışmalara da rastlanmaktadır. Bu çalışmaları inceleyen Shpigelman (2014), e-mentorluk programlarının süresi ile ilgili yapılan önerilerin 6-12 ay olduğunu bildirmektedir. Bir e-mentorluk programının sonlandırılmış olması mentor ve menti arasındaki etkileşimin devam edemeyeceği anlamına gelmemektedir. Muafiyet ve ayrılık ile kastedilen kişiler ve kurumlar arasındaki etkileşimlerin resmiyette sonlandırılmış olmasıdır. Bu sonlandırma tarafların birbirlerine karşı sorumluluklarının bittiği anlamına gelmektedir ancak ilişkilerini arkadaşlık boyutuna taşımaya engel değildir.

Sonuç

Bu çalışmada mentorluk süreci yaşamsal olaylarla ilişkili bir bakış açısıyla ele alınmış ve bu yaşamsal döngü içinde formal bir e-mentorluk ilişkisinin aşamaları ortaya konulmuştur. Mentor ve mentinin tanışmasından ayrılmasına kadar geçen tüm etkileşimlerini kapsayan bu aşamalar kapsamında roller ve sorumluluklar değerlendirildiğinde, bir e-mentorluk programı;

- birbiriyle ilişkili aşamalardan oluşan planlı bir süreç olarak tasarlanmalıdır.
- deneyimli ve alanında yetkin bir koordinatör / koordinatörler tarafından yönetilmelidir.
- mentileri geliştirme potansiyeli yüksek mentorları sürece dahil etmelidir.
- yalnızca mentinin değil mentorun da gelişimini desteklemelidir.
- ideal mentor-menti çiftlerini bir araya getirebilmelidir.
- mentor-menti görüşme sıklığını rastgeleliğe bırakmamalıdır.
- etkileşimde birden fazla ortam / teknoloji kullanmalıdır.
- gerek olması halinde yüz yüze görüşmeden yararlanmalıdır.
- teknolojik sınırlılıklar ve sorunlardan arındırılmış olmalıdır.
- mentilerin ihtiyaçlarını karşılayabilecek bir süreyle gerçekleştirilmelidir.

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E-Öğrenme Materyallerinin Evrensel Tasarım Yaklaşımı Bağlamında Değerlendirilmesi

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Özet

Bilgi teknolojilerinin hızlı gelişimi ile öğrenme ortamlarında önemli değişimler yaşanmaktadır. Bilgisayar ve internet kullanımının yaygınlaşması, çoklu ortam tasarımlarının geliştirilmesini ve daha yaygın kullanılmasını sağlamıştır. Ancak bununla birlikte çoklu ortam tasarım sürecinde birbirinden farklı fiziksel, duyusal veya bilişsel özellikteki bireyler için kapsayıcı bir tasarım yaklaşımının önemi de artmıştır. Çoklu ortam tasarımları birbirinden farklı kanallarla öğrenme sağlanan etkileşimli materyaller olarak tasarlanabilmektedir. Örneğin, bir bilgi metni görme duyusuna hitap edecek biçimde kullanıcıya sunulabildiği gibi aynı zamanda işitme duyusu ile de algılanabilecek şekilde erişilebilir hale getirilebilir. Gelişen teknolojiler sayesinde bu materyaller, farklı fiziksel ve bilişsel özelliklere sahip olan kullanıcılar için kapsayıcı bir yaklaşım ile tasarlanabilir. Böylelikle büyük kullanıcı kitlelerine sunulan materyaller için erişilebilirlik sağlanmış olur. Ancak literatür incelemesi yapıldığında bu konuda çok sayıda araştırma olmadığı görülmüştür. Bu araştırmanın amacı evrensel tasarım ilkeleri bağlamında çoklu ortam materyallerinin sahip olması gereken özellikleri araştırmak ve geniş öğrenme kitlesine sahip Açıköğretim Sistemi içerisinde bulunan etkileşimli öğrenme materyallerinin kapsayıcı hale getirilebilmesi için önerileri sunmaktır.

Araştırmada döküman analizi yöntemi kullanılarak Articulate Storyline etkileşimli materyal hazırlama programının 2022 yılında yayımlanmış olan Erişilebilirlik Raporu ve Anadolu Üniversitesi Anadolum eKampüs'teki etkileşimli öğrenme materyalleri incelenmiştir.

Araştırmanın sonucunda raporda yer alan kriterler bağlamında Anadolum eKampüs'te bulunan etkileşimli materyallerin kapsayıcı hale getirilebilmesi için öneriler sunulmuştur.

Anahtar Sözcükler: E-öğrenme, Evrensel tasarım, Web erişilebilirliği, Çoklu ortam materyalleri

Evaluation of E-Learning Materials in the Context of Universal Design Approach

Abstract

The rapid advancement of information technologies has brought significant changes to learning environments. The widespread use of computers and the internet has facilitated the development and increased utilization of multimedia designs. However, along with this, the importance of an inclusive design approach for individuals with diverse physical, sensory, or cognitive characteristics has also increased in the multimedia design process. Multimedia designs can be created as interactive materials that provide learning through various channels. For example, a piece of information text can be presented to the user in a way that appeals to the sense of sight, while also being made accessible to be perceived through the sense of hearing. Thanks to evolving technologies, these materials can be designed with an inclusive approach for users with different physical and cognitive characteristics, thus ensuring accessibility for large user populations. However, a review of the literature reveals a limited number of studies on this subject. The purpose of this research is to investigate the characteristics that multimedia materials should possess in the context of universal design principles and to provide recommendations for making interactive learning materials within the Open Education System, which reaches a wide learning audience, more inclusive.

Document analysis method was employed in the research, and the Accessibility Report of Articulate Storyline interactive material preparation program published in 2022 and the interactive learning materials on Anadolum eKampus of Anadolu University were examined.

As a result of the research, recommendations have been made for making the interactive materials available on Anadolum eKampus inclusive based on the criteria outlined in the report.

Keywords: E-learning, Universal design, Web accessibility, Multimedia learning materials

Giriş

Açık ve uzaktan öğrenmeyi desteklemek için, web üzerinden verilmek üzere hazırlanmış, zamandan ve mekândan bağımsız olarak erişim olanakları sunan, erişimin bir ağ üzerinden (İnternet ya da intranet olarak) yapıldığı eğitim şekline Web Tabanlı Eğitim (WTE) denir (Horton, 2000). Öğrenme Yönetim Sistemleri (ÖYS) ise, kullanıcılara içeriklerin sunulduğu ve öğrenme faaliyetlerinin yönetilip süreçlerin takip edilebildiği sistemlerdir (Ozan, 2008). Günümüzde gelişen teknoloji sayesinde artan sayıda kullanıcı web tabanlı ÖYS sistemleri üzerinden öğrenme faaliyetleri gerçekleştirmektedir. Bu nedenle ÖYS sistemi tasarımı ve ÖYS sistemleri içerisinde kullanıcılara sunulan çoklu ortam materyalleri tasarımında eşitlikçi ve kapsayıcı bir yaklaşım önem taşımaktadır. Zaman ve mekandan bağımsız olarak öğrenme imkanı sağlayan bu sistemler ile geniş kitlelere ulaşılabilmektedir. E-öğrenme sistemleri bu özelliği ile toplum içerisinde kalıcı veya geçici süreli dezavantajı bulunan bireyler tarafından tercih edilmektedir. Bu gruplara örnek olarak, doğuştan fiziksel, duyusal veya bilişsel engeli olan bireyler, geçici süreli fiziksel engel veya duyu kaybı yaşayan bireyler ve öğrenme güçlüğü gibi özel durumları olan bireyler gösterilebilir. Eğitim sistemlerinde engelli sınıflandırması, fiziksel, duyusal ya da bilişsel bozukluklar yanı sıra öğrenme güçlüğünden ötürü yaşanan eğitim engellerini de içermektedir (Akkurt, 2016). Buna göre materyallerin, birbirinden farklı özellikteki kullanıcılar için çeşitli alternatifler ile tasarlanması kapsayıcı bir sistem oluşturmak için önemli bir yapı taşıdır.

Bu yönüyle bakıldığında bu sistemlerin karma yapıda bir hedef kitleye hitap ettiği görülmektedir. Bu sebeple bu sistemlerin ve materyallerin tasarımında eşitlikçi ve kapsayıcı bir yaklaşım benimsenmesi zorunluluğu oluşmaktadır. Evrensel tasarım yaklaşımı, birçok alanda olduğu gibi eğitim alanında da eşitlik ve kapsayıcılığı sağlayabilmek, herkes için kullanılabilir araç-gereç ve ortamlar sağlayabilmek açısından önemli bir yaklaşım olarak ortaya çıkmış bir yaklaşımdır (Tandoğan, 2017). İlk olarak mimari alanda her birey için kullanılabilir mekan ve eşyalar tasarlama düşüncesiyle belirli ilkeler belirlenmiştir. Sonraki yıllarda ise, bu ilkelerin eğitim ve öğrenme alanında da uygulanabilirliği düşüncesi ortaya çıkmış ve bu alanda çalışmalar yapılmıştır.

Bu çalışmalar sonucu öğrenme için evrensel tasarım ilkeleri oluşturulmuştur. Evrensel tasarım ilkeleri geleneksel yüz yüze eğitimde kullanımının yanı sıra açık ve uzaktan öğrenmede de farklı boyutlarda kullanılmaktadır (Altınpulluk, 2017). Bu yaklaşıma göre öğrenme sistemleri tasarımları farklı özellikteki her kullanıcı için kullanılabilir olmalıdır.

Yapılan literatür araştırmalarında, öğrenme için evrensel tasarım ilkelerinin genel olarak sistem ve ortamların tasarlanması noktasında yol gösterici nitelikte olduğu görülmüştür. Birden fazla duyuya hitap eden, metin, fotoğraf, hareketli ve durağan grafikler, ses, animasyon ve video öğelerinin birlikte kullanıldığı kısaca sözcüklerin ve görsellerin sunum materyallerinde birlikte kullanıldığı çoklu ortam materyalleri (Akkoyunlu & Yılmaz, 2005; Mayer, 2009; Sakman, 2020), açık ve uzaktan öğrenme ortamlarının önemli öğelerindendir. Bu bakış açısıyla, öğrenme ortamlarını oluşturan çoklu ortam materyallerinin özellikleri kapsayıcılık açısından incelenmesi gereken bir bileşendir.

Bu araştırma çoklu ortam materyallerinin tasarımında evrensel tasarım yaklaşımının sürece nasıl dahil edilebileceği üzerine bir öneri sunmak ve bu öneride belirlenen kriterlere göre Anadolu Üniversitesi Açıköğretim Fakültesi öğrenme yönetimi sistemi olan Anadolum eKampüs üzerinde yayınlanan etkileşimli öğrenme materyallerinin incelemesini amaçlamaktadır. Bu inceleme sonucunda etkileşimli materyallerin erişilebilirlik özelliklerinin artırılabilmesi için bir öneri listesi oluşturulmuştur.

Yöntem

Bu çalışmada, Anadolu Üniversitesi Açıköğretim Sistemi öğrenme yönetim sistemi Anadolum eKampüs'te bulunan çoklu ortam materyallerinden etkileşimli öğrenme materyalleri üzerinden erişilebilir ve kapsayıcılık bağlamında değerlendirmeler yapılmıştır. Bu değerlendirmelerde, Articulate Storyline şirketi tarafından 2023 yılında yayınlanan Erişilebilirlik Uygunluk Raporunda listelenmiş Web İçeriği Erişilebilirlik Yönergeleri (WCAG) 2.0 standartlarından A Düzeyi kriterleri referans alınmıştır. Bu kriterlerde belirtilen özelliklere göre, incelenen etkileşimli derslerin erişilebilirlik seviyesinin artırılabilmesi için örnek sayfalar üzerinden önerilerde bulunulmuştur. Web içeriği erişilebilirlik yönergeleri, web erişilebilirliğine ilişkin uluslararası bir doküman olarak kabul edilmekte ve bireylerin, kuruluşların ve hükümetlerin gereksinimlerini karşılamak ve web erişilebilirliğine ilişkin uluslararası ortak bir standart sağlamak amacıyla hazırlanmıştır (Barutcu, 2022).

Bulgular

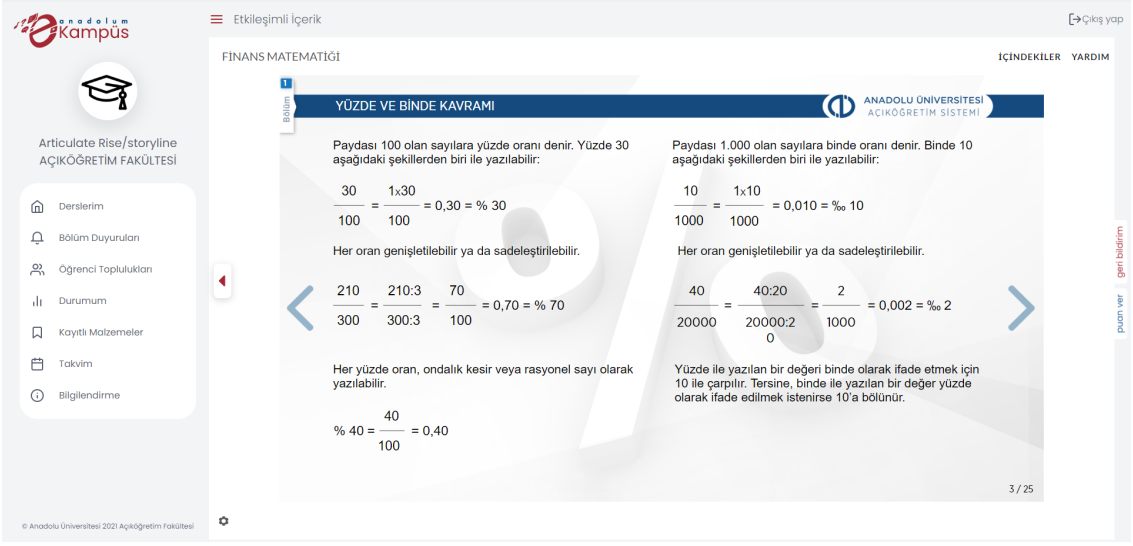
Araştırmanın bu bölümünde Articulate Storyline programı erişilebilirlik raporunun erişilebilir içerik düzenlenebilmesi için WCAG 2.1 Raporu (2023) Seviye A Kriterlerini referans alarak hazırladığı listeye göre belirtilen kriterlerin açıklamasına yer verilmiştir. Bu çalışmada Anadolu Üniversitesi Açıköğretim Sisteminde Articulate Storyline programı ile hazırlanmış olan etkileşimli çoklu ortam materyallerinin evrensel tasarım yaklaşımına uygun hale getirilebilmesi için WWW erişilebilirlik kriterleri referans alınarak öneriler sunulmuştur.

Articulate Programı Erişilebilirlik Raporu WCAG 2.1 Raporu Seviye A Kriterleri ve Öneriler:

Resim 1. Ders örneği-1

Metin Olmayan İçerik: Materyal içerisinde bulunan yazılı içerik dışındaki resim, grafik, görsel verilerin yeterli görme yetisine sahip olmayan bireyler için ekran okuyucular aracılığıyla okunabilmesini sağlayan alt metinlerin eklenmesi. Bu özellik materyalin tasarım aşamasında hazırlama aracının bu özelliğe sahip olması sayesinde görsel verilere eklenebilir.

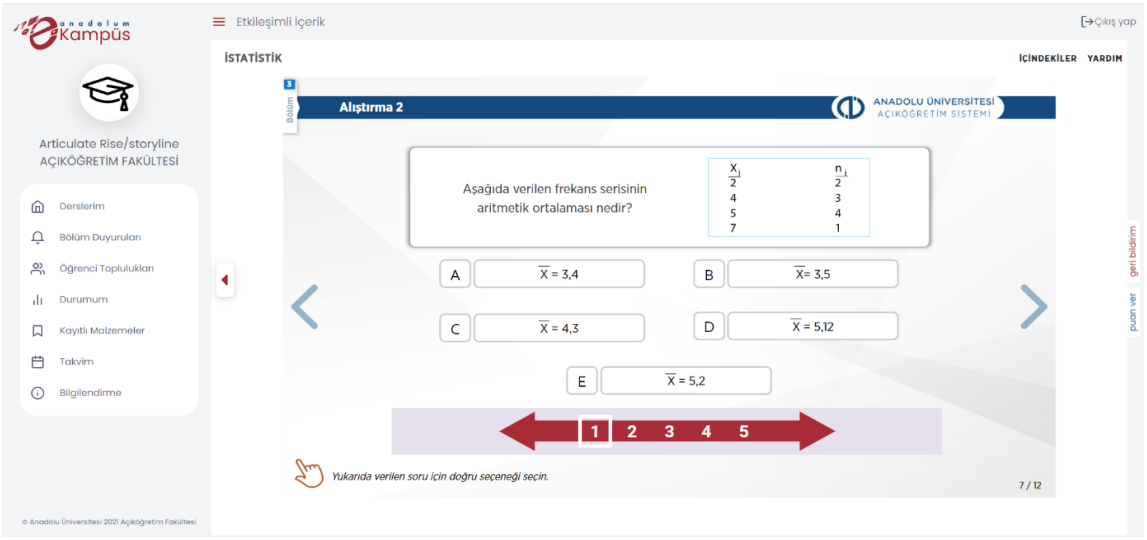
Öneri: Ders içeriklerinde bulunan görseller, Articulate aracının alt metin yazma özelliği kullanılarak doğru şeklinde isimlendirilebilir.



Resim 2. Ders örneği-2

Anlamlı Dizi: İçeriğin sunulduğu sıranın, içeriğin anlamını etkilediği durumlarda, ekran okuyucular için ekranda bulunan metinlerin dizinin anlamını bozmadan okunması için bazı işaretleyicilerin eklenmesi gerekir. Örneğin ekranda aşağıdan yukarı sıralanmış bir merdiven görselinde kavramlar verilmiş ve ilk basamaktan başlandığında anlamlı bir dizi oluşturuyorsa, ekran okuyucu bu metni yukarıdan aşağı doğru okuduğunda anlam sırası bozulacaktır. Bu gibi durumlardaekran okuma sırasını belirlemek önemlidir.

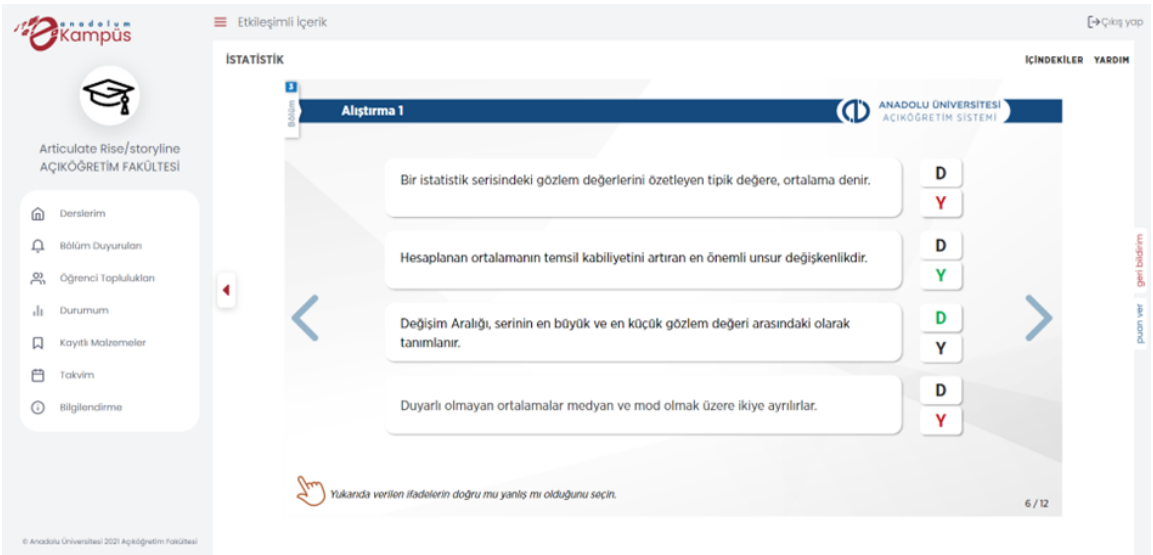
Öneri: Ekranda verilen bilgi sıralamasının önem taşıdığı durumlarda ekran okuyucular için doğru bilgi sıralaması belirtilecek şekilde etkileşimli içerik yazım aracıyla, içerikte gerekli ayarlar yapılabilir.



Resim 3. Ders örneği-3

Duyusal Özellikler: İçeriği anlamak için oluşturulan talimatlar içerikte bulunan renk, şekil, biçim, boyut, görsel konumdan bağımsız olmalıdır. Bu öğelere dayanan içerik tasarımında, görsel engeli veya algı yetersizliği olan bireyler için başka şekillerde açıklayıcı ifadeler kullanılmalıdır.

Öneri: Yalnızca görsel öğeler ile anlamın aktarıldığı ifadelerden kaçınılmalıdır. Bu tarz görsel mesajların kullanılmasının gerekli olduğu durumlarda ise içerik, sesli ifade ile anlaşılabilir şekilde betimlenebilir.



Resim 4. Ders örneği-4

Renk Kullanımı: Önemli bilgi ve talimatların renkler ile sağlandığı durumlarda renk körlüğü veya görme engeli yaşayan öğrenenler için alternatifler oluşturulmalıdır.

Öneri: İçeriklerde bulunan geri bildirimlerde doğru ve yanlış seçimlerin yalnızca renkle gösterilmesi yerine ses efekti ile desteklenebilir, renk körlüğü gibi görme bozuklukları yaşayan bireyler için ise renklerin yanında semboller kullanılarak da ilgili mesajlar verilebilir. Doğru ve yanlış seçimler için kısa geri bildirim cümleleri kullanılabilir.

Sonuç ve Öneriler

Web tabanlı öğrenme yönetim sistemleri üzerinde bulunan çoklu ortam materyalleri, üretim araçlarının ve internet teknolojilerinin hızlı gelişimi ile erişilebilir özelliklerde tasarlanma konusunda potansiyellere sahiptir. Yapılan incelemelerde Web Erişilebilirliklik Standartlarının çoklu ortam materyallerinin tasarım süreçlerine dahil edilmesinin kapsayıcılığı artırabileceği sonucuna ulaşılmıştır. Bu bağlamda, Anadolu Üniversitesi Açıköğretim Sistemi Anadolum eKampüs'te var olan etkileşimli derslere verilen krtiterlerdeki özelliklerin eklenmesiyle, erişilebilirlik seviyesinin artırılacağı düşünülmektedir. Bunun yanında bu özelliklerin yeni ders tasarımı süreçlerinin en başında sürece dahil edilmesinin süreçteki maaliyetleri de azaltabileceği ön görülmektedir. Mevcut derslerin bu özelliklere göre revize edilmesi, bir ders materyali için zamansal ve ekonomik ekstra maaliyetlere yol açabileceğinden, tasarım süreci başında bu kriterlere uygun biçimde ilerlenmesi oluşturulacak yeni materyallerde kapsayıcılığın artırılmasına katkı sağlayacaktır. Ders tasarımlarında erişilebilirliği artırabilmek için Web İçeriği Erişilebilirliği Raporunda belirtilen kriterlere uygun olarak tasarım planlamasının yapılması, farklı özelliklerde kullanıcılar için kapsayıcı bir öğrenme ortamı sağlayacaktır. Evrensel tasarım yaklaşımı bağlamında yapılacak olan düzenlemeler, çoklu ortam materyallerinin daha çok kullanıcı tarafından kullanılabilmesini sağlayacaktır.

Not

Bildirilere ilişkin 4-6 sayfa kısıtlaması nedeniyle bu bildiri metninde Articulate Storyline programı erişilebilirlik raporunda bulunan WCAG 2.1 Raporu Seviye A Kriterleri ve bu kriterlere göre oluşturulan önerilerin tamamına yer verilememiştir. Detaylı bilgi için yazarlar ile iletişime geçebilirsiniz.

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Ortaokul Öğrencilerinin Bilgisayarca Düşünme Becerileri, Problem Çözmeye Yönelik Yansıtıcı Düşünme Becerileri ve Araştırma Sorgulamaya Dönük Öz Yeterlilik Algılarının İncelenmesi

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Özet

Bu araştırmada ortaokul öğrencilerinin bilgisayarca düşünme beceri düzeyleri, problem çözmeye yönelik yansıtıcı düşünme becerileri ve araştırma sorgulamaya dönük öz-yeterlilik algılarının incelenmesi amaçlanmıştır. Çalışmada nicel araştırma yöntemlerinden korelasyonel tarama modeli kullanılmıştır. Araştırmanın çalışma grubunu Amasya ilinde bulunan 5, 6, 7 ve 8. sınıf öğrencileri oluşturmaktadır. Araştırma 239'u kız ve 200'ü erkek olmak üzere toplamda 439 öğrenci katılmıştır. Bu öğrencilerden 79'u 5. sınıf, 120'si 6. sınıf, 121'i 7. sınıf ve 119'u 8. sınıf öğrencileridir. Araştırmada veri toplama aracı olarak "Bilgisayarca Düşünme Beceri Düzeyleri Ölçeği", "Araştırma Sorgulamaya Dönük Öz-Yeterlilik Algı Ölçeği" ve "Problem Çözmeye Yönelik Yansıtıcı Düşünme Becerisi Ölçeği" kullanılmıştır. Ölçekler google form aracılığıyla öğrencilere ulaştırılmış ve veri toplama süreci tamamlanmıştır. Araştırmada elde edilen veriler betimsel istatistik, t testi, korelasyon ve regrasyon analizleri kulanılarak analiz edilmiştir. Analiz sonucunda elde edilen bulgular doğrultusunda ortaokul öğrencilerinin genel olarak bilgisayarca düşünme beceri düzeyleri, araştırma sorgulamaya dönük öz yeterlilik algıları ve problem çözmeye yönelik yansıtıcı düşünme becerilerinin yüksek olduğu görülmüştür. Cinsiyet faktörü açısından öğrencilerinin problem çözmeye yönelik yansıtıcı düşünme becerileri ve araştırma sorgulamaya dönük öz yeterlilik algıları için kız öğrencilerin lehine fark varken bilgisayarca düşünme beceri düzeyleri için anlamlı bir faklılaşma yoktur. Öğrencilerin bilgisayarca düşünme beceri düzeyleri, araştırma sorgulamaya dönük öz yeterlilik algıları ve problem çözmeye yönelik yansıtıcı düşünme becerileri arasında pozitif yönde anlamlı bir ilişki olduğu sonucuna ulaşılmıştır. Ayrıca öğrencilerinin bilgisayarca düşünme beceri düzeyleri, araştırma sorgulamaya dönük öz yeterlilik algıları ve problem çözmeye yönelik yansıtıcı düşünme becerileri birlikte birbirini yordamaktadır.

Anahtar Kelimeler: bilgisayarca düşünme, yansıtıcı düşünme, araştırma sorgulama becerisi

Investigation of Middle School Students' Computational Thinking Skills, Reflective Thinking Skills for Problem Solving and Self-Efficacy Perceptions Towards Research-Inquiry

Abstract

In this study, it is aimed to examine the levels of computational thinking skills, reflective thinking skills for problem solving and self-efficacy perceptions towards research-inquiry belonging to middle school students. The study uses the correlational survey model, one of the quantitative research methods. The study group of this research consists of 439 students (239 girls and 200 boys) who are educated at the grades of 5th, 6th, 7th and 8th in Amasya city. Specifically, there are 79 students in the 5th grade, 120 in the 6th grade, 121 in the 7th grade, and 119 in the 8th grade. The levels of computer thinking skills scale, the scale of self-efficacy perception towards research-inquiry and the scale of reflective thinking skills for problem solving were used as data collection tools in the research. The scales were delivered to the students via google form and therefore the data collection process was completed. The data obtained in the study were analysed using descriptive statistics, t test, correlation and regression analysis. Based on the findings obtained as a result of the analysis, it is concluded that middle school students generally have high levels of computational thinking skills, self-efficacy perceptions towards research-inquiry, and reflective thinking skills for problem solving. When the results are considered in terms of gender factor, there is a difference in favour of female students in their students' reflective thinking skills for problem solving and self-efficacy perceptions towards research-inquiry, but there is no significant difference in their computational thinking skills. Moreover, it is concluded that there is a significant positive relationship between students' computational thinking skills, reflective thinking skills for problem solving and self-efficacy perceptions towards research-inquiry. Finally, it is concluded that students' computational thinking skills, reflective thinking skills for problem solving and self-efficacy perceptions towards research-inquiry can predict each other.

Keywords: computational thinking, reflective thinking, research-inquiry skills

Giriş

Günümüzde öğrenme sürecinde öğrencinin daha çok aktif olduğu, öğretmenin ise yol gösterici bir görev üstlendiği yapılandırmacı yaklaşım modeli benimsenmiştir (Batdı vd., 2021). Yapılandırmacı yaklaşım ile öğrencilerin yaratıcı düşünme, eleştirel düşünme, bilgisayarca düşünme, problem çözme ve araştırma-sorgulama gibi 21. yüzyıl becerileri olarak adlandırılan özelliklere sahip olmaları beklenmektedir (Ah-Nam ve Osman, 2017). Yapılandırmacı yaklaşımı temel alan araştırma sorgulamaya dayalı öğrenme, öğrencilerin düşünerek ve araştırarak bilgiyi yapılandırdıkları ve öğrenme sürecinde yaparak yaşayarak deneyimlemelerine fırsat tanımaktır (Batdı vd., 2021). Araştırma sorgulama becerisi, öğrencilerin bilgi edinme sürecini etkili bir şekilde yönetmesini sağlayan önemli bir beceridir (Kurt, 2023). Bu beceri, bilgiye ulaşma, analiz etme, değerlendirme ve doğru sonuca ulaşma süreçlerini içerir ve bireyin problem çözme yeteneğini geliştirir (Korkmaz vd., 2016). Öğrencilerin öğrenme süreçlerinde önemli bir etkisinin olduğu düşünülen bir kavram olarak öz yeterlilik karşımıza çıkmaktadır. Öz yeterlilik, bireyin bir hedefi gerçekleştirmek için sahip olduğu yeteneğe olan inancı olarak ifade edilebilir (Sakız, 2013). Öz yeterlik algısı yüksek seviyede olan bireylerin zorluklarla daha rahat mücadele ettikleri ve bunun sonucunda başarı seviyelerinin yüksek olduğu, öz yeterliği düşük olan bireylerin ise görevlerini olduğundan daha güç algıladığı ve bunun sonucunda stres ve kaygı düzeylerinin artırdığı görülebilir (Hwang vd., 2016).

Son yılarda önemli bir beceri haline gelen ve öğrencilerin sahip olması beklenen bir diğer beceri ise bilgisayarca düşünme becerisidir (BDB). Bilgisayarca düşünme, bir problemi çözme sürecinde bilgisayar biliminde kullanılan kavramlardan yararlanarak olabilecek çözüm yolları geliştirmemize yardımcı bir düşünme becerisi olarak tanımlanabilir (Korkmaz vd., 2015). Alanyazında ortaöğretim öğrencileri ile yapılan bir araştırmada BDB ile problem çözme becerisi arasında pozitif bir korelasyon olduğunu sonucuna varılmıştır (Voskoglou ve Buckley, 2012). Ayrıca problem çözme becerisi yüksek olan öğrencilerin akademik başarılarının daha iyi olduğu gözlenmiştir (Kaya ve Korkmaz, 2021). BDB, hayatımızın her alanında kullanabileceğimiz günlük yaşantımızı kolaylaştıran bir düşüme becerisi olmakla birlikte, düşünme becerilerinin bir arada kullanıldığı öğretim ortamlarının sınırlı olduğu ve uygun öğretim uygulamalarının tasarlanması gerektiği vurgulanmıştır (Yağcı, 2018).

Yeni nesil öğrencileri uygun öğrenme ortamları sağlandığında yansıtıcı düşünebilen bireyler olarak yetişebilir (Antonio, 2020). Yansıtıcı düşünme üst düzey düşünme becerilerinden biri olarak alanyazında yer almakta ve problem çözme becerisi ile yakından ilişkilidir (Kızılkaya ve Aşkar, 2010). Bireylerde yansıtıcı düşünme becerisinin en iyi gözlenebileceği durumun problem çözme süreci olduğu söylenebilir (Kholid vd., 2020). Problem çözmeye yönelik yansıtıcı düşünme becerisi (PÇYYDB), kişinin bir problemi çözmek için neler yapabileceğini düşünmesi, bu süreçte düşüncelerini sorgulaması ve değerlendirmesi olarak tanımlanabilir (Dilekli ve Orakcı, 2019). Yansıtıcı düşünme becerisine sahip bireyler sorgular, düşünür, önceki öğrendiklerini yeni bilgilerle bağdaştırır ve ürettikleri bilgileri günlük yaşantılarında kullanırlar (Ghanizadeh, 2017). Yansıtıcı düşünen bireyler problem çözme sürecinde şüpheye düştüğü noktalarda çözüm yolunu tekrar kontrol ederler ve alternatif yollar geliştirmeye hazırdırlar (Kholid vd., 2020).

Günümüz eğitim programları düşünme becerilerinin geliştirilmesine önem vermekte ve eğitimin temel amaçlarından biri olarak görülen 21. yy becerilerinin kazandırılmasının gerekliliğini vurgulamaktadır (Ah-Nam & Osman, 2017). Bu beceriler arasındaki ilişkilerin ortaya konulması, eğitim programlarının şekillenmesinde eğitimcilere yardımcı olabilir. Literatürde bu becerilerin birbirleriyle olan ilişkilerine yönelik çalışmalar incelendiğinde problem çözme becerisinin merkezi bir konumda olup, diğer düşünme becerileri ile bir bağlantısı olduğu söylenebilir (Kaya ve Korkmaz, 2021). Bu çıkarımlara dayanarak, bu araştırmada kesişim noktaları problem çözme becerisi olan üç farklı becerinin arasındaki ilişkinin incelenmesine ihtiyaç olduğu sonucuna varmıştır. Bu bağlamda bu araştırmanın amacı, ortaokul öğrencilerinin PÇYYDB, BDB ve ASDÖA'sını belirlemek ve bu değişkenler arasındaki ilişkiyi açıklamaya yönelik bir çalışmayı literatüre kazandırmaktır.

Problem Cümlesi

Ortaokul öğrencilerinin BDB, PÇYYDB ve ASDÖA'ları nasıldır?

Alt Problemler

1. Ortaokul öğrencilerinin BDB, PÇYYDB ve ASDÖA'ları genel olarak nasıldır?
2. Ortaokul öğrencilerinin BDB, PÇYYDB ve ASDÖA'ları cinsiyetlerine göre farklılık göstermekte midir?
3. Ortaokul öğrencilerinin BDB, PÇYYDB ve ASDÖA'ları arasında ilişki var mıdır?
4. Ortaokul öğrencilerinin BDB, PÇYYDB ve ASDÖA'ları birlikte birbirini yordamakta mıdır?

Yöntem

Araştırma Deseni

Bu çalışma, nicel araştırma yöntemlerinden korelasyonel tarama modeli kullanılarak yürütülmüştür. Korelasyonel tarama modeli, birden çok değişken arasındaki ilişkiyi belirlemek amacıyla yapılan bir araştırma yöntemidir (Büyüköztürk vd., 2022).

Çalışma Grubu

Araştırmanın örneklemini Amasya ilinde bulunan ortaokul öğrencileri oluşturmaktadır. 5, 6, 7 ve 8. Sınıf düzeyinde kolay örnekleme yöntemi kullanılarak seçilen 239'u kız ve 200'ü erkek olmak üzere toplamda 439 öğrenciye ulaşılmıştır. Kolay örnekleme yöntemi, mesafe olarak ya da maddi yönden ulaşılması daha kolay ve araştırmaya gönüllü olarak katılan kişilerin olduğu örnekleme yöntemidir (Büyüköztürk vd., 2022).

Veri Toplama Araçları

Araştırmada veri toplama aracı olarak "Bilgisayarca Düşünme Beceri Düzeyleri Ölçeği", "Araştırma Sorgulamaya Dönük Öz-Yeterlilik Algı Ölçeği" ve "Problem Çözmeye Yönelik Yansıtıcı Düşünme Becerisi Ölçeği" kullanılmıştır. Öğrencilerin BDB düzeylerini ölçmek için Korkmaz vd., (2015) tarafından geliştirilmiş ve ortaokul seviyesine uyarlanmıştır. Ölçek beş faktörden ve 22 maddeden oluşmaktadır ve faktörlerin toplam Cronbach Alpha değeri 0,809 olarak belirlenmiştir. Öğrencilerin ASDÖA'sını ölçmek için Korkmaz vd. (2016) tarafından geliştirilmiştir. Ölçek üç faktör ve 23 maddeden oluşmaktadır ve ölçeğin toplam Cronbach Alfa değeri 0,835 olarak tespit edilmiştir. Öğrencilerin PÇYYDB'lerini ölçmek için Kızılkaya vd. (2010) tarafından geliştirilen ölçek üç alt faktörden ve 14 maddeden oluşmaktadır ve Cronbach Alfa değeri 0,71 olarak bulunmuştur. Tüm ölçekler 5'li likert tipinden oluşmaktadır.

Verilerin Toplanması

Araştırmada kullanılan ölçekler için öncelikle ölçek sahiplerinden e-mail yoluyla izin alındıktan sonra Milli Eğitim Müdürlüğünden ve etik kuruldan da gerekli izinler alınmıştır. Ölçekler Google form aracılığıyla ortaokul öğrencilerine ulaştırılmıştır. Katılımcılara formları doldurmaya başlamadan önce gerekli açıklamalar yapılmıştır. Bu süreçte farklı şubelerin ve branşların öğretmenlerinin yardımıyla veri toplama süreci tamamlanmıştır.

Verilerin Analizi

Araştırmada elde edilen veriler incelenip spss istatistik programı kullanılarak analiz edilmiştir. Hangi analizlerin yapılacağına karar vermeden önce normal dağılım gösterip göstermediğini belirlemek için shapiro-wilk testi uygulanmıştır. Test sonuçlarına göre BDB ölçeğinden alınan puanların normal dağılım göstermediği görülmüştür ($p>0.05$). Normal dağılım göstermeyen verilerin çarpıklık ve basıklık değerlerine bakılır. Çarpıklık ve basıklık değerleri -1.5 ile +1.5 arasında olduğu zaman verilerin normal dağılım gösterdiği varsayılmıştır. BDB'nin çarpıklık değeri -0.097, basıklık değeri -0.301 olarak bulunduğu için bu ölçek için verilerin normal dağıldığı varsayılmıştır. PÇYYDB ve ASDÖA ölçekleri için veriler normal dağılım göstermektedir ($p<0.05$). Verilerin normal dağılım göstermesi sonucunda spss programında betimsel istatistik ve parametrik testler olan t testi, korelasyon ve regrasyon analizleri yapılmıştır.

Bulgular

1.1. Ortaokul Öğrencilerinin BDB, PÇYYDB ve ASDÖA'ları

Ortaokul öğrencilerinin genel olarak BDB, PÇYYDB ve ASDÖA'larına ilişkin bulgular çizelgeler halinde aşağıda verilmiştir. Öğrencilerin BDB düzeyleri Çizelge 1'de gösterilmiştir.

Çizelge 1. Ortaokul öğrencilerinin BDB düzeyleri

	$\bar{X}$	S.S	Minimum	Maximum
BDB	3,56	0,58	1,82	5,00
Yaratıcılık	3,79	0,79	1,00	5,00
Algoritmik Düşünme	3,38	0,95	1,00	5,00
İşbirliklilik	3,89	0,95	1,00	5,00
Eleştirel Düşünme	3,34	0,97	1,00	5,00
Problem Çözme	3,45	0,89	1,00	5,00

Betimsel istatistik sonuçlarına göre ortaokul öğrencilerinin BDB ortalamasının $\bar{X}$=3,56 olduğu görülmektedir. BDB ölçeğinden alınan en yüksek puanın 5, en düşük puanın ise 1.82 olduğu görülmektedir. Alt faktörleri açısından incelendiğinde ise benzer sonuçların ortaya çıktığı söylenebilir. En yüksek ortalamaya sahip alt faktörün işbirliklilik, en düşük ortalamaya sahip alt faktörün ise eleştiren düşünme olduğu görülmektedir. Bu durumda öğrencilerin BDB'lerinin yüksek olduğu söylenebilir. Öğrencilerin PÇYYDB'lerine ilişkin bulgular Çizelge 2'de özetlenmiştir.

Çizelge 2. Ortaokul öğrencilerinin PÇYYDB'leri

	$\bar{X}$	S.S	Minimum	Maximum
PÇYYDB	3,53	0,84	1,00	5,00
Sorgulama	3,52	0,91	1,00	5,00

Değerlendirme	3,53	0,91	1,00	5,00
Nedenleme	3,54	0,94	1,00	5,00

Betimsel istatistik sonuçları incelendiğinde ortaokul öğrencilerinin PÇYYDB ölçek ortalamasının $\bar{X}$=3,53 olduğu görülmektedir. PÇYYDB ölçeğinden alınan en yüksek puanın 5, en düşük puanın ise 1 olduğu görülmektedir. Alt faktörleri açısından incelendiğinde ise ortalamalar birbirine çok yakın olsa da en yüksek ortalamaya sahip alt faktörün nedenleme, en düşük ortalamaya sahip alt faktörün ise sorgulama olduğu görülmektedir. Bu durumda öğrencilerin PÇYYDB'lerinin yüksek olduğu söylenebilir. Öğrencilerin ASDÖA'larına ilişkin bulgular Çizelge 3'te verilmiştir.

Çizelge 3. Ortaokul öğrencilerinin ASDÖA'ları

	$\bar{X}$	S.S	Minimum	Maximum
ASDÖA	3,68	0,67	1,57	5,00
Kaçınma	3,53	0,99	1,00	5,00
Araştırmayı Sürdürebilme	3,74	0,89	1,00	5,00
Kişisel Gelişim	3,93	0,88	1,00	5,00

Betimsel istatistik sonuçlarına göre ortaokul öğrencilerinin ASDÖA ortalamasının $\bar{X}$=3,68 olduğu görülmektedir. ASDÖA ölçeğinden alınan en yüksek puanın 5, en düşük puanın ise 1.57 olduğu görülmektedir. Alt faktörleri açısından incelendiğinde ise benzer sonuçların ortaya çıktığı söylenebilir. En yüksek ortalamaya sahip alt faktörün kişisel gelişim, en düşük ortalamaya sahip alt faktörün ise kaçınma olduğu görülmektedir. Bu durumda öğrencilerin ASDÖA'larının yüksek olduğu söylenebilir.

1.2. Cinsiyet Değişkenine Göre Ortaokul Öğrencilerinin BDB, PÇYYDB ve ASDÖA'ları

Ortaokul öğrencilerinin BDBD ölçeği, PÇYYDB ölçeği ve ASDÖA ölçeğine verdikleri yanıtların cinsiyetler açısından fark olup olmadığı bağımsız örneklem t testi ile analiz edilmiş olup bulgular Çizelge 4'te gösterilmiştir.

Çizelge 4. Cinsiyet değişkenine göre öğrencilerin BDB, PÇYYDB ve ASDÖA'ları

	Cinsiyet	N	$\bar{X}$	S.S	sd	t	p
BDB	Kız Erkek	239 200	3,57 3,55	0,59 0,56	437	0,25	0,81
Yaratıcılık	Kız Erkek	239 200	3,83 3,75	0,78 0,79	437	1,05	0,29
Algoritmik Düşünme	Kız Erkek	239 200	3,32 3,46	0,97 0,93	437	-1,55	0,12
İşbirliklilik	Kız Erkek	239 200	3,87 3,92	0,96 0,93	437	-0,57	0,57
Eleştirel Düşünme	Kız Erkek	239 200	3,34 3,34	0,95 0,99	437	0,02	0,99
Problem Çözme	Kız Erkek	239 200	3,30 3,38	0,84 0,94	437	1,43	0,15
PÇYYDB	Kız Erkek	239 200	3,60 3,45	0,82 0,85	437	1,95	0,05
Sorgulama	Kız Erkek	239 200	3,60 3,43	0,89 0,93	437	1,93	0,05
Değerlendirme	Kız Erkek	239 200	3,60 3,45	0,91 0,91	437	1,69	0,09
Nedenleme	Kız Erkek	239 200	3,61 3,56	0,94 0,94	437	1,69	0,09
ASDÖA	Kız Erkek	239 200	3,78 3,56	0,63 0,67	437	3,52	0,00
Kaçınma	Kız Erkek	239 200	3,67 3,37	0,93 1,04	437	3,08	0,00
Araştırmayı Sürdürebilme	Kız Erkek	239 200	3,82 3,65	0,88 0,91	437	1,98	0,05
Kişisel Gelişim	Kız Erkek	239 200	3,99 3,87	0,87 0,89	437	1,45	0,14

Çizelge incelendiğinde ortaokul öğrencilerinin BDB'leri ($t_{(2\text{-}437)}$=0.25; $p>0,05$) cinsiyetler açısından incelendiğinde anlamlı bir fark bulunamadığı söylenebilir. Aynı şekilde alt faktörlere bakıldığında da anlamlı bir

fark olmadığı görülmektedir. Çizelgeye göre PÇYYDB'nin ($t_{(2-437)}$=1.95; $p<0,05$) cinsiyetler açısından anlamlı bir fark oluşturduğu ve bu farkın kız öğrencilerinin lehine olduğu söylenebilir. Aynı şekilde alt faktörlere bakıldığında sorgulama alt faktörünün ($t_{(2-437)}$=1.93; $p<0,05$) kız öğrencilerin lehine istatistiki olarak fark gösterdiği, değerlendirme ($t_{(2-437)}$=1.69; $p>0,05$) ve nedenleme ($t_{(2-437)}$=1.69; $p>0,05$) alt faktörlerinin cinsiyetler açısından anlamlı bir fark göstermediği görülmektedir. Çizelge incelendiğinde ASDÖA'nın ($t_{(2-437)}$=3.52; $p<0,05$) cinsiyetler açısından fark gösterdiği, bu farkın da kız öğrencilerinin lehine olduğu görülmektedir. Alt faktörlerine bakıldığında kaçınma ($t_{(2-437)}$=3.08; $p<0,05$) ve araştırmayı sürdürebilme ($t_{(2-437)}$=1.98; $p<0,05$) faktörlerinin cinsiyetler açısından anlamlı bir fark olduğu fakat kişisel gelişim ($t_{(2-437)}$=1.45; $p>0,05$) faktörünün istatistiki olarak fark göstermediği görülmektedir. Buna göre cinsiyetin ortaokul öğrencilerinin BDB'sini farklılaştırmadığı, PÇYYDB ve ASDÖA'yı farklılaştırdığı söylenebilir. Cinsiyetin ortaokul öğrencilerinin yaratıcılık, algoritmik düşünme, işbirliklilik, eleştirel düşünme ve problem çözme faktörlerine etkisinin olmadığı görülebilir. Öğrencilerin değerlendirme ve nedenleme faktörlerine bakıldığında cinsiyetler açısından farklılaşmadığı görülürken sorgulama faktörünün farklılaştığı söylenebilir. Yine cinsiyet faktörünün öğrencilerin kaçınma ve araştırmayı sürdürebilme faktörlerine etkisi olduğu söylenebilirken kişisel gelişim faktörüne bir etkisinin olmadığı görülmektedir.

1.3. Ortaokul Öğrencilerinin BDB, PÇYYDB ve ASDÖA'ları Arasında İlişki

Ortaokul öğrencileri için BDB, PÇYYDB ve ASDÖA'ları arasında bir ilişki olup olmadığı korelasyon analizi ile belirlenmiştir. Analiz sonucu ortaya çıkan bulgular Çizelge 5'te sunulmuştur.

Çizelge 5. Öğrencilerin BDB, PÇYYDB ve ASDÖA'ları arasındaki ilişki düzeyleri

	BDB	*Yaratıcılık*	*Algoritmik Düşünme*	*İşbirliklilik*	*Eleştirel Düşünme*	*Problem Çözme*	ASDÖA	*Kaçınma*	*Araştırmayı Sürdürebilme*	*Kişisel Gelişim*
BDB							0,617**	0,302**	0,601**	0,550**
Yaratıcılık							0,393**	0,096*	0,489**	0,461**
Algoritmik Düşünme							0,351**	0,037	0,507**	0,447**
İşbirliklilik							0,255**	0,078	0,290**	0,295**
Eleştirel Düşünme							0,406**	0,105*	0,484**	0,489**
Problem Çözme							0,504**	0,501**	0,218**	0,150**
PÇYYDB	0,672**	0,591**	0,568**	0,395**	0,638**	0,096*	0,519**	0,148**	0,609**	0,603**
Sorgulama	0,620**	0,565**	0,528**	0,366**	0,598**	0,066	0,454**	0,107*	0,554**	0,561**
Değerlendirme	0,604**	0,529**	0,486**	0,388**	0,560**	0,093	0,462**	0,142**	0,522**	0,538**
Nedenleme	0,614**	0,521**	0,544**	0,320**	0,587**	0,107*	0,507**	0,159**	0,595**	0,552**

** p<0.01, * p<0.05

Çizelge incelendiğinde ortaokul öğrencilerinin BDB ile PÇYYDB (r=0.672; p<0.05), BDB ile ASDÖA (r=0.617; p<0.05), PÇYYDB ile ASDÖA (r=0.519; p<0.05) arasında pozitif yönde anlamlı bir ilişki olduğu görülmektedir. Bu durumda öğrencilerin BDB düzeyleri arttıkça PÇYYDB'nin arttığı, PÇYYDB arttıkça ASDÖA'nın arttığı söylenebilir. Aynı şekilde BDB arttıkça da ASDÖA'nın arttığı söylenebilir. Çizelge incelendiğinde PÇYYDB ve faktörleri ile BDB ve yaratıcılık, algoritmik düşünme, işbirliklilik, eleştirel düşünme faktörleri arasında pozitif yönlü bir ilişki olduğu gözlenmektedir. Ancak PÇYYDB ile problem çözme faktörü arasında (r=0.096; p<0.05) pozitif yönde zayıf bir ilişki olduğu görülürken problem çözme faktörü ile sorgulama (r=0.066; p>0.05) ve değerlendirme (r=0.093; p>0.05) faktörleri arasında ilişki olmadığı söylenebilir. BDB ve faktörleri, ASDÖA ile araştırmayı sürdürebilme ve kişisel gelişim faktörleri arasında pozitif yönde anlamlı bir ilişki olduğu söylenebilir. BDB'nin faktörleri olan algoritmik düşünme ve işbirliklilik faktörleri ile ASDÖA'nın kaçınma faktörü arasında ilişki olmadığı gözlenmektedir. Yine çizelgeye göre PÇYYDB ile faktörlerinin, ASDÖA ile faktörleri arasında pozitif yönlü bir ilişki olduğu saptanmıştır.

1.4. Ortaokul Öğrencilerinin BDB, PÇYYDB ve ASDÖA'sının Birlikte Birbirini Yordaması

Ortaokul öğrencilerine göre BDB, PÇYYDB ve ASDÖA'nın birlikte birbirini ne kadar yordadığı regrasyon analizi ile belirlenmiştir. Ortaokul öğrencilerinin PÇYYDB ve ASDÖA'nın BDB'ye etkisi Çizelge 6'da verilmiştir.

Çizelge 6. Öğrencilerin PÇYYDB ve ASDÖA'sının, BDB'lerine etkisi

	Sabit	Standart Hata	t	p	İlişki	
					Kısmi	İkili
Sabit	1,220	,108	11,259	,000		
PÇYYDB	,330	,026	12,823	,000	,523	,412

ASDÖA	,319	,033	9,760	,000	,423	,314

Bilgisayarca düşünme becerisi = 1,22 + 0,33 Problem çözmeye yönelik yansıtıcı düşünme becerisi + 0,32 Araştırma sorgulamaya dönük öz-yeterlilik algısı, R^2=0,55; p<0,05

Çizelgeye göre ortaokul öğrencilerinin BDB düzeylerini, PÇYYDB ile ASDÖA birlikte %55 oranında anlamlı bir şekilde yordamaktadır. Tek başına bakıldığında ise PÇYYDB'nin %52 oranında, ASDÖA'nın ise %42 oranında yordadığı görülmektedir. Bu durumda öğrencilerin BDB düzeylerini en çok PÇYYDB'nin yordadığı söylenebilir. Ortaokul öğrencilerinin BDB ve ASDÖA'larının, PÇYYDB'ye etkisi Çizelge 7'de özetlenmiştir.

Çizelge 7. Öğrencilerin BDB ve ASDÖA'larının, PÇYYDB'ye etkisi

	Sabit	Standart Hata	t	p	İlişki	
					Kısmi	İkili
Sabit	-,207	,195	-1,064	,288		
BDB	,830	,065	12,823	,000	,523	,447
ASDÖA	,214	,056	3,792	,000	,179	,132

Problem çözmeye yönelik yansıtıcı düşünme becerisi = -0,21 + 0,83 Bilgisayarca düşünme becerisi + 0,21 Araştırma sorgulamaya dönük öz-yeterlilik algısı, R^2=0.47; p<0,05

Çizelge incelendiğinde ortaokul öğrencilerinin PÇYYDB'lerini, BDB ve ASDÖA birlikte %47 oranında anlamlı bir şekilde yordamaktadır. Tek başına bakıldığında ise BDB'nin %52 oranında, ASDÖA'nın ise %18 oranında yordadığı görülmektedir. Bu durumda öğrencilerin PÇYYDB'lerini en çok BDB'nin yordadığı söylenebilir. Benzer şekilde ortaokul öğrencilerinin BDB ve PÇYYDB'nin, ASDÖA'ya etkisi Çizelge 8'de verilmiştir.

Çizelge 8. Öğrencilerin BDB ve PÇYYDB'lerinin ASDÖA'ya etkisi

	Sabit	Standart Hata	t	p	İlişki	
					Kısmi	İkili
Sabit	1,150	,154	7,488	,000		
BDB	,561	,058	9,760	,000	,423	,362
PÇYYDB	,149	,039	3,792	,000	,179	,141

Araştırma sorgulamaya dönük öz-yeterlilik algısı = 1,15 + 0,56 Bilgisayarca düşünme becerisi + 0,15 Problem çözmeye yönelik yansıtıcı düşünme becerisi, R^2=0,40; p<0,05

Çizelgeye göre ASDÖA'yı, BDB ile PÇYYDB birlikte %40 oranında anlamlı bir şekilde yordamaktadır. Tek başına bakıldığında ise BDB'nin %42 oranında, PÇYYDB'nin %18 oranında yordadığı görülmektedir. Bu durumda öğrencilerin ASDÖA'larını en çok BDB'nin yordadığı söylenebilir.

Sonuç ve Tartışma

Araştırma bulgularına göre ortaokul öğrencilerinin BDB düzeylerinin, betimsel istatistik sonuçlarına göre yüksek olduğu görülmektedir. BDB ölçeğinin alt faktörlerine göre yapılan incelemede, öğrencilerin tüm becerilerde yüksek düzeyde olduğu sonucuna varılabilir. Benzer bir çalışmada Korkmaz vd. (2016), bireylerin BDB'si incelemiş ve katılımcıların yarısının orta düzeyde olduğu, diğer yarısının ise yüksek düzeyde bir ortalamaya sahip olduğu vurgulanmıştır. Ortaokul öğrencilerinin PÇYYDB'lerinin betimsel istatistik sonuçlarına göre yüksek olduğu bulunmuştur. PÇYYDB ölçeğinin faktörlerine göre yapılan incelemede de, öğrencilerin tüm becerilerde yüksek düzeye sahip olduğu sonucuna varılabilir. Benzer bir araştırma Kholid vd. (2020) tarafından yapılmış ve matematik öğrtmenliği bölümündeki öğrencilerin bir problem karşısında yansıtıcı düşünme becerilerini kullanma eğilimde olduğunu vurgulamıştır. Abdul Rabu ve Badlishah (2020) ise çalışmasında işbirlikçi bir öğrenme ortamında öğrencilerin yansıtıcı düşünme becerilerini incelemiş ve düşük düzeye sahip oldukları sonucuna ulaşmıştır. Ortaokul öğrencilerinin ASDÖA'larının betimsel istatistik sonuçlarına göre yüksek düzeyde olduğu söylenebilir. ASDÖA ölçeğinin faktörlerine göre yapılan incelemelerde de öğrencilerin tüm becerilerde yüksek ortalamaya sahip olduğu görülmektedir. Alanyazında bu çalışmaya benzer olarak Ozan ve Korkmaz (2018), ortaokul öğrencilerinin ASDÖA'larını araştırmış ve yüksek düzeyde olduğunu vurgulamıştır.

Ortaokul öğrencilerinin BDB düzeyleri cinsiyetler açısından incelendiğinde kızlar ve erkekler arasında anlamlı bir fark bulunamadığı görülmektedir. Ölçeğin faktörlerine göre de incelendiğinde cinsiyet değişkeni açısından anlamlı bir fark bulunamadığı görülmektedir. Bu araştırmaya benzer bir çalışma Chongo vd. (2020) tarafından yapılmış ve bilişimsel düşünme becerilerinde cinsiyete göre anlamlı bir farklılık bulunamamıştır. Farklı bir sonuç elde eden Román-González vd. (2017), bilişimsel düşünme performansını cinsiyet değişkeni açısından incelemiş ve erkek öğrencilerin lehine istatistiki olarak anlamlı bir fark olduğunu belirtmiştir. Ortaokul öğrencilerinin PÇYYDB'leri cinsiyet değişkenine göre incelendiğinde kız öğrencilerin lehine anlamlı bir fark olduğu görülmektedir. Alt faktörlere bakıldığında sorgulama alt faktörünün kız öğrencilerin lehine istatistiki olarak fark gösterdiği,

değerlendirme ve nedenleme alt faktörlerinin cinsiyetler açısından anlamlı bir fark göstermediği görülmüştür. Sa'dijah vd. (2021) tarafından yapılan bir çalışmada yansıtıcı düşünme becerilerinin erkek ve kadın öğretmen adayları arasında farklılık gösterdiğini belirtmiştir. Bu araştırmalardan farklı olarak Rasyid vd. (2018), ortaokul öğrencilerinin bir problem çözme sürecinde yansıtıcı düşünme becerilerinin cinsiyet farklılıklarına bağlı olmadığı sonucuna ulaşmıştır. Ortaokul öğrencilerinin ASDÖA'ları cinsiyet değişkenine göre incelendiğinde kız öğrencilerin lehine anlamlı bir fark olduğu belirtilmiştir. Alt faktörlerine bakıldığında kaçınma ve araştırmayı sürdürebilme faktörlerinin cinsiyetler açısından anlamlı bir fark olduğu fakat kişisel gelişim faktörünün istatistiki olarak fark göstermediği görülmektedir. Kafalı ve Akçöltekin (2024) çalışmasında, fen bilimleri öğretmenlerinin bilimsel araştırma öz yeterliliklerini cinsiyet açısından araştırmış ve erkek öğretmenlerin öz yeterliliklerinin kadın öğretmenlere göre daha yüksek olduğu sonucuna ulaşmıştır. Bahadır ve Tuncer (2017) çalışmasında, araştırma öz yeterliliğini cinsiyet faktörüne göre öğretmen adayları için değerlendirmiş; kız ve erkek öğrenciler arasında anlamlı bir fark gözlenemediğini belirtmiştir.

Ortaokul öğrencilerinin BDB düzeyleri ile PÇYYDB'leri, BDB düzeyleri ile ASDÖA'sı, ASDÖA ile PÇYYDB'si arasında pozitif yönde anlamlı bir ilişki vardır. Düşünme becerileri üzerine benzer ilişkilerin araştırıldığı çalışmalar alanyazında mevcuttur. Başaran ve İlter (2023)'in çalışmasında katılımcıların bilgisayarlı düşünme becerileri ile araştırma sorgulamaya dayalı öğretim öz yeterliliği arasındaki ilişki incelendiğinde, iki değişken arasında orta düzeyde bir ilişki bulunmuştur. Sulistiyo ve Wijaya (2020), araştırmaya dayalı öğrenmenin lise öğrencilerinin bilişimsel düşünme becerileri ve öz yeterliliği üzerindeki etkililiği incelemiş ve olumlu bir etkisi olduğunu ortaya koymuştur.

Ortaokul öğrencilerinin BDB'leri, PÇYYDB'leri ve ASDÖA 'ları birlikte birbirini yordamaktadır. Aynı zamanda BDB'yi en çok PÇYYDB'nin yordadığı, PÇYYDB'yi ise en çok BDB'nin yordadığı görülmektedir. Aynı zamanda ASDÖA'yı en çok BDB'nin yordadığı sonucuna ulaşılmıştır. Benzer bir şekilde He vd. (2021) araştırmasında, eleştirel düşünmenin BDB'yi önemli ölçüde geliştirebileceğini ortaya koymuştur.

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Çevrimiçi Ortamda İşbirliği Göstergelerinin Belirlenmesi: Programlama Örneği

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Özet

Çevrimiçi öğrenme sahip olduğu eş zamanlı ve eş zamansız ortamlar sayesinde, öğrenenlerin etkileşimini zaman ve mekân kısıtlaması olmadan genişletmektedir. Araştırmacılar, çevrimiçi öğrenme ortamlarında geribildirim, etkili işbirliği ve tartışma gibi imkânlar sunan öğretimsel stratejiler kullanılarak derse bağlılığın artırılabileceğini ifade etmektedirler. Bu öğretimsel stratejilerin geliştirilebilmesi için işbirliği göstergeleri belirleme noktasında dersin doğası kritik öneme sahiptir. Programlamanın doğası gereği soyut kavramlarla çalışılması gerektiğinden öğrenenler birtakım zorluklar yaşamaktadırlar. Yaşanan bu zorluklar araştırmacıları, programlama öğretim yöntem ve ortamlarında çeşitli alternatifler aramaya yönlendirmiştir. Bu kapsamda programlama mantığının anlaşılması için programlama etkinliklerine işbirliğini dahil etmenin önemi vurgulanmaktadır. Yapılan çalışmalar, etkili işbirliğinin basitçe doğal olarak ortaya çıkamayacağını, aslında modelleme ve geri bildirim yoluyla öğretilmesi ve desteklenmesi gerektiğini ortaya koymuştur. Bu çalışmada çevrimiçi ortamda programlama eğitimi için işbirliği göstergelerinin belirlenmesi amaçlanmaktadır. Bu amaç doğrultusunda çalışmada nitel araştırma yöntemlerinden sistematik literatür taraması yöntemi kullanılacaktır. Etkili işbirliği sağlayabilmek için çevrimiçi öğretim ortamlarından yararlanılabilir fakat programlamanın doğasından kaynaklanan zorluk ile çevrimiçi sunulmasının zorluklarını aşabilme amacıyla çevrimiçi programlama öğretimi sürecinin daha hassas biçimde planlanması gerekmektedir. Bu noktada, çevrimiçi ortam tasarımı için öğrenme analitiklerinden faydalanılabilir. Çevrimiçi ortamlardan elde edilen verilerdeki örüntülerin tespit edilerek analizi yoluyla çevrimiçi öğrenme süreçlerini kolaylaştırıcı bir unsur olarak öğrenme analitikleri kullanılmaktadır. Göstergeler, çevrimiçi ortamda bu örüntülerin görselleştirilmesini sağlayarak, öğrencilerin çevrimiçi öğrenme ortamındaki etkileşim verilerini izleyerek ve bu veriler üzerinde veri madenciliği analizleri yaparak tespit edilen problemlerin çözümü için anlaşılır sonuçlar sunmaktadır. Programlama öğretiminde bu işbirliğinin ne şekilde yapılması gerektiği, nasıl daha verimli hale getirileceği, bu amaçla öğrenme analitiklerinden nasıl yararlanılabileceğine yönelik literatürde yeterli çalışma bulunmamaktadır. Bu kapsamda programlama eğitiminde çevrimiçi işbirliği göstergelerinin belirlendiği çalışmanın çevrimiçi ders tasarımı konusunda alana önemli katkılar sağlayacağı öngörülmektedir. Bu çalışmada uzman görüşleri ve literatür çerçevesinde çevrimiçi programlamada işbirliği için göstergeler belirlenmiştir. Ayrıca öğrenme analitiklerinin çevrimiçi işbirliğinin belirlenmesi noktasındaki kullanımı, bu alan çalışmaları için önemli bir farklılık olarak düşünülebilir.

Anahtar Kelimeler: Programlama Eğitimi, Çevrimiçi Öğrenme, İşbirlikli Öğrenme, Öğrenme Analitikleri, Öğrenme Analitiği Göstergeleri

Giriş

Günümüzde, tüm alanlarda çağın gerektirdiği niteliklere sahip bireylerin yetiştirilmesi öngörülmektedir. Araştırmalar, 21. yüzyıl becerileri olarak öğrencilerden sahip olmaları beklenen bu yeni becerileri kazandırmada programlama öğrenmenin, önemli bir etkisinin olduğunu ortaya koymuştur (Tekdal, Baz & Çatlak, 2015). Bilgisayar programlama, bir problemin çözümü için gerekli komutların bilgisayarın anlayabileceği şekilde komutlara çevrilmesi, derlenmesi ve çalıştırılması sürecidir (Kesici ve Kocabaş, 2001). Bu sebeple bir donanımın nasıl davranacağını oluşturmak ve yönlendirmek için problem çözme, mantık yürütme, karar verme gibi birtakım üst düzey düşünme becerilerini kullanabilmek gerekir (Monroy-Hernandez ve Resnick, 2008; Shin, Park ve Bae, 2013; Akpınar ve Altun, 2014) Bu beceriler ve programlamanın temel yapıları olan algoritma, koşullu ifadeler, döngüler, fonksiyonlar, diziler, öğrenimi ve gelişimi zor bir süreç olarak görülmektedir (Fesakis ve Serafeim, 2009).

Programlama dili öğreniminin zor olması ve programlamadaki soyut kavramlar dolayısıyla programlama mantığının anlaşılması için belirlenen eğitimsel ve profesyonel faydaları nedeniyle programlama etkinliklerine işbirliğini dahil etmenin önemi vurgulanmaktadır (Saygıner & Tüzün, 2017). Dünya genelinde sürekli değişen ihtiyaçlar ve gelişen teknoloji, eğitim-öğretim yöntemlerinde bazı dönüşümleri kaçınılmaz hale getirmiştir. İnternet teknolojilerinin hızlı gelişimi ve internete erişimin artmasıyla işbirlikli öğrenme süreci internet üzerine taşınmış bu sayede bireylerin mekândan bağımsız olarak birlikte programlama yapabilmeleri sağlanmıştır

(Cheung ve Vogel, 2013). Bunun yanında araştırmacılara göre, çevrimiçi öğrenme ortamlarında geribildirim, işbirlikli kod yazma ve tartışma gibi imkânlar sunan öğretimsel stratejiler kullanılarak derse bağlılık artırılabilmektedir (Kılıç, Horzum & Çakıroğlu, 2016; Denner, Green & Campe, 2021). Programlama eğitimi açısından da öğrencilerin zaman ve mekân sınırlaması olmadan işbirlikli bir şekilde kod yazabilecekleri, öğretmenlerin öğrencilerin gelişimlerini takip edip onlara ödev ve dönüt verebileceği yenilikçi yaklaşımların önemi giderek artmaktadır. Çevrimiçi öğrenme ortamlarının tasarımında, bu ortamlardan elde edilen verilerdeki örüntülerin tespit edilerek analizi yoluyla öğrenme analitiklerinin çevrimiçi öğrenme süreçlerini kolaylaştırıcı bir unsur olarak kullanılmasını sağlamıştır (Park & Jo, 2019).

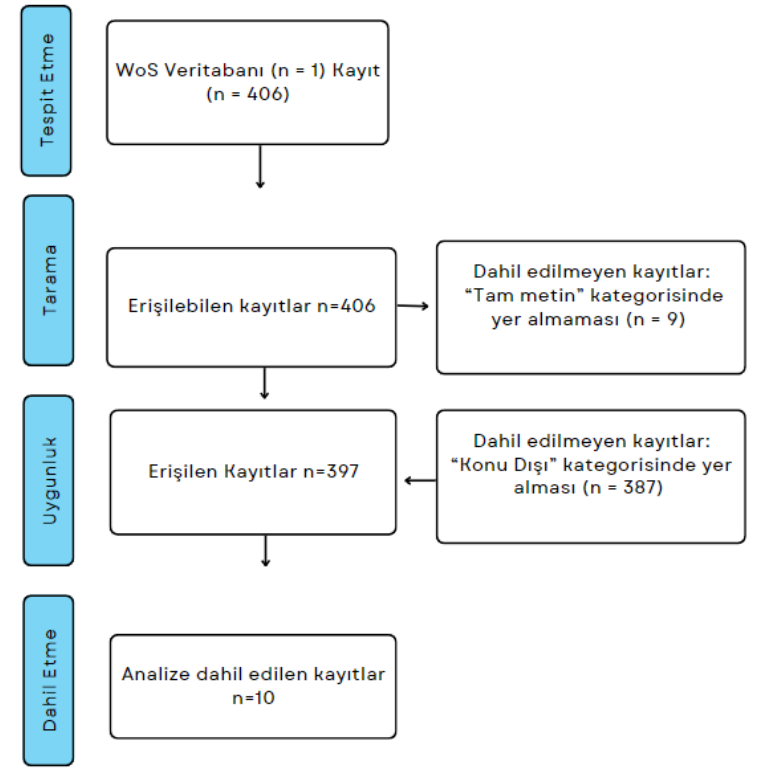
Öğrenme analitiği alanının birçok hedefi olmasına rağmen ortak temel hedef, çevrimiçi öğrenme ortamlarından elde edilen yüksek miktardaki kullanıcı verilerini (büyük veri) analiz ederek öğrenme sürecinin etkililiğini ve öğrenen performansını artırmaya dönük çalışmalar yapmaktır. Öğrenme analitikleri, temelde öğrenci etkileşimlerinin analizi yoluyla, öğrencilere öğrenimleri hakkında geri bildirim sağlamayı amaçlar. Bu geri bildirimler genellikle öğrenme panelleri aracılığıyla sağlanmaktadır (Reimers ve Neovesky 2015).

Öğrenme analitiği gösterge panelleri; öğrenenlere, öğrenme süreçlerine ve öğrenme bağlamlarına ait farklı göstergelerin bir veya daha fazla görselleştirmeyle bir araya getirildiği tek bir ekran olarak tanımlanmıştır (Schwendimann ve diğerleri, 2016). Çevrimiçi ortamda davranış örüntülerinin görselleştirilmesini sağlayan göstergeler, öğrencilerin çevrimiçi öğrenme ortamındaki etkileşim verilerini izleyerek ve bu veriler üzerinde veri madenciliği analizleri yaparak tespit edilen problemlerin çözümü için anlaşılır sonuçlar sunmaktadır (Park & Jo, 2019). Literatürde, çevrimiçi öğrenme kapsamında çeşitli göstergeler belirlenmiş ve bunlar üzerinden analizler yapılmıştır. Fakat işbirlikli programlama için öğrenme analitiği göstergelerine rastlanmamıştır. Programlama alanındaki öğrenme analitiği çalışmaları genellikle etkileşim yoğunluğu üzerinde yoğunlaşmıştır. Programlama alanında daha önce yürütülen nitel çalışmalar, öğrenme süreçlerinin ayrıntılı bir düzeyde zengin tanımlarını sunabilsede bu sonuçları genelleştirmek oldukça zordur. Standart niceliksel yöntemler, verilerin yeterince ayrıntılı incelenmesini desteklemez. Bu noktada eğitsel veri madenciliği ve öğrenme analitiklerinden yararlanmak kritik öneme sahip olabilir. Bu çalışmada literatür taraması ve alan uzman görüşleri doğrultusunda çevrimiçi işbirlikli programlama öğretimi için öğrenme analitiği göstergelerini belirlemek amaçlanmaktadır.

Yöntem

Bu araştırmada, çevrimiçi ortamda programlama eğitimi için işbirliği göstergelerinin belirlenmesi amaçlanmaktadır. Bu amaç doğrultusunda çalışmada nitel araştırma yöntemlerinden sistematik literatür taraması yöntemi kullanılmıştır. Sistematik literatür taraması, bir araştırma sorusu veya ilgili konu hakkında birden fazla araştırma çalışmasından elde edilen bulguların toplamasının, eleştirel olarak değerlendirilmesinin, birleştirilmesinin ve sunulmasının sistematik bir yoludur (Pati ve Lorusso, 2017). Ayrıca sistematik literatür taraması, belirli bir araştırma sorusuna yönelik literatürdeki uygun çalışmaları sentezleyerek araştırmacılara kanıta dayalı bilgi sağlar (Snyder, 2019).

Bu araştırmada sistematik literatür taraması Web of Science (WoS), Education Resources Information Center (ERIC), Sciencedirect, Google Scholar ve Scopus veri tabanları kullanılarak yapılmıştır. Birden fazla veri tabanında taranan makaleler, erişilen ilk veri tabanı dikkate alınarak çalışmaya dahil edilmiştir. Kullanılan arama sorgusu “learning analytics" and " programming education*" (Topic) OR “learning analytics" and " programming education*" (Title) OR collaborative programming education (Topic) AND collaborative OR cooperative OR pair (Topic) AND learning analytics indicators (Topic) and Education Educational Research or Computer Science (Research Areas) şeklindedir. Arama sorgusu yazarken kapsamı daraltmak ve ilişkili anahtar kelimeleri aramak için AND mantıksal (boolean) operatörü kullanılmıştır. Grup olarak kullanılan kelimeler ise tırnak (“”) işareti arasında belirtilmiştir. Bir kelime kökünden türetilmiş farklı kelimeler için “*” kesme (truncation) özelliği sorguya dahil edilmiştir. 10 Mayıs 2024'de gerçekleştirilen ilk arama, 406 çalışma arasından 10 çalışma, PRISMA akış şemasında gösterildiği gibi filtreleme süreci ve kartopu yaklaşımından geçtikten sonra seçilmiştir (Page ve ark., 2021). İlgili çalışmalardan yalnızca 10 tanesinin, araştırma kapsamında kullanılabilecek bulguları içerdiği belirlenmiştir. Literatür taramasının tekrarlanabilirliği ve geçerliliğini sağlamak için bu çalışmada Şekil 1’de yer alan PRISMA akışı izlenmiştir.



Şekil 1. Örneklem Seçim Sürecinde Prisma Akış Diyagramı

Bulgular

Çevrimiçi ortamda programlama eğitimi için işbirliği göstergelerinin belirlenmesi amacıyla yapılan sistematik literatür taraması sonucunda 10 çalışma araştırmaya dahil edilmiş ve bu çalışmalardan elde edilen veriler tablolar halinde aşağıda sunulmuştur.

Tablo 1. Araştırma Kapsamında İncelenen Çalışmalar

Yazar/Yıl	Programlama Ortamı	Gösterge Tipi	Kullanılan Araç
Xu, W., Wu, Y., & Ouyang, F. (2023)	Blok	Click Stream/ Video / Ses	code.org
Sun, D., Ouyang, F., Li, Y., & Chen, H. (2021)	Blok	Click Stream/Video / Ses	Minecraft'ta Python Programlama
Berland, M., Davis, D., & Smith, C. P. (2015)	Metin	Kod / Döküman	Amoeba
Laakso, M. J., Kaila, E., & Rajala, T. (2018)	Metin	Click Stream, Değişiklik Kayıtları, Süre	ViLLE web tabanlı IDE
Fernandez-Medina, C., Pérez-Pérez, J. R., Álvarez-García, V. M., & Paule-Ruiz, M. D. P. (2013)	Metin	Kod/Doküman/Hata Kayıtları	Eclipse IDE
Bodaker, L., & Rosenberg-Kima, R. B. (2023)	Blok	Video/ Ekran kaydı	Scratch, Zoom
Zhen, Y., Zheng, L., & Chen, P. (2021)	Metin	Sohbet ekranı/Transkript	Visual Studio Code
Li, L., Xu, L. D., He, Y., He, W., Pribesh, S., Watson, S. M., & Major, D. A. (2021)	Metin	Kod/Döküman	Zoom, Google Documents, Visual Basic
Lu, O. H., Huang, J. C., Huang, A. Y., & Yang, S. J. (2018)	Metin	Clickstream	Mooc, phyton web tabanlı IDE
Hsu, T. C., Abelson, H., Patton, E., Chen, S. C., & Chang, H. N. (2021)	Blok	Kod / Döküman/ Süre	MIT App Inventor

Tablo 1 incelendiğinde yapılan çalışmalarda gösterge elde etmek için veri kaynağı olarak genellikle tıklama akışı ve video kaydı kullanıldığı görülmektedir. Çalışmalarda blok veya metin tabanlı programlama ortamlarının kullanıldığı, gösterge olarak etkileşim durumları üzerinde yoğunlaşıldığı tespit edilmiştir.

Literatür taraması sonucu araştırmaya dahil edilen 10 çalışmadan ve alan uzman görüşlerinden yararlanılarak belirlenen çevrimiçi ortamda programlama eğitimi için işbirliği göstergeleri Tablo 2'de sunulmuştur.

Tablo 2. Çevrimiçi Ortamda Programlama Eğitimi İçin İşbirliği Göstergeleri

Boyut	Gösterge
Genel İşbirliği (Sohbet Ekranı)	• Katkı mesajı • Doğrulama mesajı • Açıklama • Kabul etme • Reddetme • Grup üyeleri arasında düşünce ve görüş alışverişi • Grup üyeleri arasında, grup görevlerini başarmak için birbirlerini motive ettikleri teşvik edici etkileşimler • Grup yönetimi • İşi organize etme
Çevrimiçi Programlamada İşbirliği (Editör)	• Gönderi dosyası oluşturma • Kod ekleme • Kod silme • Kod kopyalama • Kod yapıştırma • Kontrol için Kodu Çalıştırma • Hata Ayıklama
Sistem Etkileşim Durumu	• Gönderi Dosyasında Tıklama Sayısı • Gönderi Dosyasında Geçirilen Süre • Gönderi Dosyasına Erişim Sayısı • Sistemde Geçirilen Süre

Tablo 2 incelendiğinde, çevrimiçi ortamda programlama eğitimi için 3 temel boyutta 20 işbirliği göstergesi belirlendiği görülmektedir.

Sonuç

Programlamanın doğası gereği soyut kavramlarla çalışılması gerektiğinden öğrenenlerin yaşadıkları zorlukların üstesinden gelebilmeleri için işbirliğinin önemi vurgulanmaktadır. Bu işbirliğini belirlenmesi ve yönetilmesi için öğrenme analitikleri kritik öneme sahiptir. Programlama öğretiminde bu işbirliğinin ne şekilde yapılması gerektiği, nasıl daha verimli hale getirileceği, bu amaçla öğrenme analitiklerinden nasıl yararlanılabileceğine yönelik literatürde yeterli çalışma bulunmamaktadır. Çevrimiçi ortamda programlama eğitimi için işbirliği göstergelerinin belirlenmesi amacıyla nitel araştırma yöntemlerinden sistematik literatür taraması yöntemi ile yürütülen bu çalışmada 3 temel boyutta 20 gösterge belirlenmiştir. Bu kapsamda programlama eğitiminde çevrimiçi işbirliği göstergelerinin belirlendiği çalışmanın çevrimiçi ders tasarımı konusunda alana önemli katkılar sağlayacağı öngörülmektedir.

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0-6 Yaş Çocukların Teknoloji Kullanım Alışkanlıklarının İncelenmesi*

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Özet

Bu çalışmanın amacı 0-6 yaş dönemindeki çocukların teknoloji kullanım alışkanlıklarını incelemektir. Bu bağlamda çocukların dijital cihaz tercihi ve kullanım sıklığı, sosyal medya kullanım tercihi ve mobil oyun oynama süresini ortaya çıkarmak; çocukların dijital cihaz kullanımının sosyal, psikolojik ve fiziksel etkilerini anlamak amaçlanmıştır. Ayrıca dijital cihaz kullanımının çocukların sorumluluklarını nasıl etkilediği ve süre sınırlamasına uyma durumları da irdelenmiştir. Nicel betimsel yaklaşımla gerçekleştirilen bu çalışmada araştırmacılar tarafından geliştirilen anket kullanılarak 0-6 yaş aralığında çocuğu olan 120 ebeveynden veri toplanmıştır. Elde edilen veriler betimsel olarak analiz edilmiş ve frekans/yüzde analizleri yapılarak tablolarla sunulmuştur. Elde edilen bulgulara göre 0-6 yaş çocuklar, dijital cihaz olarak en çok akıllı telefon ve televizyonu kullanmaktadır. Çocukların yaklaşık %60'ı her gün dijital cihaz kullanmaktadır. Çocukların yaklaşık yarısı günde yarım saatten fazla dijital cihazları kullanmakta, mobil oyun oynamakta ve yaklaşık %60'ı televizyon izlemektedir. Çocukların %40'tan fazlası günde yarım saatten fazla akıllı telefon kullanmaktadır. Çocukların %87'si YouTube ve %11'i TikTok kullanmaktadır. Çocukların yaklaşık %50'si hiç fiziksel aktivite yapmamakta veya nadiren yapmaktadır. Önemli bir kısmı akranlarıyla iletişime geçmede sorun yaşadığı, problemleri nadiren çözebildiği, dikkat dağınıklığı ve uyku problemi yaşadığı, cihaz kullanımına bağlı olarak sinirlenebildiği görülmüştür. Çocukların yaklaşık %70'i ebeveynlerin koyduğu süre sınırını genellikle aşmaktadır.

Anahtar Kelimeler: Çocuklar, ebeveynler, okul öncesi, teknoloji

Investigation of Technology Use Habits of 0-6 Years Old Children

Abstract

This study aims to examine the technology usage habits of children aged 0-6. In this context, to reveal children's digital device preference and frequency of use, social media usage preference, and mobile game playing time; It is aimed to understand the social, psychological, and physical effects of children's use of digital devices. In addition, how the use of digital devices affects children's responsibilities and their compliance with time limits were also examined. In this study, which was carried out with a quantitative descriptive approach, data was collected from 120 parents with children between the ages of 0-6 using a questionnaire developed by the researchers. The data obtained was analyzed descriptively and presented in tables by frequency/percentage analysis. According to the findings, children aged 0-6 mostly use smartphones and televisions as digital devices. Approximately 60% of children use digital devices every day. Approximately half of the children use digital devices, play mobile games, and approximately 60% watch television for more than half an hour a day. More than 40% of children use smartphones for more than half an hour a day. 87% of children use YouTube and 11% use TikTok. Approximately 50% of children do not do any physical activity or do it rarely. It has been observed that a significant portion of them have problems communicating with their peers, are rarely able to solve problems, experience distraction and sleep problems, and may become angry due to device use. Approximately 70% of children often exceed the time limit set by parents.

Keywords: Children, parents, preschool, technology, family

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Giriş

Teknoloji, toplumların değişiminde etkili olan etmenlerden birisidir ve insanların yaşam şekillerini değiştirmiştir. Bu değişim hayatın birçok alanında görülmektedir. Dolayısıyla bu değişikliklerin çocukları da etkilemesi kaçınılmazdır. Çocuklar artık erken yaşta ve hızlı bir şekilde teknolojiyle tanışmaktadırlar (Güngör vd., 2020). Çocukların internet kullanımı ile ilgili yapılan TÜİK 2021 araştırmasında ise 6-15 yaş çocuklar için internet kullanımı 2013 yılında %50,8 olmasına rağmen bu oran 2021'de %82,7 olarak ortaya çıkmıştır. İnternet kullanımının cinsiyete göre çok büyük farklılık göstermediği ancak az bir oranla erkek çocukların daha fazla internette vakit geçirdiği aynı çalışmada görülmektedir. 2013'te erkek çocukların internet kullanımı %53,7'dir, kız çocukların ise %47,8'dir. 2021 yılında bu oran erkeklerde %83,9'a, kızlarda %81,5'e yükselmiştir. Bununla birlikte düzenli internet kullanan çocukların oranının arttığı da ortaya çıkmıştır. Çalışmaya göre düzenli internet kullanan çocukların oranı %98,6'dır. 2013 yılında bu oran %91,8 olarak belirlenmişti. Bu sonuçlar teknoloji kullanımının hem çocuklar hem yetişkinler arasında her geçen gün arttığını ve yaygınlaştığını göstermektedir (TÜİK, 2021)

Teknolojinin hayatımızın her alanına girmesi ve bunların her alanda kullanılıp ulaşılabilir hale gelmesi çocukların gelişimlerini kısıtlayabilmektedir. Bu kısıtlamalar sosyal, fiziksel, bilişsel, dil, duygusal alanların neredeyse hepsinde görülebilmektedir. Bu araçlar çocuklar tarafından kontrolsüzce kullanılırsa birçok zararlı içeriğe maruz kalmaları kaçınılmaz olacaktır (Cengiz Saltuk ve Erciyes,2020). Çocukların teknoloji ile tanışmaları ev ortamında ebeveynler aracılığıyla başlamaktadır. Ebeveynler çocuklara rol model olmaktadır. Çocuklar ilk olarak televizyon, tablet, akıllı telefon gibi teknolojik araçlarla tanışmaktadır (Çalhan ve Göksu, 2024). İnsanların günlük hayatının önemli bir parçası haline gelen teknolojik araçlar, okul öncesi çocukların ilgisini de aileleri aracılığıyla çekmektedir (Özkılıç Kabul, 2019). Teknolojinin erişiminin kolay olması çocukların teknolojiye ayırdıkları süreyi arttırmıştır. Bununla birlikte çocuklar artık akranları ile yüz yüze iletişim kurarak oynamaktan kaçınmakta daha çok teknolojik araçlar ile bireysel oynamaktadırlar (Güngör vd., 2020).

Çocukların televizyon, telefon, tablet, bilgisayar gibi teknolojik araçlarla artık daha fazla vakit geçirdikleri görülmektedir. Bunun sebebi teknolojinin ulaşılabilirliğinin artmış olmasıdır (Özdemir Ürün ve Oğuz Atıcı, 2022). Bahsedilen araçların çocukların günlük yaşamana girmesi onların bilişsel, sosyal, dil, duygusal, fiziksel gelişimleri üzerinde etkilidir. Teknolojik araçların yetişkinler tarafından kullanımın artması çocukların da yetişkinleri model almasına sebep olmuştur ve çocukların teknoloji ile ilk tanışmaları bu şekilde aile ortamında gerçekleşmektedir. Çocukların bu cihazlarla etkileşimleri öncelikle pasif olarak gerçekleşmekte daha sonra bu cihazları birebir kullanma şeklinde olmaktadır (Ateş ve Durmuşoğlu Saltalı, 2019). Bu cihazların topluma entegre olması çocukların oyun tercihlerinde farklılığa neden olmuştur (Sapsağlam, 2018). Çocukların sıklıkla kullandığı teknolojik oyunların onlara faydalı olması, oyunların süresinin yaşlarına uygun olması, bu oyunların şiddet içerip içermemesi onların gelişimi açısından önemlidir (Cengiz Saltuk ve Erciyes, 2020).

Bireyin yaşamında okul öncesi dönem, önemli ve kritik olarak ifade edilebilecek bir dönemdir. Çünkü tüm gelişim alanlarında hızlı bir gelişim gözlemlenmektedir. Bu dönemde, çocuğun gelişimini etkileyen pek çok faktör bulunmakla birlikte bu faktörlerin içinde kullandıkları teknolojik araçlar da bulunmaktadır. Bu cihazların kullanım süreleri, kullanım şekilleri çocuğun gelişimini etkilemektedir (Güngör vd., 2020).

Teknolojik araçlar çocuğun gelişimini destekleyebildiği gibi (Aral ve Doğan Keskin, 2018) doğru kullanılmaması çocukları olumsuz da etkileyebilmektedir. Çocuklar günümüzde artık televizyon, bilgisayar, akıllı telefon, tablet gibi teknolojik araçlarla uzunca vakit geçirmektedirler (Ulusoy ve Bostancı, 2014). Bu araçların küçük yaşlardan itibaren kullanılmaya başlanması çocukların ekran karşısında daha çok vakit geçirmesine neden olmaktadır (Koyuncuoğlu ve Akaroğlu, 2022). Çocuk ekran karşısında vakit geçirirken izlediklerinin ne olduğu yani izlediklerinin içeriği, bunları ne kadar izlediği gibi değişkenler ve bunların onu nasıl etkilediği çocuğun gelişimi açısından önem arz etmektedir (Cengiz Saltuk ve Erciyes, 2020).

Bu araştırmanın amacı 0-6 yaş dönemindeki çocukların teknoloji kullanım alışkanlıklarını incelemektir. Bireyin gelişiminin çok hızlı olduğu ve kritik bir öneme sahip olan okul öncesi dönemde çocuğun gelişimini etkileyen faktörlerden biri de teknolojidir. Günlük yaşamın bir parçası haline gelen teknolojik araçların çocuklar üzerinde önemli etkileri bulunmaktadır. Bu bağlamda bu çalışmanın yaşamın temeli olan 0-6 yaş dönemindeki çocukların teknolojik araçları kullanım alışkanlıklarının anlaşılmasında katkı sağlayacağı düşünülmektedir. Araştırma kapsamında aşağıdaki sorulara yanıt aranmıştır:

1) Çocukların dijital cihaz (TV, akıllı telefon, tablet, bilgisayar) tercihi ve kullanım sıklığı nasıldır?
2) Çocukların sosyal medya kullanım tercihleri nasıldır?
3) Çocukların mobil oyun süresi nedir?
4) Çocukların dijital cihaz kullanımı sosyal yönlerini nasıl etkiler?
5) Çocukların dijital cihaz kullanımı, psikolojik yönlerini nasıl etkiler?
6) Çocukların dijital cihaz kullanımı, sorumluluklarını nasıl etkiler?
7) Çocukların dijital cihaz kullanımı, fiziksel problemler yaşamalarına neden olur mu?
8) Ebeveynlerin süre sınırlamasına ilişkin tutumları nasıldır?

Yöntem

Araştırma Deseni

Bu araştırma nicel betimsel bir araştırmadır. Araştırmada 0-6 yaş çocukların teknoloji kullanım alışkanlıkları ortaya çıkarılacağı için bu araştırma büyük kitlelerin hali hazırda var olan durumlarını ortaya çıkarma amacı taşıyan tarama modeli kullanılarak yürütülmüş betimsel bir araştırmadır.

Örneklem

Çalışma grubunu, Mardin'in Kızıltepe ilçesinde ikamet eden, 0-6 yaş aralığında çocuğa sahip, araştırmaya gönüllü olarak katılmayı kabul eden toplam 120 ebeveyn oluşturmuştur. Araştırmanın çalışma grubunun oluşturulmasında örnekleme yöntemi olarak Kota Örnekleme (tabakalı amaçsal örnekleme) yöntemi kullanılmıştır. Bu yöntem araştırılan grup alt gruplara bölünerek alt grubun özelliklerini gösterip betimlemek için kullanılabilmektedir. Örnekleme olasılığa dayanmamaktadır, amaçlı bir şekilde belirlenmektedir (Büyüköztürk vd., 2019). Bu araştırma yaş aralığına göre 6 alt grup (0-12 ay, 13-24 ay, 25-36 ay, 37-48 ay, 49-60 ay, 61-72 ay) oluşturulup her gruptan 20 ebeveyn ile sınırlandırılmıştır. Araştırmaya katılan annelerin çoğunluğunun 26-35 yaş aralığında ve ilköğretim mezunudur. Araştırmaya katılan babaların ise büyük bir çoğunluğu 26-45 yaş aralığında ve neredeyse yarısı ilköğretim mezunudur. Annelerin büyük bir çoğunluğu herhangi bir mesleğe sahip değil. Aile gelir düzeyi ise çoğunlukla orta gelir sınıfındadır. Ebeveynlerin çocuklarının cinsiyeti birbirine yakın sayıdadır. Çocukların neredeyse tamamı kendine ait bir dijital cihaza sahip değildir.

Veri Toplama Aracı ve Veri Analizi

Araştırmada verilerin toplanması amacıyla, araştırmanın amaçları doğrultusunda araştırmacı tarafından ilgili literatür taranarak araştırmacılar tarafından oluşturulan anket formu kullanılmıştır. Anket formunun çalışmanın amacına uygunluğu konusunda uzman görüşü alınmıştır. Bu görüşler doğrultusunda ankette gerekli düzenlemeler yapılmış ve anket formu son halini almıştır. Anket formu uygulanmadan önce katılımcılara gerekli kısa açıklama yapılmıştır. Anket formunda, çocuğun ve ebeveynlerinin demografik bilgileriyle, teknolojik araç kullanım durumlarına ilişkin 35 soru yer almaktadır. Anket formu, Ek-1'de sunulmuştur. Verilerin analizinde betimsel analiz kullanılmıştır.

Bulgular

Bu çalışmada 120 ebeveynden toplanan nicel veriler betimsel olarak analiz edilmiştir. Elde edilen bulgular başlıklar halinde sunulmuştur.

Çocukların Dijital Cihaz Tercihi ve Kullanım Sıklığı

Çocukların en çok vakit geçirmeyi sevdiği dijital cihazlara ilişkin veriler analiz edilmiş ve Tablo 1'de sunulmuştur.

Tablo 1. Çocukların en çok tercih ettiği dijital cihazların dağılımı

Dijital Cihazlar	*f*	%
Televizyon	43	38
Akıllı Telefon	64	56
Tablet	6	5
Bilgisayar	1	1

*n = 114

Tablo 1 incelendiğinde çocukların en sevdiği dijital cihazın akıllı telefon olduğu tespit edilmiştir (f=64, %56). Televizyonun ise en çok sevilen ikinci dijital cihaz olduğu görülmektedir (f= 43, %3). Çocukların sevdiği dijital cihazlar arasında bilgisayarın son sırada olduğu göze çarpmaktadır. Çocukların haftalık dijital cihaz kullanım sıklığına ilişkin veriler incelenmiş ve çocukların büyük çoğunluğunun dijital cihazları her gün kullandığı görülmüştür (f=70, %59). Bununla birlikte hiç dijital cihaz kullanmayan çocukların olduğu da görülmüştür (f=14, %12). Ayrıca çocukların dijital cihazlarda günde ortalama ne kadar vakit geçirdiğine ilişkin veriler analiz edilmiş ve çocukların dijital cihazları günlük kullanırken en çok 0-30 dakika arası vakit geçirdiği tespit edilmiştir (f=43, %36). Dijital cihazlarda 4 saat ve üzeri vakit geçiren çocukların en az olduğu görülmüştür (f=8, %7). Çocukların

günlük ortalama televizyon izleme süresi incelendiğinde ise çocukların önemli bir kısmında bu sürenin 30-60 dakika arası olduğu görülmüştür (*f*=45, %38). Günlük televizyon izleme süresinde 4 saat ve üzeri seçeneğinin en az işaretlenen seçenek olduğu tespit edilmiştir (*f*=4, %4). Ayrıca çocukların önemli bir bölümünün günlük akıllı telefon kullanım süresi 0-30 dakika olarak tespit edilmiştir (*f*=40, %33). Veriler incelendiğinde günlük olarak telefonla hiç vakit geçirmeyen çocukların sayısının da fazla olduğu görülmüştür (*f*=30, %25).

Çocukların günlük tablet kullanım süresine ilişkin veriler analiz edilmiş ve çocukların neredeyse tamamının tablet kullanmadığı görülmüştür (f=103, %87). Bazı çocukların yaklaşık yarım saat tablet kullandığı (f=5, %4)), bazılarının 30-60 dk arasında kullandığı (f=7, %6), bazılarının ise 2-3 saat aralığında tablet kullandığı (f=4, %3) görülmüştür. Çocukların günlük bilgisayar kullanım süresi incelendiğinde ise neredeyse hiçbirinin kullanmadığı tespit edilmiştir (*f*=116, %96).

Çocukların Sosyal Medya Kullanım Tercihleri

Çocukların sosyal medya platformlarından hangilerini tercih ettiklerine ilişkin veriler analiz edilmiş ve Tablo 2'de sunulmuştur.

Tablo 2. Sosyal medya araçları

Sosyal Medya Araçları	*f*	%
YouTube	75	87
TikTok	9	11
Diğer	2	2
Instagram	0	0

* n = 86

Tablo 2 incelendiğinde çocuklar tarafından en çok tercih edilen sosyal medya platformunun YouTube olduğu tespit edilmiştir (f=75, %87). Ebeveynlerin verdiği bilgiye göre TikTok platformu, az tercih edilmiş olsa bile çocuklar tarafından kullanılmaktadır (f=9, %11). Instagram platformunun ise hiçbir çocuk tarafından kullanılmadığı görülmüştür.

Çocukların Mobil Oyun Oynama Süreleri

Çocukların günlük ortalama mobil oyun süresine ilişkin veriler analiz edilmiş ve Tablo 3'te sunulmuştur.

Tablo 3. Günlük mobil oyun süresi

Mobil Oyun Süresi	*f*	%
Hiç	55	47
0-30 Dakika	28	24
30-60 Dakika	22	19
2-3 Saat	9	8
4 Saat ve Üzeri	4	2

* n = 118

Tablo 3 incelendiğinde çocukların günlük mobil oyun süresi sorusuna en çok verilen cevabın hiç olduğu görülmektedir (f=55, %47). Veriler incelendiğinde bu soruya verilen en yüksek ikinci yanıtın ise 0-30 dakika arası olduğu tespit edilmiştir (f=28, %24). Çocukların günlük mobil oyun süresi sorusuna en az verilen cevabın ise 4 saat ve üzeri olduğu bulunmuştur.

Çocukların Dijital Cihaz Kullanımına Bağlı Olarak Sosyal Yönleri

Çocukların haftalık sosyal veya spor etkinlik sıklığına ilişkin veriler analiz edilmiş ve çocukların sosyal veya spor etkinlik yapma sıklığı sorusuna en çok verilen cevabın hiçbir zaman olduğu görülmüştür (n=118, *f*=37, %31). Bu soruya ikinci en çok verilen cevabın ise ara sıra seçeneği olduğu tespit edilmiştir (*f*=35, %30). Bununla birlikte soruya verilen en az cevabın ise her zaman seçeneği olduğu görülmüştür (*f*=8, %7). Ayrıca çocukların akranlarıyla kolayca iletişime geçme sıklığı sorusuna en çok verilen cevabın her zaman (n=116, *f*=52, %45), en az cevabın ise nadiren seçeneği olduğu tespit edilmiştir (*f*=6, %5). Çocukların karşılaştığı gündelik problemleri çözme sıklığı

sorusuna en çok verdikleri cevabın ise ara sıra olduğu görülmüştür (n=115, *f*=35, %30). Bu soruya verilen en az cevabın ise hiçbir zaman seçeneği olduğu tespit edilmiştir (*f*=13, %12).

Çocukların Dijital Cihaz Kullanımına Bağlı Olarak Psikolojik Yönleri

Çocukların dijital cihaz kullanımına bağlı olarak sinirlilik yaşama sıklığına ilişkin veriler analiz edilmiştir ve çocukların dijital cihaz kullanımına bağlı olarak sinirlilik yaşama sıklığı sorusuna verilen en çok cevabın hiçbir zaman olduğu görülmüştür (n=120, *f*=46, %38). Bu soruya verilen en az cevabın ise sık sık olduğu tespit edilmiştir (*f*=6, %5). Çocukların dijital cihaz kullanımına bağlı olarak dikkat dağınıklığı yaşama sıklığı sorusuna en çok verilen cevabın hiçbir zaman olduğu görülmüştür (n=118, *f*=58, %49). Bu soruya verilen en az cevabın ise sık sık olduğu tespit edilmiştir (*f*=3, %3). Çocukların dijital cihaz kullanmak için ağlama sıklığı sorusuna verilen en çok cevabın ara sıra (n=120, *f*=36, %29), en az cevabın ise sık sık olduğu tespit edilmiştir (*f*=9, %8).

Çocukların Dijital Cihaz Kullanımına Bağlı Olarak Sorumluluklarını Yerine Getirme

Çocukların dijital cihaz kullanımına bağlı olarak uyku problemi yaşama sıklığına ilişkin veriler analiz edilmiştir. Buna göre çocukların dijital cihaz kullanımına bağlı olarak uyku problemi yaşama sıklığı sorusuna verilen en çok cevabın hiçbir zaman olduğu görülmüştür (n=119, *f*=77, %64). Ayrıca çocukların dijital cihaz kullanmak için beslenmeyi erteleme sorusuna verilen en çok cevabın hiçbir zaman olduğu görülmüştür *(*n=117*, f=72, %*61). Çocukların yemek yerken aynı zamanda da cihaz kullanım sıklığında en çok ara sıra seçeneğinin işaretlendiği görülmüştür (*f*=44, % 36). Bu soruya en çok verilen ikinci cevabın ise nadiren seçeneği olduğu tespit edilmiştir (n=120, *f*=31, %25). Son olarak çocukların dijital cihaz kullanımına bağlı olarak sorumluluklarını erteleme sıklığı sorusuna en çok verilen cevabın hiçbir zaman olduğu görülmüştür (n=120, *f*=59, %50).

Çocukların Dijital Cihaz Kullanımına Bağlı Olarak Yaşadıkları Fiziksel Problemler

Çocukların dijital cihaz kullanımına bağlı olarak göz problemi yaşama sıklığına ilişkin veriler analiz edilmiştir ve çocukların dijital cihaz kullanımına bağlı olarak göz problemi yaşama sıklığı sorusuna verilen en çok cevabın hiçbir zaman olduğu görülmüştür (n=119, *f*=84, %71). Ayrıca çocukların dijital cihaz kullanımına bağlı olarak boyun ağrısı problemi yaşama sıklığı sorusuna verilen en çok cevabın hiçbir zaman olduğu görülmüştür (n=118, *f*=89, %75). Çocukların dijital cihaz kullanımına bağlı olarak baş ağrısı problemi yaşama sıklığı sorusuna en çok verilen cevabın da hiçbir zaman olduğu görülmüştür (n=119, *f*=96, %80). Çocukların dijital cihaz kullanımına bağlı olarak yorgunluk, halsizlik yaşama sıklığı sorusuna verilen en çok cevabın da hiçbir zaman olduğu görülmüştür (n=118, *f*=81, %69). Son olarak çocukların dijital cihaz kullanımına bağlı olarak sırt ağrısı problemi yaşama sıklığı sorusuna verilen en çok cevabın hiçbir zaman olduğu tespit edilmiştir (n=118, *f*=95, %81).

Ebeveynlerin Süre Sınırlamasına İlişkin Tutumları

Çocukların dijital cihaz kullanımı sırasında ebeveynlerinin süre sınırlanması koymasına ilişkin veriler analiz edilmiş (n=113) ve ebeveynlerinin büyük çoğunluğunun çocukların dijital cihaz kullanımı sırasında süre sınırlaması koyduğu tespit edilmiştir (*f*=88, %78). Bununla birlikte süre sınırlaması koymayan ebeveynler de bulunmaktadır (*f*=25, %22). Ayrıca çocukların çoğunlukla konulan süre sınırlamasına uyulduğu ortaya çıkmıştır (*f*=29, %39). Çocukların konulan süre sınırlamasına sık sık uyduğunu belirten ebeveyn sayısı da yüksektir (*f*=22, %29). Süre sınırlamasına hiç uymayan çocukların da olduğu dikkat çekmektedir (*f*=5, %7*).*

Tartışma ve Sonuç

Bu çalışmada çocukların teknoloji kullanım alışkanlıklarının incelenmesi amaçlanmıştır. Bu kapsamda araştırmada bireyin gelişimi için önemli bir dönem olan okul öncesi dönem (0-6 yaş) çocukların ebeveynleri ile çalışılmıştır. Çalışmada çocukların dijital cihaz tercihleri ve kullanım sıklıkları, mobil oyun oynama süreleri, dijital cihaz kullanım sonucu fiziksel problem yaşama durumları, sorumluluklarını erteleme durumları, ebeveynlerin dijital cihaz kullanmada çocuğa süre sınırlamasına ilişkin tutumları, çocukların dijital cihaz kullanımının sosyal ve psikolojik yönlerine etkileri ile ilgili veriler elde edilerek betimsel analiz yapılmıştır.

Çalışma sonucunda çocukların dijital cihaz tercihi ve kullanım sıklıkları incelendiğinde 0-6 yaş çocukların %56'sının akıllı telefon ve %38'inin televizyon tercih ettikleri ve %59'unun her gün dijital cihaz kullandıkları ortaya çıkmıştır. Dijital cihazların çocuklar tarafından günlük kullanım süreleri incelendiğinde ise %36'sının günde 0-30 dakika dijital cihaz kullandığı tespit edilmiştir. Bu bulguyu destekleyen Koyuncuoğlu ve Akaroğlu (2022) tarafından yapılan araştırmada 0-6 yaş çocukların %88'inin cep telefonu, %95'i televizyon %66'sının tablet ve %54'ü bilgisayar kullandığı tespit edilmiştir. Aynı çalışmada çocukların günlük ekran kullanım süreleri incelendiğinde çocukların %19'u günde 0-30 dakika, %31'i 30-60 dakika arasında ekrana maruz kaldıkları görülmektedir. Aral ve Doğan Keskin (2018) çalışmalarında çocukların hafta içi ve hafta sonu cep telefonu,

bilgisayar ve tabletle 30 dakika ve altında, televizyonla 31- 60 dakika vakit geçirdiklerini belirtmiştir. Ateş ve Durmuşoğlu Saltalı (2019)'nın çocukların tablet ve cep telefonu kullanma sürelerine ilişkin yaptıkları araştırmaya göre çocukların büyük çoğunluğunun bir saatin üzerinde akıllı telefon ve tablet kullandığı tespit edilmiş ayrıca çocukların %31'i üç saatin üzerinde cep telefonu ve tablet kullandığı ortaya çıkmıştır. Güngör ve diğerlerinin (2020) yaptıkları çalışmaya göre teknolojik araçlar içerisinde çocukların en çok televizyonu tercih ettikleri ortaya çıkmıştır. İlgili çalışmada çocukların hafta içinde bu araçları daha fazla kullandıkları tespit edilmiştir.

Bu çalışmada çocukların %38'i günlük 30-60 dakika televizyon izlemektedir. Çocukların günlük akıllı telefon kullanım süresinin ise 0-30 dakika arasında görülmüştür. Araştırma çocukların neredeyse tamamının tablet kullanmadığını ortaya koymuştur. Koyuncuoğlu ve Akaroğlu (2022) yaptığı araştırma incelendiğinde ise her üç çocuktan ikisinin tablet kullandığı görülmektedir. Bu farklılığın sebebi her iki çalışmadaki örneklem grubu arasında sosyoekonomik düzey farklılığı olabileceği düşünülmektedir. Ayrıca bu çalışmada çocukların tamamına yakını günlük olarak bilgisayar kullanmadığı ortaya çıkmıştır. Türkiye İstatistik Kurumu (TÜİK) verilerinin bilgisayar kullanım yaşını Türkiye'de ortalama 8'olarak ortaya koyması bu araştırma sonucunu desteklemektedir. Özyürek (2018)'in yaptığı çalışmada çocukların yarısının dört yaşına kadar bilgisayarla ev ortamında tanıştıkları ortaya çıkmıştır.

Bu çalışmada elde edilen bir diğer sonuca göre çocukların en çok tercih ettiği sosyal medya platformu YouTube olmuştur. Eğlence ve öğrenme ihtiyaçlarını karşılamak için video içeriği sunan platformlarının çocuklar için önemli olduğu söylenebilir. Bu durum, çocukların eğitimde teknolojiyi benimsemesinin, erken çocukluk döneminde bilişsel gelişime olumlu katkılar sağlayabileceği görüşünü desteklemektedir. Ancak, çalışmamızın bulguları TikTok'un çocuklar arasında daha düşük bir tercih olduğunu göstermektedir. Bu sonuç, Ateş ve Durmuşoğlu Saltalı'nın (2019) KKTC'deki 5-6 yaş çocuklarının tablet ve cep telefonu kullanımına ilişkin araştırmalarıyla uyumludur. Bununla birlikte, Aral ve Doğan Keskin'in (2018) araştırması TikTok'un çocuklar arasında daha yaygın olarak kullanıldığını göstermektedir. Bu farklılığın kültürel farklılıklardan kaynaklanabileceği düşünülmektedir.

Bu çalışmanın en dikkat çeken sonuçlarından biri de çocukların Instagram kullanmadığıyla ilgilidir. Oysa ki Güngör ve diğerleri (2020) Instagram'ın çocuklar arasında yaygın bir şekilde kullanıldığını gözlemlemiştir. Ebeveynlerin teknoloji kullanımına yönelik tutumları ve kısıtlamaları, çocukların sosyal medya tercihlerini şekillendirebilir (Çalhan ve Göksu, 2024; Özyürek, 2018; Güngör ve diğerleri, 2020). Ebeveynlerin bu tutumlarının, çocukların dijital medya kullanım alışkanlıklarını yönlendirmede kritik bir rol oynadığı bilinmektedir. Ancak, bu sonuçların literatürdeki diğer araştırma bulgularıyla karşılaştırılması, çocukların sosyal medya kullanım alışkanlıklarını daha kapsamlı bir şekilde anlamamıza yardımcı olacaktır. Gelecekteki araştırmalar, çocukların sosyal medya kullanımını etkileyen faktörleri daha derinlemesine inceleyerek, bu alandaki kanıtları artırabilir ve çocukların dijital ortamları daha güvenli bir şekilde kullanmalarına yardımcı olabilir.

Bu çalışmada çocukların mobil oyun oynama süreleri genellikle düşük düzeyde çıkmıştır. Aksaçlıoğlu ve Yılmaz (2007), öğrencilerin televizyon izleme ve bilgisayar kullanma alışkanlıklarının okuma alışkanlıklarını nasıl etkilediğini ortaya koymuştur. Bu bağlamda, çocukların mobil oyun oynama süreleri ile okuma alışkanlıkları arasındaki ilişki üzerinde durulabilir. Özellikle, hiç oyun oynamayan çocukların okuma alışkanlıklarının daha olumlu olabileceği öngörülebilir. Aral ve Doğan Keskin (2018), çocukların teknoloji kullanım alışkanlıklarının ebeveyn tutumlarına bağlı olduğunu göstermiştir. Bu durum, çocukların mobil oyun oynama sürelerinin aile içindeki kurallar ve ebeveynlerin tutumları tarafından şekillendiğini göstermektedir. Özellikle, ebeveynlerin mobil oyun kullanımını sınırlamaya yönelik tutumlarının çocukların oyun oynama sürelerini etkilemiş olabilir. Ateş ve Durmuşoğlu Saltalı (2019), çocukların mobil cihaz kullanımının aile içindeki tutumlarla yakından ilişkili olduğunu ortaya koymuştur. Bu bağlamda, mobil oyun oynama sürelerinin aile içindeki tutumlarla paralel olabileceği düşünülebilir. Koyuncuoğlu ve Akaroğlu (2022), çocukların ekran süresinin bireysel düzenleme yetenekleriyle ilişkili olduğunu ileri sürmüştür.

Araştırma sonucundan bir diğeri çocukların dijital cihaz kullanımının psikolojik olarak onları etkileyip etkilemediği ile ilgilidir. İlk olarak, çocukların büyük bir kısmının dijital cihaz kullanmaya bağlı olarak sinirlilik durumu yaşamadığı görülmüştür. Bununla birlikte çocukların yaklaşık yarısı dikkat dağınıklığı yaşamamaktadır. Çocukların diğer yarısı ise belli dönemlerde veya her zaman dikkat dağınıklığı yaşamaktadır. Ayrıca çocukların büyük bir kısmının (yaklaşık %70) dijital cihaz kullanmak için genellikle ağladığı belirlenmiştir. Literatürdeki bulgular, çocuklarda dijital cihaz kullanımının çeşitli olumsuz psikolojik ve sosyo-duygusal etkilere yol açabileceğini göstermektedir. Bu nedenle, ebeveynlerin ve eğitimcilerin çocukların dijital cihaz kullanımını sınırlandırmak ve bu cihazların kullanımının potansiyel risklerini azaltmak için gerekli önlemleri alması önemlidir. Aral ve Doğan Keskin (2018) ise dijital cihaz kullanımının uyku problemleri, agresyon ve anksiyete gibi problemlerle ilişkili olabileceğini ileri sürmüştür. Cengiz Saltuk ve Erciyes (2020) ise dijital cihaz kullanımının dil gelişimini olumsuz etkileyebileceğini belirlemiştir. Gündüz Kalan (2011), medya okuryazarlığı bilinci düşük olan ebeveynlerin çocuklarının daha fazla ekrana maruz kaldıklarını ve bu durumun problemli davranışlara yol açabileceğini tespit etmiştir. Özdemir Ürün ve Oğuz Atıcı (2022), okul öncesi çocukların dijital oyunlara aşırı ilgi

duymasının sosyal becerilerini olumsuz etkileyebileceğini ileri sürmüştür. Yeşilay (2019) teknoloji bağımlılığının çocuklarda dikkat eksikliği, uyku problemleri, obezite ve depresyon gibi problemlere yol açabileceğini belirtmiştir.

Bu çalışmada yaklaşık olarak her 10 çocuktan 4'ünün dijital cihaz kullanımından dolayı uyku problemleri yaşadığı tespit edilmiştir. Bu oran okul öncesi dönem çocukları için değerlendirildiğinde yüksek bir orandır. Bacanlı (2002) da dijital cihaz kullanımının çocuklarda uyku düzenini bozabileceğini ve uykuya dalma zorluğu yaratabileceğini belirtmiştir. Bu çalışmada dijital cihaz kullanımının çocuklarda sorumluluk duygusunu da olumsuz etkilediği ve dijital cihaz kullanımının çocuklarda dil becerilerini geliştirme potansiyeline sahip olduğu gözlenmiştir. Dijital cihazların çocuklarda dil becerilerini geliştirme potansiyeline sahip olduğu, ancak sorumluluk duygusu üzerindeki etkisinin karmaşık bir konu olduğu ve farklı değişkenlerden etkilenebildiği söylenebilir. Bu çalışmanın bir diğer sonucu çocukların dijital cihaz kullanımından kaynaklı fiziksel problemler yaşama durumuyla ilgilidir. Araştırma sonucuna göre çocukların %71'i dijital cihaz kullanımına bağlı olarak herhangi bir göz problemi yaşamamaktadır. Ancak ebeveynlere göre çocukların %29'luk kısmı göz problemi yaşayabilmektedir. Bu çalışmanın bulguları, literatürde yer alan diğer araştırmaların bulgularıyla büyük ölçüde örtüşmektedir. Aksaçlıoğlu ve Yılmaz (2007) araştırmalarında dijital cihaz kullanımının çocuklarda göz problem sıklığını ve şiddetini artırdığı belirtilmiştir. Dijital cihazlarla geçirilen süre arttıkça göz problemleri de artmaktadır. Aral ve Doğan Keskin (2018), ebeveynlerin %75'inin çocuklarının dijital cihaz kullanırken gözlerini ovuşturduğunu veya baş ağrısı çektiğini gözlemlediğini belirtmiştir. Aslan ve Cansever (2007), dijital cihaz kullanmanın çocuklarda miyop geliştirme riskini artırdığını belirtmiştir. Ateş ve Durmuşoğlu Saltalı (2019), çocukların %65'i dijital cihaz kullanırken gözlerinin yorgun olduğunu, Aydemir ve diğerleri (2012) tablet bilgisayar kullanımının çocuklarda göz yorgunluğu ve baş ağrısı riskini artırdığını belirtmişlerdir. Aydoğan ve Koçak (2003) ise dijital cihaz kullanımının çocuklarda göz koordinasyonu ve odaklanmada olumsuz etkiler yarattığını belirtmişlerdir. Çalışmamıza göre ayrıca çocukların %75'i dijital cihaz kullanımından kaynaklı boyun ağrısı yaşamamakta, %25'i ise yaşamaktadır. Bununla birlikte çocukların %25'i dijital cihaz kullanımından dolayı baş ağrısı, yaklaşık %30'u yorgunluk yaklaşık %20'si ise sırt ağrısı yaşamaktadır. Gökel (2020) yaptığı araştırmada teknolojik araçların ciddi sağlık sorunlarına neden olduğunu ortaya koymuştur. Mustafaoğlu ve Yasacı (2018)'nın çalışmasında dijital oyun oynamaktan kaynaklı çocukların duruş bozukluğu yaşadığı ve özellikle omurgalarda omuz ve ellerde sorunlar ortaya çıktığı ayrıca dijital oyun oynamanın göz sorunlarına ve uyku sorunlarına sebep olduğu belirlenmiştir.

Yapılan bu araştırma ile son olarak ebeveynlerin çocukların dijital cihaz kullanımına yönelik süre sınırlamasına ilişkin tutumları incelenmiştir. Çocukların dijital cihaz kullanımı sırasında ebeveynlerinin süre sınırlaması koyup koymadığına dair bulgular incelendiğinde ebeveynlerin %78'inin çocuklara süre sınırlaması koyduğu görülmektedir. Süre sınırlaması konulan çocukların yaklaşık %30'u ya bu süreye hiç uymamakta ya da ara sıra uymaktadır. Çocukların yaklaşık %70'nin ise konulan süreye uygun hareket ettiği görülmektedir. Aral ve Doğan Keskin (2018) yaptıkları bir çalışmada ebeveynlerin 0-6 yaş arası çocuklarının teknolojik alet kullanımı hakkındaki görüşleri ve tutumları incelemişlerdir. Araştırmaya katılan ebeveynlerin yaklaşık %72'sinin çocuklarına ekran kullanımı için süre sınırlaması getirdiği tespit edilmiştir. Bu çalışmada ebeveynlerin çoğunun çocuklarının dijital cihazları eğlence amaçlı kullandığını ve kullanım süresini sınırlamakta zorlandıklarını belirttiği de görülmektedir. Bu bulguların çalışmamızın bulgularıyla örtüştüğü görülmektedir. Cengiz Saltuk ve Erciyes (2020), okul öncesi dönem çocuklarında teknoloji kullanımına ilişkin ebeveyn tutumlarını ve bu tutumların çocukların bilişsel ve sosyal, duygusal gelişimi üzerindeki etkilerini incelemişler ve ebeveynlerin aşırı korumacı veya kontrolsüz tutumlarının çocukların gelişimini olumsuz etkileyebileceği sonucuna varmışlardır. Koyuncuoğlu ve Akaroğlu (2022) ise araştırmasında ekran kullanımıyla ilgili ailede kuralların olmamasının ekran kullanım süresinin artmasına sebep olduğunu tespit etmiştir.

Bu çalışma, Mardin'in Kızıltepe ilçesinde yaşayan 120 çocuğun ebeveynin 0-6 yaş çocuklarıyla ilgili sunduğu verilerle sınırlıdır. Farklı sosyo-ekonomik seviyelerden ve farklı coğrafi bölgelerden daha geniş katılımlı çalışmalar yapılabilir. Ayrıca farklı yaş gruplarındaki çocukların dijital cihaz kullanım alışkanlıklarını ve bu kullanımın etkilerini inceleyen araştırmalar da yapılabilir. Ebeveynlerin dijital cihaz kullanımına dair tutum ve davranışların çocukların kullanımını nasıl etkilediği araştırılabilir. Ayrıca çalışmanın verileri, ebeveynlerin beyanlarıyla sınırlıdır. Ebeveynler, kendi çocuklarıyla ilgili olumlu kanaatte bulunma eğiliminden kaynaklı objektif davranmamış olabilir. Çocuklardan da doğrudan veri toplayarak (Görüşme, Gözlem vb.) araştırmalar gerçekleştirilebilir. Ayrıca çocukların sosyal medya kullanımını etkileyen faktörleri daha derinlemesine inceleyecek çalışmalar yapılabilir. Ebeveynlerin çocukların sosyal medya platformlarından en çok YouTube'u kullandığını göz önüne alarak onların bu platformda kendilerine uygun içeriklerle vakit geçirip geçirmediklerine dikkat etmesi önerilmektedir. Çocukların dijital cihaz kullanım sürecinde ebeveynlerin katılımı önerilmektedir. Çocukların dijital cihaz kullanımından kaynaklı daha az fiziksel, sosyal, psikolojik sorunlar yaşamaları, sorumluluklarını erteleme davranışı göstermemeleri ve özdenetim sahibi olmalarını sağlamak için küçük yaştan itibaren çocuklara rutinler oluşturulmalıdır. Çocukların dijital cihaz kullanım sürelerinin ebeveynlerinin kontrolünde olması çocukların özellikle fiziksel ve sosyal gelişimlerinin olumsuz yönde etkilenmemesi açısından önemlidir. Son olarak ebeveynlerin dijital cihaz kullanımının riskleri ve faydaları konusunda bilinçlendirilmesi ve çocukların sosyal etkinliklere katılımının teşvik edilmesi önemli görülmektedir.

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EK-1. Çocukların Teknoloji Kullanım Alışkanlıkları Anketi

**Ankette geçen "dijital cihaz" ifadesiyle, akıllı telefon, tablet, televizyon ve bilgisayar kastedilmektedir.*

1) Annenin Yaşı: ( ) 18 ve altı ( ) 19-25 ( ) 26-35 ( ) 36-45 ( ) 45 ve üzeri
2) Annenin Eğitim Düzeyi: ( ) İlköğretim ( ) Lise ( ) Üniversite
3) Babanın Yaşı: ( ) 18 ve altı ( ) 19-25 ( ) 26-35 ( ) 36-45 ( ) 45 ve üzeri
4) Babanın Eğitim Düzeyi: ( ) İlköğretim ( ) Lise ( ) Üniversite
5) Annenin Çalışma Durumu: ( ) Çalışıyor ( ) Çalışmıyor
6) Ailenin Gelir Durumu: ( ) Düşük ( ) Orta ( ) İyi ( ) Çok İyi
7) Çocuğun Cinsiyeti: ( ) Kız ( ) Erkek
8) Çocuğun Yaşı: ( ) 0-12 ay ( ) 13-24 ay ( ) 25-36 ay ( ) 37-48 ay ( ) 49-60 ay ( ) 61-72 ay
9) Çocuğunuzun kendine ait dijital cihazı var mı? ( ) Evet ( ) Hayır
10) Çocuğunuzun en çok vakit geçirmeyi sevdiği dijital cihaz hangisidir?
( ) Televizyon ( ) Akıllı telefon ( ) Tablet ( ) Bilgisayar
11) Çocuğunuzun dijital cihaz kullanma sıklığı nedir?
( ) Her gün ( ) Haftada 1-3 gün ( ) Haftada 4-6 gün ( ) Hiç kullanmıyor
12) Çocuğunuz bahsedilen dijital cihazlarla günde ortalama ne kadar vakit geçirmektedir?
( ) Hiç ( ) 0-30 dakika ( ) 30-60 dakika ( ) 2-3 saat ( ) 4 saat ve üzeri
13)Çocuğunuzun günlük ortalama televizyon izleme süresi nedir?
( ) Hiç izlemiyor ( ) 0-30 dakika ( ) 30-60 dakika ( ) 2-3 saat ( ) 4 saat ve üzeri
14) Çocuğunuzun günlük ortalama akıllı telefon kullanım süresi nedir?
( ) Hiç kullanmıyor ( ) 0-30 dakika ( ) 30-60 dakika ( ) 2-3 saat ( ) 4 saat ve üzeri
15) Çocuğunuzun günlük ortalama tablet kullanım süresi nedir?
( ) Hiç kullanmıyor ( ) 0-30 dakika ( ) 30-60 dakika ( ) 2-3 saat ( ) 4 saat ve üzeri
16) Çocuğunuzun günlük ortalama bilgisayar kullanım süresi nedir?
( ) Hiç kullanmıyor ( ) 0-30 dakika ( ) 30-60 dakika ( ) 2-3 saat ( ) 4 saat ve üzeri
17) Çocuğunuz en çok hangi sosyal medya platformunda vakit geçiriyor? *(Eğer çocuğunuz sosyal medyada vakit geçirmiyorsa bu soruyu yanıtlamayınız.)* ( ) YouTube ( )TikTok ( ) Instagram ( ) Diğer
18) Çocuğunuz günde ortalama ne kadar süre mobil oyun oynar?
( ) Hiç oynamaz ( ) 0-30 dakika ( ) 30-60 dakika ( ) 2-3 saat ( ) 4 saat ve üzeri
19) Çocuğunuz haftada ne sıklıkla sosyal etkinlik ya da spor etkinliği yapmaktadır?
( ) Hiçbir zaman ( ) Nadiren ( ) Ara sıra ( ) Sık sık ( ) Her zaman
20) Çocuğunuzda dijital cihaz kullanmaya bağlı sinirlilik durumu gözlemliyor musunuz?
( ) Hiçbir zaman ( ) Nadiren ( ) Ara sıra ( ) Sık sık ( ) Her zaman
21) Çocuğunuz dijital cihaz kullanmaya bağlı olarak dikkat dağınıklığı yaşıyor mu?
( ) Hiçbir zaman ( ) Nadiren ( ) Ara sıra ( ) Sık sık ( ) Her zaman
22) Çocuğunuz dijital cihaz kullanmaya bağlı göz problemi (ağrı, sulanma vb.) yaşıyor mu?
( ) Hiçbir zaman ( ) Nadiren ( ) Ara sıra ( ) Sık sık ( ) Her zaman
23) Çocuğunuzda dijital cihaz kullanmak için ağlıyor mu?
( ) Hiçbir zaman ( ) Nadiren ( ) Ara sıra ( ) Sık sık ( ) Her zaman
24) Çocuğunuz dijital cihaz kullanmaya bağlı uyku problemleri yaşıyor mu?
( ) Hiçbir zaman ( ) Nadiren ( ) Ara sıra ( ) Sık sık ( ) Her zaman
25) Çocuğunuz dijital cihaz kullanmak için beslenmeyi erteliyor mu?
( ) Hiçbir zaman ( ) Nadiren ( ) Ara sıra ( ) Sık sık ( ) Her zaman
26) Çocuğunuz dijital cihaz kullanmaya bağlı boyun ağrısı yaşıyor mu?
( ) Hiçbir zaman ( ) Nadiren ( ) Ara sıra ( ) Sık sık ( ) Her zaman
27) Çocuğunuz dijital cihaz kullanmaya bağlı baş ağrısı yaşıyor mu?
( ) Hiçbir zaman ( ) Nadiren ( ) Ara sıra ( ) Sık sık ( ) Her zaman
28) Çocuğunuz dijital cihaz kullanmaya bağlı yorgunluk, halsizlik yaşıyor mu?
( ) Hiçbir zaman ( ) Nadiren ( ) Ara sıra ( ) Sık sık ( ) Her zaman
29) Çocuğunuz dijital cihaz kullanmaya bağlı sırt ağrısı yaşıyor mu?
( ) Hiçbir zaman ( ) Nadiren ( ) Ara sıra ( ) Sık sık ( ) Her zaman
30) Çocuğunuz yemek yerken aynı zamanda televizyon ya da diğer cihazları izler/kullanır mı?
( ) Hiçbir zaman ( ) Nadiren ( ) Ara sıra ( ) Sık sık ( ) Her zaman
31) Çocuğunuz dijital cihaz kullanımına bağlı olarak sorumluluklarını erteler mi?
( ) Hiçbir zaman ( ) Nadiren ( ) Ara sıra ( ) Sık sık ( ) Her zaman
32) Çocuğunuz, koyduğunuz süre sınırlamasına uyar mı? ***(****Süre sınırı koymuyorsanız bu soruyu yanıtlamayın.****)***
( ) Hiçbir zaman ( ) Nadiren ( ) Ara sıra ( ) Sık sık ( ) Her zaman
33) Çocuğunuz akranlarıyla kolayca iletişime geçebiliyor mu?
( ) Hiçbir zaman ( ) Nadiren ( ) Ara sıra ( ) Sık sık ( ) Her zaman
34) Çocuğunuz karşılaştığı gündelik problemleri çözebiliyor mu?
( ) Hiçbir zaman ( ) Nadiren ( ) Ara sıra ( ) Sık sık ( ) Her zaman

İngilizce Öğretiminde Teknoloji Destekli Biçimlendirici Değerlendirme: Araştırmaların Yöntemsel Eğilimi ve Sonuçları

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Özet

Bu çalışmanın amacı İngilizce öğretiminde teknoloji destekli biçimlendirici değerlendirmeye odaklanan araştırmaların incelenmesidir. Bu bağlamda Web of Science, Scopus ve ERIC veri tabanları taranmış ve 119 araştırma makalesi bu çalışma kapsamında incelenmiştir. İlgili araştırmalar, yöntemsel eğilim (araştırma deseni, örneklem grubu, örneklem sayısı, örnekleme yöntemi, veri toplama araçları, veri analiz teknikleri), araştırılan dijital araçlar/ortamlar, incelenen değişkenler ve elde edilen sonuçlar betimsel yaklaşımla incelenmiştir. Elde edilen sonuçlara göre İngilizce öğretiminde teknoloji destekli biçimlendirici değerlendirmeye odaklanan araştırmaların son yıllarda artış gösterdiği görülmüştür. En sık tercih edilen araştırma deseninin nitel araştırmalarda durum çalışması, nicel araştırmalarda ise deneysel desen olduğu görülmüştür. Araştırmalarda en sık tercih edilen örneklem grubu üniversite öğrencileri, örneklem sayısı 31-100 katılımcı, örnekleme yöntemi amaca uygun örnekleme olmuştur. Veri toplama araçları olarak en çok anket, görüşme ve doküman tercih edilmiştir. Veri analiz tekniği olarak frekans, yüzde, ortalama, standart sapma, *t*-testi, içerik analizi, Anova ve korelasyon en sık tercih edilen analizler olmuştur. İlgili araştırmalarda üniversite öğrencilerinin akademik başarısı, yazma becerileri, motivasyon, performans ve dijital araçlara ilişkin tutum/algıları; öğretmenlerin ve akademisyenlerin araçlara ilişkin deneyimleri ve biçimlendirici değerlendirme stratejileri, yöntem ve teknikleri en sık odaklanılan değişkenler olmuştur. İlgili araştırmalardan elde edilen sonuçlar, İngilizce öğretiminde teknolojinin biçimlendirici değerlendirme amaçlı kullanılmasının önemli katkılar sağladığını göstermektedir.

Anahtar Kelimeler: Teknoloji destekli biçimlendirici değerlendirme, İngilizce öğretimi, web 2.0, CALL

Technology-Assisted Formative Assessment in English Language Teaching: Methodological Trends and Results of Research

Abstract

The purpose of this study is to examine research focusing on technology-supported formative assessment in English language teaching. In this context, Web of Science, Scopus and ERIC databases were scanned and 119 research articles were examined within the scope of this study. The methodological tendency (research design, sample group, sample size, sampling method, data collection tools, data analysis techniques) of the relevant research, the digital tools/environments investigated, the variables examined and the results obtained were examined with a descriptive approach. According to the results, it has been observed that research focusing on technology-supported formative assessment in English language teaching has increased in recent years. It has been observed that the most frequently preferred research design is the case study in qualitative research and the experimental design in quantitative research. The most commonly preferred sample group was university students, the number of samples was 31-100 participants, and the sampling method was purposeful sampling. Surveys, interviews, and documents were most preferred as data collection tools. As data analysis techniques; frequency, percentage, mean, standard deviation, t-test, content analysis, ANOVA, and correlation were the most frequently preferred analyses. In the primary studies, university students' academic achievement, writing skills, motivation, performance, and attitudes/perceptions towards digital tools; Teachers' and academics' experiences with the tools and formative assessment strategies, methods, and techniques were the most frequently focused variables. The results show that using technology for formative assessment purposes in teaching English makes significant contributions.

Keywords: Technology-supported formative assessment, English language teaching, web 2.0, CALL

Giriş

Yabancı dil eğitimi, insanlar arasındaki etkileşimin artmasıyla eski dönemlerden günümüze üzerinde durulan bir eğitim alanı olmuştur. İletişimin hızla geliştiği küreselleşen dünyamızda ise yabancı dil eğitiminin önemi özellikle vurgulanmaktadır. UNESCO'nun 2023 yılı verilerine göre İngilizce dünya çapında en çok konuşulan ikinci dilidir. Dünyada 50'den fazla ülkenin resmi dili olan İngilizce; bilim, siyaset, kültür, teknoloji ve iş dünyasında da en çok tercih edilen iletişim dili olduğu için resmi ve özel kurumlar aracılığıyla veya bireysel olarak yaygın şekilde öğrenilir. Günümüzde İngilizce öğrenimine önem veren ülkeler, bireyin öğrenme ihtiyaçlarına değer veren öğrenci merkezli yapılandırmacı bir anlayışla eğitim süreçlerini düzenlemektedir. İçinde bulunduğumuz dijital çağda bireyi önceleyen öğrenme ve öğretme süreçleri kaçınılmaz olarak dijital teknolojilerden de etkilenmektedir. Bu durum eğitim öğretimde yapılan değerlendirmelerin de mevcut teknolojik araçlarla desteklenmesini ve güncellenmesini sağlamıştır.

Öğrenme ve değerlendirme kavramları birbiriyle bağlantılı kavramlardır (Boz ve Boz, 2005). Değerlendirme basamağı, öğrenme hedefinin ne kadarına ulaşılıp ne kadarının eksik kaldığını görmek bakımından öğretim programlarının en temel basamaklarındandır. Bu basamak, öğrenme ürünlerinin niteliğini ve sınırını ölçerken, iyileştirme için yapılabileceklerin tartışılmasına fırsat tanır. Öğrenme ürünleri birçok farklı ölçme aracıyla ölçülüp değerlendirilebilir fakat eğitim ve öğretimde değerlendirme kullanım amacına göre genellikle "biçimlendirici değerlendirme" ve "özetleyici değerlendirme" olarak ikiye ayrılır.

Bu çalışmaya konu olan "biçimlendirici değerlendirme" terimi ilk olarak Cronbach (1963) tarafından öğretim programını gözden geçirmek ve geliştirmek için değerlendirmeyi kullanma fikri olarak önerilmiştir. Brown ve Abeywickrama (2004)'a göre ise biçimlendirici değerlendirme, öğrencilerin ilerleme sürecini sürdürmelerine yardımcı olmak amacıyla yeterliliklerini ve becerilerinin tam da "oluşturma" sürecinde değerlendirilmesidir ve böyle bir oluşumun anahtarı, öğrenmenin gelecekteki devamlılığı göz önünde bulundurularak, performansa ilişkin uygun geri bildirimin (öğretmen tarafından) verilmesi ve (öğrenci tarafından) içselleştirilmesidir. Heritage (2010)'a göre biçimlendirici değerlendirme, öğrenmeyle ilgili sürekli ve sistematik bir süreçtir ve dört temel unsuru vardır; 1) "boşluğu" belirlemek, 2) geri bildirim, 3) öğrenci katılımı, 4) öğrenme ilerlemeleri. Kısacası biçimlendirici değerlendirmenin odak noktası öğrenci gelişiminin sürekliliğini sağlamaktır denilebilir. Özetleyici değerlendirmeler ise daha geleneksel bir anlayışa sahiptir; bir öğrencinin ne anladığını ölçmeyi veya özetlemeyi amaçlar ve genellikle bir dersin veya öğretim biriminin sonunda gerçekleşir (Brown ve Abeywickrama, 2004). Biçimlendirici ve özetleyici değerlendirme arasındaki temel ayrım, zamanlamayla değil, amaç ve sonuçla ilgilidir (Sadler, 1989). Bu bağlamda, teorik olarak herhangi bir değerlendirme aracı, öğrenme sürecinde veya sonunda biçimlendirici değerlendirme aracı olarak kullanılabilir fakat biçimlendirme amacına hizmet edebilmesi için değerlendirmenin öğrencilere ve öğretmenlere yönelik eyleme dönüştürülebilir bilgiler içermesi yani anlamlı geri bildirimler vermesi gerekir (Heritage, 2010).

Öğrenmelerin süreç boyunca ne derece öğrenildiğinin geri bildirimi, sürecin sağlıklı işlemesi için önemlidir. Geribildirimin başarılı olması için de onun öğrenciyi düşünmeye sevk etmesi gerekir ki bu ancak öğrenciye kendi gelişimi için ne yapması gerektiğine yönelik bir yorum ve yönlendirmeyle mümkündür (Leahy vd., 2005). Bunun yanı sıra, Bhagat ve Spector (2017)'a göre geri bildirimin yapılandırmacı ve etkili olabilmesi için ertelenmemesi gerekir, aksi takdirde yanlış anlaşılmalara sebep olup öğrenme sürecini negatif etkileyebilmektedir. Biçimlendirici değerlendirmede, öğretmenin (öğrencilere) hedef kazanımlar ve öğrenme eksiklikleri hakkında geribildiriminden bahsedilebileceği gibi, öğrencilerin öğrenme süreci içinde kendi vardıkları noktayı ve hedefe yaklaşmaları için yapmaları gerekenleri kendilerine hatırlattıkları bir öz düzenlemeden ve değerlendirmeden de söz edilebilir (Sadler, 1989). Ayrıca öğrenmelerin sürekliliği için öğretmen ve öğrenci arasındaki karşılıklı etkileşim, geri bildirim ve öz düzenleme kadar akran değerlendirmesi de biçimlendirici değerlendirmenin önemli bir parçasıdır denilebilir (Black ve Wiliam, 1998).

Başlangıçta da değinildiği gibi, günümüzde öğrencilerin teknolojiyle çevrelenmiş bir dünyada yaşıyor olması sebebiyle, biçimlendirici değerlendirmenin etkili uygulanabilmesi için dijital araçların kullanımı önemlidir. Teknoloji destekli biçimlendirici değerlendirme araçları, öğrenci ve öğretmenlere öğretim sürecinde destek olan tüm çevrimiçi programlar, uygulamalar ya da teknolojilerdir. Bu bağlamda uygun nitelikteki tüm Web 2.0 araçları, e-rubrikler, e-portfolyolar, çevrimiçi yazım biçimlendirme uygulamaları ve etkileşimli çalışma kağıtları teknoloji destekli araçlara örnek verilebilir. Bahsedilen bu araçların ortak özelliği öğretmenlerin öğrencilerin gelişimini süreç içinde hızlı ve etkili bir şekilde gözlemlemesine ve gözlemlerini raporlaştırmasına imkân sağlamasıdır (Bhagat ve Spector, 2017). Bu veriler daha sonra öğretmen tarafından özel öğrenme eksikliklerini belirlemek ve öğretimi buna göre planlamak için kullanılabileceği gibi öğrencilerin öz düzenleme ve değerlendirme yapmasına da imkân tanır.

Çeşitli dijital araçlar ülkemizde ve dünyada son yıllarda halihazırda artan bir ilgiyle kullanılmaya başlanmışken, Covid-19 pandemi döneminde zorunlu olarak uygulanan uzaktan eğitim koşulları sebebiyle geleneksel tekniklerin ve öğretim araçlarının yetersiz kalması, teknolojinin tüm eğitim süreçlerinde kullanılmasını gerekli kılmıştır. Son

yıllarda teknoloji kullanımının dil öğretiminde yaygınlaşması sonucu bu alanda yapılan araştırmalara yönelik ilginin giderek arttığı belirtilmektedir (Akdağ ve Özkan, 2017; Goksu vd., 2022; Sercanoğlu vd., 2021). Literatürdeki araştırmalarda öğrenme sürecinde bilgi ve becerilerdeki eksik kalan yönleri değerlendirmek için teknoloji destekli biçimlendirici araçları kullanmanın etkili ve ilginç bir yöntem olduğu belirtilmiştir (Elmahdi vd., 2018; Yarahmadzehı ve Goodarzı, 2020; Zhyhadlo, 2022).

Dijital teknolojilerin desteklediği öğrenme ortamları, öğrencilerde düşünme süreçlerini harekete geçirmekte, özerk çalışma becerilerini geliştirmekte, bilgisayar okuryazarlığını ve dijital farkındalıklarını şekillendirebilmektedir (Di Gregorio ve Beaton, 2019). Bu becerilerin 21. yüzyıl becerileri olarak nitelendirilen yaratıcı düşünme, iş birliği, eleştirel düşünme ve iletişim becerileri ile örtüştüğü ve bu bağlamda teknoloji destekli biçimlendirici araçların bu yönde bir fayda sağladığı öne sürülebilir. Dijital teknoloji destekli araçların kullanımıyla; yazılı, işitsel, görsel vb. farklı formatlarda kullanılabilen geri bildirimlerin verdiği mesaj anlamca zenginleşir ve bu mesaj farklı beceri alanlarını destekleyerek öğrencilerde öz düzenlemeyi teşvik eder (Cosi vd., 2020; Li vd., 2022; Ranalli vd., 2018).

Web 2.0 araçları olarak adlandırılan, içeriğinin oluşumuna kullanıcıların aktif olarak katıldığı, okuyup yazarak ve düşünerek kendi fikirlerini özgürce yansıttıkları çevrimiçi öğrenme ortamlarından günümüzde en sık kullanılanları, video paylaşım siteleri, sosyal ağlar, WiKi'ler ve bloglardır (Ergül Sönmez ve Çakır, 2021). Web 2.0 araçlarının en önemli pozitif özelliklerinden biri hızlı geri bildirim sağlamalarıdır (Kent, 2019). Geleneksel değerlendirme araçları olan kâğıt ve kalemle çok daha uzun süreceği tahmin edilen biçimlendirici değerlendirme süreci Web 2.0 araçlarının kullanımıyla hızlı ve daha etkili hale gelebilir (Robertson vd., 2019). Son yıllarda özellikle Öğrenci Yanıtlama Sistemleri olarak adlandırılan, öğrenci performanslarıyla ilgili hızlı geri bildirim alınabilen ve öğrenmeyi oyunlaştıran Web 2.0 araçlarının İngilizce öğretiminde kullanımıyla ilgili araştırmaların dikkat çektiği ve bu araçların kullanımının genel olarak pozitif bir tecrübe olarak ele alındığı görülmüştür (Kent, 2019; Kolisnyk vd., 2022; Nadeem ve Al Falig, 2020; Saeed Alharbi ve Meccawy, 2020).

Teknoloji destekli araçlar yoluyla öğrencilerin hedef kazanımları etkili, eğlenceli ve kolay bir şekilde edinebilmesinin ve kazanımların hızlı değerlendirilebilmesinin mümkün olup olmadığının tartışıldığı araştırmalar bu çalışmanın konusunu oluşturmaktadır. Çalışmanın amacı, İngilizce öğretiminde teknoloji destekli biçimlendirici değerlendirmeye odaklanan son yıllarda yapılan araştırmaların, yöntemsel eğilim (araştırma deseni, örneklem grubu, örneklem sayısı, örnekleme yöntemi, veri toplama araçları, veri analiz teknikleri), araştırılan dijital araçlar/ortamlar, incelenen değişkenler ve elde edilen sonuçlar bakımından incelenmesi ve elde edilen sonuçların istatistiksel olarak bütüncül bir şekilde ortaya konulmasıdır.

Bu çalışmada aşağıdaki sorulara yanıt aranmıştır:

1) Araştırmaların yıllara göre dağılımı nasıldır?
2) Araştırmaların yöntemsel eğilimi nasıldır?
3) Araştırmalarda hangi dijital araçlar ve değişkenler incelenmiştir?
4) Araştırmalarda hangi sonuçlar elde edilmiştir?

Yöntem

Bu çalışmada İngilizce öğretiminde biçimlendirici değerlendirme aracı olarak dijital araçların kullanımıyla ilgili araştırmaların yöntemsel eğilimini ve bu araştırmalarda ulaşılan sonuçları incelemek amaçlanmıştır. Bu bağlamda 2014 ile Nisan 2023 arasında yayınlanan 119 makale incelenmiş ve araştırma soruları doğrultusunda içerik analizi yöntemiyle analiz edilmiştir.

Makalelerin Seçilmesi ve Veri Toplama Süreci

Araştırmaya dahil edilecek araştırmalar, Web of Science (WoS), Scopus ve ERIC veri tabanları taranarak belirlenmiştir. İlgili veritabanlarında ("formative") AND ("assessment" OR "feedback") AND ("English" OR "second language" OR "ESL" OR "EFL" OR "foreign language") AND ("digital" OR "web 2.0" OR "web based" OR "web-based" OR "gamification" OR "tools" OR "technology") sorgu cümlesiyle tarama yapılmıştır. 2014 yılından Nisan 2023 yılına kadar yayınlanan makaleler (article) ile sınırlandırma yapılarak yapılan taramada WoS (114 sonuç), Scopus (139) ve ERIC (226 sonuç) veritabanında toplam 483 sonuç elde edilmiştir. Bu sonuçlarla ilgili 392 makalenin tam metnine erişilebilmiştir. Tekrarlanan tam metinler silindikten sonra bağımsız 311 tam metin makale elde edilmiştir. Özetler incelenmiş ve İngilizce öğretiminde biçimlendirici değerlendirme amacıyla teknolojinin kullanımına odaklanmadığı tespit edilen 118 makale araştırma kapsamından çıkarılmıştır. Geriye kalan 193 tam metin araştırmacılar tarafından incelenmiş ve 74 makalenin daha İngilizce öğretiminde biçimlendirici değerlendirme amaçlı teknoloji kullanımıyla ilgili olmadığı tespit edilmiştir. Sonuç olarak bu çalışmaya 119 makale dahil edilmiştir.

Veri Toplama Aracı ve Veri Girişi

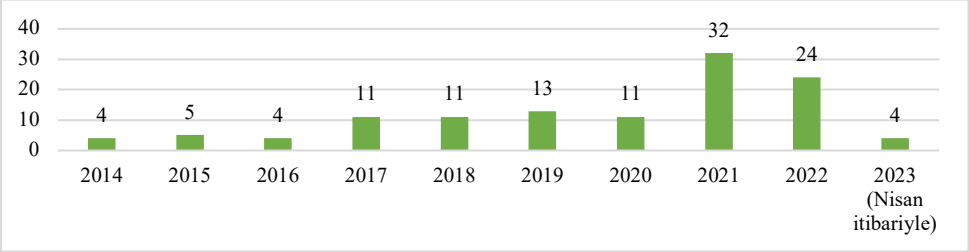
Çalışmaya dahil edilen 119 makale, araştırmacılar tarafından "Özet", "Yöntem" ve "Sonuç ve Öneriler" bölümleri incelenmiş ve araştırma sorularını yanıtlamak için gerekli veriler Göksu ve diğerleri (2022) tarafından geliştirilen veri toplama formuna girilmiştir. Yöntemsel eğilime ilişkin veriler betimsel olarak analiz edilmiştir. İncelenen dijital araçlar belirlenmiş, değişkenler ve araştırma sonuçları içerik analizi tekniğiyle analiz edilmiştir.

Bulgular

İngilizce öğretiminde biçimlendirici değerlendirme aracı olarak dijital araçların kullanımına odaklanan araştırmalar incelenmiş ve elde edilen bulgular dört başlık altında sunulmuştur.

Araştırmaların Yıllara Göre Dağılımı

İngilizce öğretiminde biçimlendirici değerlendirme amaçlı dijital araçların kullanımına odaklanan 119 araştırma makalesinin yıllara göre dağılımı Şekil 1'de sunulmuştur. Şekil 1'de de görüldüğü üzere son yıllarda araştırmaların sayısında önemli bir artış yaşanmıştır.



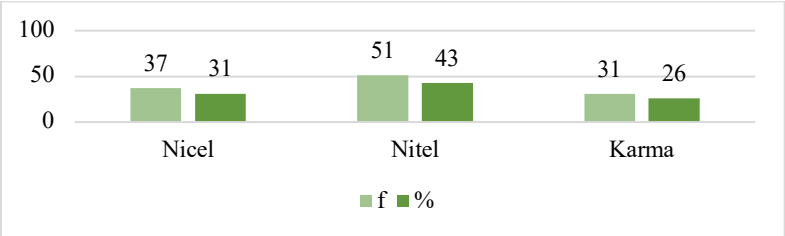
Şekil 1. Araştırmaların yıllara göre dağılımı

Araştırmaların Yöntemsel Eğilimi

Araştırmaların hangi araştırma deseniyle yürütüldüğü, örneklemi, hangi veri toplama araçlarının kullanıldığı ve verilerin hangi tekniklerle analiz edildiği incelenmiş ve alt başlıklar halinde sunulmuştur.

Araştırma Deseni

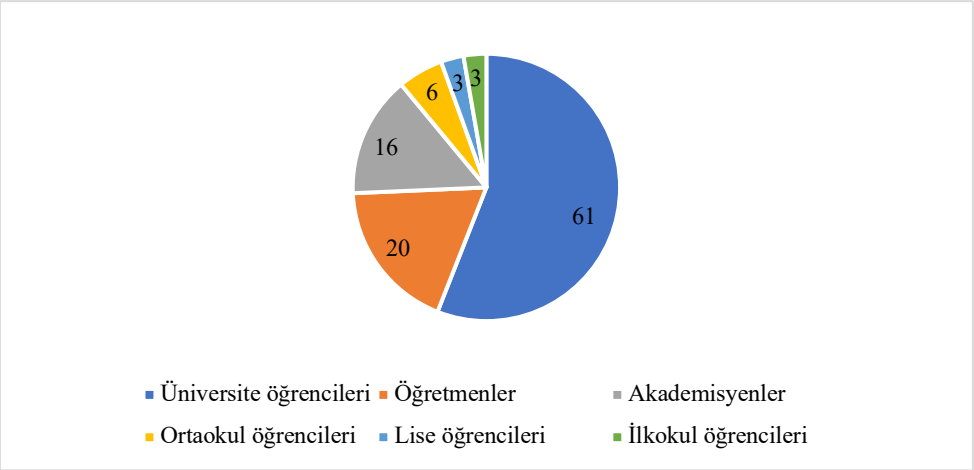
Araştırmalar genel olarak nitel, nicel ve karma yöntem olarak sınıflandırıldığında, her üç yöntemin de tercih edildiği görülmüştür. Ancak nitel araştırma yöntemi, nicel ve karma yöntemlere göre daha sık tercih edilmiştir. Nitel araştırma desenlerinden durum çalışmasının 27 araştırmada, derleme çalışmalarının ise 12 çalışmada tercih edildiği görülmüştür. Nicel çalışmalarda ise deneysel/yarı deneysel desen daha sık tercih edilmiştir (f=24). Deneysel/yarı deneysel deseni tarama çalışmaları izlemiştir (f=11). Şekil 2'de sunulan grafikte karma araştırma en az tercih edilen desen olmuştur.



Şekil 2. Araştırma Deseni

Örneklem Grubu, Sayısı ve Yöntemi

Katılımcılı araştırmalarda tercih edilen örneklem grubu incelendiğinde araştırmaların önemli bir kısmının üniversite öğrencileriyle (f=61) yürütüldüğü anlaşılmaktadır. Üniversite öğrencilerini, öğretmenler (f=20) ve akademisyenler (f=16) takip etmiştir. İlkokul, ortaokul ve lise düzeyindeki araştırmaların sınırlı olduğu görülmüştür. Bazı araştırmalarda birden fazla grupla çalışılmıştır. Örneklem grubuna göre araştırmaların dağılımı Şekil 3'te sunulmuştur.



Şekil 3. Araştırmalarda tercih edilen örneklem grubu

Örnekleme sayısına bakıldığında ise katılımcılı 98 araştırmada en çok tercih edilen örneklem sayısı 31-100 aralığında olmuştur (f=34, %34). İkinci olarak 11-30 aralığında örneklem sayısı tercih edilmiştir (f=20, %20). 16 araştırmada 1-10, 15 araştırmada 101-300, 11 araştırmada 301-1000 ve 2 araştırmada ise 1000'den fazla katılımcı sayısı tercih edilmiştir. Araştırmaların yarısından fazlası örnekleme yöntemi olarak amaca uygun örnekleme, yaklaşık 3'te biri ise kolay ulaşılabilir ve 11 araştırmada ise seçkisiz örnekleme yöntemi tercih edilmiştir. Araştırmaların örnekleme sayısı ve örnekleme yöntemine ilişkin dağılımı Tablo 1'de sunulmuştur.

Tablo 1. Araştırmaların örneklem sayısı ve örnekleme yöntemine göre dağılımı

Örneklem Sayısı	f	%
31 ile 100	34	34,69
11 ile 30	20	20,41
1 ile 10	16	16,33
101 ile 300	15	15,31
301 ile 1000	11	11,22
1000+	2	2,04
Örnekleme Yöntemi		
Amaca uygun	55	56,12
Kolay ulaşılabilir	32	32,65
Seçkisiz	11	11,23

*n=98

Veri Toplama Araçları

Araştırmalarda kullanılan veri toplama araçları incelendiğinde anket (n=49) ve görüşmenin (n=46) en sık tercih edilen araçlar olduğu görülmüştür. Ayrıca 44 araştırmada çeşitli dokümanlar, materyal, blog, video, e-portfolyo, ses dosyaları, raporlar, ekran görüntüleri, metin mesajları, forum gönderileri, günlükler, yazılı-sözlü geri bildirim mesajları, sistemlerin log kayıtları veya raporları kullanılarak veri toplandığı görülmüştür. Ayrıca 27 tane araştırmada başarı testi, performans testi veya rubrik benzeri araçlar kullanılmıştır. 22 araştırmada gözlem tekniği ve 12 araştırmada ise çeşitli ölçekler kullanılmıştır. Veri toplama araçlarının araştırmalarda tercih edilme sıklığı Tablo 2'de sunulmuştur.

Tablo 2. Araştırmalarda kullanılan veri toplama araçları

Sıra	Veri toplama aracı	n
1	Anket	49

2	Görüşme Formu	46
3	Doküman/materyal/blog/video/e-portfolyo/ses/rapor/ekran görüntüleri/metin mesajları/forum gönderileri/günlükler/yazılı-sözlü geri bildirimleri/log kayıtları/sistem raporları	44
4	Başarı testi/Performans testi/Rubrik	27
5	Gözlem	22
6	Ölçek	12

*Bazı araştırmalarda birden fazla veri toplama yöntemi/aracı kullanılmıştır. n: Kaç tane araştırmada kullanıldığını ifade etmektedir.

Veri Analiz Yöntemleri

İncelenen araştırmalarda toplanan verilerin hangi yöntemlerle analiz edildiği incelenmiş ve Tablo 3'te sunulmuştur. Buna göre nicel betimsel yaklaşımın tercih edildiği araştırmalarda çoğunlukla frekans ve yüzde ile ortalama ve standart sapma kullanıldığı görülmüştür. Nicel kestirimsel yaklaşımın tercih edildiği araştırmalarda ise çoğunlukla t-testi, Anova/Ancova veya korelasyon analizinin tercih edildiği görülmüştür. Nitel yaklaşımın benimsendiği araştırmalarda ise betimsel analiz ve içerik analizi tercih edilmiştir. Bazı araştırmalarda birden fazla yaklaşım benimsenmiştir. Veri analiz yöntemlerinin dağılımı Tablo 3'te sunulmuştur.

Tablo 3. Araştırmalarda tercih edilen veri analiz yöntemleri

Veri Analiz Yöntemi/Yöntemleri	
Nicel Betimsel	n
Frekans & Yüzde	32
Ortalama & Standart Sapma	32
Grafik	3
Toplam=	67
Nicel Kestirimsel	n
t-test	21
Anova/Ancova	13
Korelasyon	12
Parametrik olmayan testler	5
Regresyon	5
Faktör analizi	3
Ki-kare	3
Manova/Mancova	1
Toplam=	63
Nitel	n
Betimsel	45
İçerik analizi	35
Toplam=	80

Araştırmalarda İncelenen Dijital Araçlar ve Odaklanılan Değişkenler

Araştırmalarda incelenen teknolojilere bakıldığında büyük ölçüde bilgisayar destekli biçimlendirici değerlendirmenin (computer-assisted formative assesment) araştırıldığı ve biçimlendirici değerlendirmede öğrenci yanıtlama sistemlerine (student response system) odaklanan araştırmaların sınırlı olduğu görülmüştür. Genel olarak Socrative, Kahoot, Plickers, video, e-portfolio, Quizizz, Blackboard, Blog, Essatcritics, Moodle, Onenote, Second Life ve çeşitli yapay zekâ destekli yazma araçları kullanılarak yapılan biçimlendirici değerlendirme

etkinliklerinin dil öğrenmedeki etkisinin çeşitli değişkenler açısından araştırıldığı görülmüştür. Bu değişkenlerin örneklem grubuna göre dağılımı Tablo 4'te verilmiştir.

Tablo 4. Araştırmalarda odaklanılan değişkenlerin örneklem grubuna göre dağılımı

Üniversite öğrencileri	Akademik başarı (24), yazma becerileri (7), motivasyon (6), performans (6), araçlara ilişkin tutum/algı (5), algı (4), araçların etkililiği (3), öğrenme davranışları (2), tercihler (2), aktivitelerin etkililiği (2), tutum (2), öz-değerlendirme algısı (2), yazmaya ilişkin tutum, kelime öğrenme stilleri, okuma becerileri, sistem dönütlerine tepki, başarı algısı, genel dil becerileri, derse katılım, teknolojik yeterlik, öğrenmenin etkililiği, sınav kaygısı, çeviri değerlendirme yöntemlerinin etkililiği, geri bildirime ilişkin algı, konuşma yeterliği, öz düzenleme, öz-yeterlik, değerlendirme aracı deneyimleri, öğrenme ilgisi, konuşma kaygısı, gramer bilgisi.
Akademisyenler	Değerlendirme biçimleri/stratejiler/yöntemler (6), algı (5), deneyimler (3), uzaktan eğitimde tercih edilen araçlar/uygulamalar (2), problemler, zorluklar ve çözüm önerileri (2), dönüt verme biçimi, değerlendirme araçları yeterliği, geribildirime ilişkin algı, araçlara ilişkin algı, biçimlendirici değerlendirmeye ilişkin görüşler.
Öğretmenler	Araçlara ilişkin deneyim (7), değerlendirme teknikleri/biçimleri/uygulamaları (5), araçlara ilişkin algı (4), değerlendirmeye yönelik inanç/algı (3), araç tercihleri, başarı algısı, araçların kullanılabilirliği, yeterlikleri, profesyonel gelişime ilişkin algıları.
İlkokul, Ortaokul, Lise öğrencileri	Tutum, performans, otonom öğrenme, araçlara ilişkin tutum/algı

Tablo 4 incelendiğinde araştırmaların çoğunlukla yükseköğretimde gerçekleştirildiği ve bu araştırmalarda üniversite öğrencileri ve akademisyenlerle ilgili değişkenlere odaklanıldığı görülmektedir. İngilizce öğretiminde, teknoloji destekli biçimlendirici değerlendirmenin Üniversite öğrencilerine ilişkin akademik başarı, yazma becerileri, motivasyon, performans ve dijital araçlara ilişkin tutumlarının daha sık araştırıldığı görülmüştür. Ayrıca öğrencilerin İngilizce öğrenmeye ilişkin algısı, kullanılan araçların etkililiği, öğrenme davranışları, tercihler, gerçekleştirilen aktivitelerin etkililiği, tutum ve öz-değerlendirme gibi değişkenler ön plana çıkmıştır. Ayrıca ilgili araştırmalarda akademisyenlerin değerlendirme biçimleri/stratejiler/yöntemler, algıları, deneyimleri, uzaktan eğitimde tercih ettikleri araçlar/uygulamalar, yaşadıkları problemler, zorluklar ve çözüm önerileri, dönüt verme biçimleri, değerlendirme araçlarına ilişkin yeterlikleri, geribildirime ilişkin algıları, dijital araçlara ilişkin algıları ve biçimlendirici değerlendirmeye ilişkin görüşleri incelenmiştir.

Öğretmenlerle yürütülen araştırmalarda ise öğretmenlerin araçlara ilişkin deneyimleri, değerlendirme teknikleri/biçimleri/uygulamaları, araçlara ilişkin algıları, biçimlendirici değerlendirmeye yönelik inanç/algıları, dijital araç tercihleri, başarı algısı, araçların kullanılabilirliğine ilişkin görüşleri, yeterlikleri ve profesyonel gelişime ilişkin algılarının incelendiği görülmüştür. Lise, ortaokul ve ilkokul öğrencileriyle yapılan araştırmaların sınırlı olmakla birlikte ilgili araştırmalarda öğrenmeye ilişkin tutum, performans, otonom öğrenme ve araçlara ilişkin tutum/algılarının incelendiği görülmüştür.

Araştırmalarda Elde Edilen Sonuçlar

Araştırmaların özet ve sonuç bölümleri incelenmiş ve ön plana çıkan sonuçlar üniversite öğrencileri, akademisyenler ve öğretmenler açısından kategorize edilerek sunulmuştur.

Üniversite Öğrencilerine Yönelik Sonuçlar

- Çevrimiçi iş birliğine dayalı yazma etkinliklerinin yazma becerisini geliştirdiği ortaya çıkmıştır.
- Biçimlendirici değerlendirme amaçlı otomatik geri bildirim sağlayan yazma araçlarının, öğrencilerin yazmaya ilişkin endişelerini azalttığı ve gramer bilgisini geliştirdiği tespit edilmiştir.
- Biçimlendirici değerlendirme olarak öz-değerlendirme aktivitelerinin faydalı olduğu ve öğrencilerin öz farkındalık sahibi olmalarını sağladığı ortaya çıkmıştır.
- Sohbet analiz araçları kullanılarak yapılan biçimlendirici değerlendirme, İngilizce öğretiminde etkilidir.
- Teknoloji tabanlı biçimlendirici değerlendirme etkinlikleri öğrencilerin motivasyonlarını ve öğrenme süreçlerine ilişkin farkındalıklarını arttırmaktadır. Ayrıca öğrencilere sınıf içinde ve dışında İngilizce öğrenmek için yenilikçi, yaratıcı ve gerçek fırsatlar sunmaktadır.
- Yapay zekâ destekli yazma araçları, lisansüstü öğrencilerin davranışlarını ve tutumlarını olumlu etkileyebilir.
- Teknoloji tabanlı biçimlendirici değerlendirme uygulamaları, öğrenme performansına katkı sağlamaktadır.
- Biçimlendirici değerlendirmede Socrative, kalem kâğıt yönteminden daha etkilidir.

- Öğrenciler, biçimlendirici araç olarak Socrative aracını kâğıt-kalem yönteminden daha etkili bulmuştur.
- Öğrencilerin Socrative mobil değerlendirme aracına yönelik tutumu, klasik değerlendirmeye göre daha yüksek çıkmış ve öğrenciler mobil değerlendirme aracını eğlenceli ve kullanılabilir bulmuştur.
- Sınıf içi biçimlendirici değerlendirme aracı olarak Socrative kullanımı etkili olmuştur.
- Öğrencilerin okuma becerilerini geliştirirken, öğrenci yanıt sisteminin akran etkileşim tekniğiyle kullanılmasının etkili olabileceği görülmüştür.
- Süreç izleme teknolojileri, ikinci dilde yazma eğitimlerinde tanılayıcı ve biçimlendirici olarak kullanılabilir.
- Kahoot, Wordwall ve Mentimeter gibi biçimlendirici değerlendirme araçları, yabancı dil derslerinde kelime bilgisini ve dilbilgisini geliştirmek, öğrenmeyi pekiştirmek, metnin kavranıp kavranmadığını test etmek veya konu tekrarı yapmak için kullanılabilir. Ayrıca ilgili araçlar, öğrenci katılımını teşvik eder.
- Çevrimiçi oyunlaştırılmış öğrenme araçları öğrenmeyi eğlenceli kılar ve daha etkileşimli bir ortam sunar. Ayrıca öğretmenlere farklı öğretme ve değerlendirme araçları ve teknikleri sunar ve böylece bireysel öğrenme ihtiyaçları karşılanabilir.
- Dil öğreniminde mobil uygulamaların entegrasyonu eğer mobil test sistemlerinin sağladığı pedagojik potansiyel akran öğrenimi ve sorgulamaya dayalı bir yaklaşımla birleştirilirse daha etkili olabilir.
- Teknoloji tabanlı geri dönüt platformu, öğrencilerin yazma performanslarını, motivasyonlarını arttırmış, dil bilgilerini ve içerik bilgilerini zenginleştirmiş ve aktif katılımlarını desteklemiştir.
- Öğrenciler, Kahoot uygulamasının derslerle ve ders notlarıyla bağlantı kurma, önemli noktaları hatırlama ve dersle ilgili diğer yararlı bilgi ve bilgileri keşfetmeye olanak sağladığını düşünmektedirler.
- Blog yazmanın pedagojik bir araç olarak ve bir değerlendirme türü olarak kullanımının dil öğrenmeyi ve öğretmeyi zenginleştirebildiği, bireysel ve toplumsal olarak 21. yy. becerilerini desteklediği görülmüştür.
- Çevrimiçi değerlendirmelerin öğrencilerin dinleme, okuma ve yazma becerilerini geliştirmektedir.
- Oyunlaştırılmış Clickers kullanımının, öğrencilerin algı, tercih ve performansları bakımından öğrenmelerine olumlu etkiler yaptığı ortaya çıkmıştır.
- Algısal kullanım kolaylığı, algısal fayda ve davranışsal niyet, mobil tabanlı değerlendirme sistemlerinin daha uzun süre kullanımını etkilemektedir.
- Web tabanlı biçimlendirici değerlendirme, dikkatlice tasarlanıp organize edildiğinde ve uygulandığında öğrencilerin öğrenmelerini teşvik edip kolaylaştıran faydalı bir yöntemdir. Ayrıca öğrencilerin öğrenme bağımsızlığını teşvik etmekte ve öğrencilerin genel dil yeterliğini geliştirmelerine katkı sağlamaktadır.
- Second Life, katılımcıların İngilizce işlevsel yazım becerilerini geliştirmede etkili olmuştur.
- Turnitin, intihal yazılımı olarak bilinse de biçimlendirici ve özetleyici değerlendirme için kullanılabilir.
- Quizizz uygulaması, içerdiği oyun unsurları sayesinde sınav kaygısını düşürebilmektedir. Öğrenciler, Quizizz etkinliği sonunda hatalar üzerinde düşünme fırsatı bulmaktadır. Aynı zamanda Quizizz uygulamasıyla soru oluşturmaları istenildiğinde konuları daha iyi öğrenebilmektedirler. Öğrenciler, Quizizz sorularını cevaplarken kendi notlarına bakma fırsatı verilmesini tercih etmektedirler. Quizizz etkinliklerini senkron olarak değil de asenkron olarak tercih etmektedirler.
- Görsel-işitsel geribildirimlerin öğrenmeyi, etkileşimi ve aktif dinlemeyi teşvik ettiği tespit edilmiştir. Ayrıca öğrencilerin yazma performanslarını ve akademik motivasyonlarını önemli ölçüde etkilemektedir.
- Dijital biçimlendirici testlerin geleneksel konuşma testlerinden daha etkili olduğu ortaya çıkmıştır. Ancak öğrencilerin teknik sorunlar yaşayabilmesi, bu testlerin dezavantajları olarak görülmektedir.
- Çevrimiçi öğretimde biçimlendirici değerlendirme, öğrencilerin eleştirel okuma becerilerini arttırmaktadır.
- İngilizce dili öz-yeterliği ve İngilizce diline ilişkin olumlu tutum, teknolojiye dayalı öz düzenlemeli öğrenme stratejileriyle ilişkili bulunmuştur.
- Öğrencilere göre, dijital araçlar biçimlendirici değerlendirmeyi geliştirme potansiyeline sahiptir.
- Socrative, biçimlendirici geri bildirim sağlamada ve zaman kazandırmada etkili bir araçtır.
- Çevrimiçi biçimlendirici değerlendirme araçları, İngilizce okuduğunu anlamada etkili araçlardır.
- Mobil tabanlı oyunlaştırılmış etkinlikler, öğrencilerin başarılarını anlamlı düzeyde arttırmaktadır.

Akademisyenlere Yönelik Sonuçlar

- Akademisyenler tarafından önemli görülen biçimlendirici değerlendirme kriterleri; yaratıcılık ve orijinallik, organizasyon, dil, yetkinlik, modlar arası etkileşim, çeşitlilik ve değerlendirme biçimidir.
- Öğrencilerin yazma ödevlerine yapılan yazılı dönütlerin daha negatif olduğu; video ile yapılan dönütlerin daha dengeli ve sosyal ilişkileri gözetici olduğu görülmüştür.
- Akademisyenlerin pandemi döneminde, çeşitli dijital biçimlendirici değerlendirme araçlarını tercih ettikleri görülmüştür. Aynı zamanda eş zamanlı iş birlikli yazmayı kolaylaştırmada ve objektif biçimlendirici değerlendirmeler yapma konusundaki teknoloji bilgisi eksikliği nedeniyle sorun yaşadıkları görülmüştür.

- Akademisyenler, öğrencilerinin uzaktan değerlendirilmesini pek uygun görmemektedir. Ayrıca akademik intihali yeterince önleyecek güvenilir bir yazılım olmadığını, öğrencilerin sanal öğrenme ortamlarıyla yeterince buluşturulamadığı ve biçimlendirici değerlendirmeye pek önem verilmediğini ileri sürmektedirler.
- Online eğitimde biçimlendirici değerlendirme etkinlikleri, öğretmen/öğrenci etkileşimini teşvik eder, öğrenci katılımını motive eder ve öğrencilere demokratik bir öğrenme ortamı sağlar.
- Akademisyenler, oyun tabanlı birçok dijital biçimlendirici değerlendirme aracını etkili bulmuştur.
- Akademisyenler, çevrimiçi sınıfları yönetme, işbirlikli yazma ve objektif biçimlendirici değerlendirmeler yapma konusunda teknolojik beceri eksikliği nedeniyle sorun yaşamışlardır.
- Eşzamanlı işbirlikçi yazma öğretimi; öğrenci katılımı, hedefler, içerik, araçlar, sınıf yönetim stratejileri, eğitmen ve öğrenci rolleri, çevrimiçi etkinlik ve değerlendirme konularında katkı sağlamaktadır.
- Teknoloji tabanlı biçimlendirici değerlendirme etkinlikleri, akademisyenlerin daha dinamik dersler planlamalarına ve öğrencilerin ilerlemesini katkı sağlamaktadır.
- Yükseköğretimde eğitmenler, biçimlendirici değerlendirme konusunda farkındalık sahibidir.

Öğretmenlere Yönelik Sonuçlar

- Öğretmenlerin mesleki gelişim programlarında online öz-değerlendirme ve akran değerlendirme temelli biçimlendirici değerlendirme uygulamalarının kullanılması önerilmektedir.
- Türkiye'de İngilizce öğretmenleri biçimlendirici değerlendirme süreçlerinden ziyade geleneksel değerlendirme yöntemlerine güvenmektedir. Biçimlendirici değerlendirme yapabilmeleri için mevcut değerlendirme uygulamalarını değerlendirmeleri ve öğrenme için değerlendirme (assessment for learning) stratejilerini ve geri bildirim prosedürleri konusunda kendilerini geliştirmeleri gerekir.
- Öğretmenlerin temel dört dil becerisini geliştirmek için çeşitli aktiviteler kullandığını ancak önemli bir kısmı, iyileştirme ve zenginleştirme faaliyetleri bakımından çoklu stratejiler kullanmayı tercih etmemektedir.
- Bazı öğretmenlerin teknoloji tabanlı değerlendirme araçlarıyla ilgili olumsuz algıya sahip olduğu ve bu araçların kullanımıyla ilgili yeterli bilgiye sahip olmadıkları görülmüştür.
- Öğretmenlerin biçimlendirici değerlendirmede daha çok kâğıt kalem tekniğine güvendikleri ortaya çıkmıştır.
- Öğretmenler, her dil becerisi için farklı bir değerlendirme türü tercih ettiklerini ifade etmişlerdir.
- Teknolojik imkanların sınırlı olduğu okullarda GradeCam'in kullanışlı olacağı ifade edilmiştir.
- Kâğıt kalemle yapılan değerlendirmeler, performans ödevleri ve sınıf içi gözlemleri, öğretmenlerin en çok kullandığı değerlendirme araçlarıdır.
- Çoktan seçmeli sorular, öğretmenlerin sınavlarda en çok tercih ettiği soru tipleridir. Öğretmenler, İngilizce başarısını değerlendirirken çoğunlukla performans ve iletişim temelli değerlendirme türlerini kullanmaktadır.
- Öğretmenlerin, biçimlendirici değerlendirme konularında yetersiz bilgiye sahip oldukları ortaya çıkmıştır.
- Teknoloji destekli biçimlendirici değerlendirmenin İngilizce öğretiminde, pedagojik, yönetimsel, değerlendirme, sosyal ve gelişimsel olanaklar sunduğu ortaya çıkmıştır.
- İşbirlikçi düşünme ve geri bildirime dayalı biçimlendirici değerlendirme, öğretmen yeterliğini arttırmaktadır.
- Video tabanlı biçimlendirici değerlendirme etkinliklerinde; öz değerlendirme yaklaşımı İngilizce konuşma kaygısını düşürmekte, akran değerlendirme yaklaşımı ise konuşma becerilerini geliştirmektedir.
- Öğretmenlerin biçimlendirici değerlendirme görevleri oluşturmak için Kahoot, Google Forms, Quizlet, Classtime, Quizizz, Socrative, Quizalize, Gimkit, Blooket, Liveworksheets ve Wizerme araçlarını tercih ettiği görülmüştür. Bu araçlardan bazıları, güçlü bir rekabet unsuru sağlarken bir kısmı özetleyici değerlendirmeye daha uygun olduğu görülmüştür.
- İngilizce blog yazmanın lise öğrencilerinin yazma becerilerine pozitif etkisi olduğu ortaya çıkmıştır.
- Ortaokulda, konuşmaya dayalı biçimlendirici değerlendirme etkinlikleri, öğrencilerinin dil becerileri hakkında öğretmenlere ve öğrencilere yararlı bilgiler sağlama potansiyeline sahip olup İngilizce dil becerilerini geliştirmektedir.
- Oyunlaştırılmış biçimlendirici değerlendirme etkinlikleri, ilkokul öğrencilerinin akademik performansını arttırmakta ve öz-düzenleme stratejileri geliştirmelerine katkı sağlamaktadır.
- İlkokul öğrencileri, İngilizce dersinde Plickers kullanımına yönelik olumlu tutuma sahiptir.
- Öğretmenler Plickers kullanarak gruplar arası meydan okuma aktiviteleri gibi öğrenme stratejileri geliştirebilir. Öğrencilerin Plickers kayıtları önemli birer öğrenme portfolyosu olarak kullanılabilir ve öğrencilere destek eğitimi açısından değerlendirilebilir.
- Kırsal bölgelerdeki okul yöneticileri öğretmenlerin Plickers kullanımıyla ilgili profesyonel öğretim desteği alması için bir öğrenme topluluğu oluşturabilir.
- Öğretmenlerin farklı öğrenciler için farklı geri dönüt modelleri kullanması önerilmektedir.
- Öğretmenlerin Socrative gibi değerlendirme aracı ve öğrenci yanıt sistemlerini kullanması önerilmektedir.
- Biçimlendirici değerlendirmede, öğrencilerin düzeylerine göre sınıflandırılması önerilmektedir.
- Öğrenci, öğretmen ve velilerin iş birliği yapması önerilmektedir.

- Öğretmenlere farklı değerlendirme ve geri dönüt yöntemleri ile ilgili eğitimler veya seminerler verilebilir.
- Mobil cihazların okullarda veya başka kurumlarda faydalı şekilde kullanımı teşvik edilmelidir.
- Öğretmenlere biçimlendirici değerlendirmede kullanabilecekleri çeşitli araç ve tekniklerin farkında olmalarını sağlamak amacıyla workshoplar, kurslar vb. düzenlenmelidir.
- Okulların daha şeffaf değerlendirmelere yer vermesi önerilmektedir.

Diğer Sonuçlar

- İkinci dilde yazma sürecinde sanal dönütler, yazma performansını arttırma potansiyeline sahiptir.
- Online değerlendirmenin esnekliği, hızlı geri-dönüt imkânı sunması ve teşvik edici kendi kendini düzenleyen öğrenme ortamı olması, avantajları arasındadır.
- Teknolojiyle zenginleştirilmiş değerlendirme, öğrencilerin performansı üzerinde pozitif etkiye sahiptir.
- Plickers, biçimlendirici değerlendirme amaçlı kullanılmaya elverişli olup, hızlı ve kolay bir kullanım sunmanın yanı sıra hem küçük hem de büyük gruplarda kullanılabilmektedir.
- Liveworksheets'in biçimlendirici değerlendirmede çok sayıda avantaja sahip olduğu ortaya çıkmıştır.
- Çok sayıda dijital aracın İngilizcede tartışmaya dayalı makale yazmayı desteklediği ancak akademik yazımda yeterince etkili olmadığı sonucuna varılmıştır.
- Farklı geri dönüt modellerinin öğretmenlerin dil kullanımına ve öğrenciyle iletişimine etkisi incelenebilir.
- Öğrenci yanıt sistemi kullanılarak akran etkileşimli tekniği, geleneksel sınıf ve tersyüz edilmiş sınıf modelleri temel alınarak karşılaştırmalı deneysel araştırmalar yapılabilir.
- Oyunlaştırılmış dijital araçların yabancı dil derslerinde genel öğrenci başarısına etkisi de araştırma konusu olabilir ya da daha az başarılı öğrenciler üzerindeki etkisi incelenebilir.
- Etkileşimli çevrimiçi kaynakların öğrencilerin yabancı dil dersindeki gelişimlerine etkisi yaş ve cinsiyet bağlamında da araştırılabilir.

Tartışma ve Sonuç

Bu araştırmada 2014 yılından 2023 Nisan ayına kadar ERIC, Scopus ve Web of Science veri tabanlarında yayımlanan İngilizce öğretiminde teknoloji destekli biçimsel değerlendirmeye odaklanan 119 makale, araştırmaların yöntemsel eğilimlerini belirlemek ve sonuçlarını ortaya koymak amacıyla içerik analizi yöntemiyle incelenmiştir. Belirlenen tarihlerde yapılan araştırmalarda yöntemsel olarak nitel araştırma yönteminin, nicel ve karma yöntemlere göre daha sık tercih edildiği, karma araştırmaların en az tercih edilen desen olduğu görülmüştür. Araştırmalarda tercih edilen örneklem grubu incelendiğinde araştırmaların önemli bir kısmının üniversite öğrencileriyle yürütüldüğü, bunu sırasıyla öğretmenlerin ve akademisyenlerin takip ettiği belirlenmiştir. İlkokul, ortaokul ve lise düzeyindeki araştırmaların sınırlı olduğu, bazı araştırmalarda ise birden fazla grupla çalışıldığı gözlemlenmiştir. Örnekleme sayısına bakıldığında, katılımcılı 98 araştırmada en çok tercih edilen örneklem sayısı 31-100 aralığında olmuştur. İkinci olarak 11-30 aralığında örneklem sayısı tercih edilmiştir. 16 araştırmada 1-10, 15 araştırmada 101-300, 11 araştırmada 301-1000 ve 2 araştırmada ise 1000'den fazla katılımcı sayısı tercih edilmiştir. Araştırmaların yarısından fazlası örnekleme yöntemi olarak amaca uygun örnekleme, yaklaşık 3'te biri ise kolay ulaşılabilir ve 11 araştırmada ise seçkisiz örnekleme yöntemi tercih edilmiştir.

Araştırmalarda kullanılan veri toplama araçları incelendiğinde anket (n=49) ve görüşmenin (n=46) en sık tercih edilen araçlar olduğu görülmüştür. Ayrıca 44 araştırmada çeşitli dokümanlar, materyal, blog, video, e-portfolyo, ses dosyaları, raporlar, ekran görüntüleri, metin mesajları, forum gönderileri, günlükler, yazılı-sözlü geri bildirim mesajları, sistemlerin log kayıtları veya raporları kullanılarak veri toplandığı görülmüştür. 27 tane araştırmada ise başarı testi, performans testi veya rubrik benzeri araçlar kullanılmıştır. 22 araştırmada gözlem tekniği ve 12 araştırmada ise çeşitli ölçekler kullanılmıştır. İncelenen araştırmalarda toplanan verilerin hangi yöntemlerle analiz edildiği incelenmiştir ve buna göre nicel betimsel yaklaşımın tercih edildiği araştırmalarda çoğunlukla frekans ve yüzde ile ortalama ve standart sapma kullanıldığı görülmüştür. Nicel kestirimsel yaklaşımın tercih edildiği araştırmalarda ise çoğunlukla t-testi, Anova/Ancova veya korelasyon analizinin tercih edildiği görülmüştür. Nitel yaklaşımın benimsendiği araştırmalarda ise betimsel analiz ve içerik analizi tercih edilmiştir. Bazı araştırmalarda birden fazla yaklaşım benimsenmiştir.

Araştırmalarda incelenen teknolojilere bakıldığında büyük ölçüde bilgisayar destekli biçimlendirici değerlendirmenin (computer-assisted formative assesment) araştırıldığı ve biçimlendirici değerlendirmede öğrenci yanıtlama sistemlerine (student response system) odaklanan araştırmaların sınırlı olduğu görülmüştür. Genel olarak Socrative, Kahoot, Plickers, video, e-portfolio, Quizizz, Blackboard, Blog, Essatcritics, Moodle, Onenote, Second Life ve çeşitli yapay zekâ destekli yazma araçları kullanılarak yapılan biçimlendirici değerlendirme etkinliklerinin dil öğrenmedeki etkisinin çeşitli değişkenler açısından araştırıldığı görülmüştür. Araştırmaların çoğunlukla yükseköğretimde gerçekleştirildiği ve bu araştırmalarda üniversite öğrencileri ve akademisyenlerle ilgili değişkenlere odaklanıldığı görülmektedir. İngilizce öğretiminde, teknoloji destekli biçimlendirici

değerlendirmenin üniversite öğrencilerine ilişkin akademik başarı, yazma becerileri, motivasyon, performans ve dijital araçlara ilişkin tutumlarının daha sık araştırıldığı görülmüştür. Öğretmenlerle yürütülen araştırmalarda ise öğretmenlerin araçlara ilişkin deneyimleri, değerlendirme teknikleri/biçimleri/uygulamaları, araçlara ilişkin algıları, biçimlendirici değerlendirmeye yönelik inanç/algıları, dijital araç tercihleri, başarı algısı, araçların kullanılabilirliğine ilişkin görüşleri, yeterlikleri ve profesyonel gelişime ilişkin algılarının incelendiği görülmüştür. Lise, ortaokul ve ilkokul öğrencileriyle yapılan araştırmaların sınırlı olmakla birlikte ilgili araştırmalarda öğrenmeye ilişkin tutum, performans ve araçlara ilişkin tutum/algılarının incelendiği görülmüştür.

Bu araştırmanın bulguları İngilizce öğretiminde teknolojinin biçimlendirici değerlendirme amaçlı kullanılmasının önemli katkılar sağladığını göstermektedir. Akademisyenler açısından bu araçların kullanımı genel olarak etkili ve kullanışlı bulunsa da teknoloji bilgisi eksikliği sebebiyle bazı akademisyenlerin teknik sorunlar yaşadıkları görülmüştür. Öğretmenler açısından sonuçlarına bakıldığında, bazı öğretmenlerin teknoloji destekli araçların kullanımı konusunda yetersiz bilgiye ve olumsuz algıya sahip oldukları ve kalem kâğıt temelli biçimlendirici değerlendirme araçlarına daha çok güvendikleri dikkat çekse de genel olarak kullanımın olumlu etkileri raporlanmıştır. Bu araçların avantajları hızlı geri dönüt sağlaması, öğrencilerin dört temel dil becerisinin gelişimini teşvik edici olması, eğlenceli ve esnek olması, akran iş birliğini desteklemesi, dijital okur yazarlığı arttırması, öz değerlendirmeye imkân sağlaması ve öğretmenler açısından raporlanabilir veriler sunması olarak özetlenebilir. Yapılan analizde bazı katılımcıların kullanılan teknolojiyle ilgili teknik sorunlar yaşadığı veya olumsuz algı ve kaygı sebebiyle zor durumda kaldıkları çalışmalar da gözlemlenmiştir (Köroğlu, 2021). Öğrencilerin kendi ses kayıtlarının öz değerlendirme için dinletildiği Han ve Fan (2020)' ın yaptığı çalışmada bazı öğrenciler bu tecrübeyi moral bozucu ve kalp kırıcı olarak nitelendirmişlerdir. Zou ve diğerlerinin (2021) yaptığı araştırmada bazı katılımcıların öğretmen tarafından verilen geri dönütleri otomatik yazım düzeltme sistemlerinin verdiği geri dönütlere tercih ettiği, bu sistemler tarafından verilen geri dönütleri güvenilmez bulduğu görülmüştür. Fakat yapılan analiz sonucu araştırmalarda genel olarak katılımcıların teknoloji destekli araçları ilgi çekici ve kullanışlı bulduğu belirlenmiştir (Mohamad vd., 2020; Peyghambarian vd., 2015; Zhyhadlo, 2022).

Bu çalışma, Nisan 2014-2023 tarihleri arasında yayınlanmış ve WoS, ERIC ve Scopus veri tabanlarında taranan İngilizce öğretiminde teknoloji destekli biçimlendirici değerlendirme araçlarına odaklı 119 makale ile sınırlıdır. Araştırma sonuçları değerlendirilirken, söz konusu tarihlerin dışında kalan ve ilgili veri tabanlarında taranmayan araştırmaların sonuçlarına bu çalışmada yer verilmediği göz önünde bulundurulmalıdır. Yapılan içerik analizinde İngilizce öğretiminde teknoloji destekli biçimlendirici değerlendirmeye yönelik araştırmaların ilkokul, ortaokul ve lise düzeyinde sınırlı sayıda olduğu görülmüştür. Bu sebeple bu kademelerde yapılacak araştırmalara ihtiyaç olduğu söylenebilir. Akademisyenlerin teknoloji destekli biçimlendirici değerlendirme araçlarını kullanırken yaşadığı problemler, zorluklar, öz yeterlik algıları ve araştırmalarda bahsedilen çözüm önerileri dikkate alınarak bu konuda destekleyici eğitimler verilebilir. Öğretmenlerin bu araçların kullanımına yönelik tecrübeleri, tercihleri ve görüşlerine ilişkin daha fazla araştırma yapılabilir.

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Öğretmenlerin Türkçe Dersinde Elektronik Kitap Kullanımına İlişkin Algısı*

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Özet

Bu çalışmanın amacı Türkçe dersinde sınıf öğretmenleri ile Türkçe öğretmenlerinin elektronik ders kitaplarının kullanımına ilişkin algılarını tespit etmektir. Ayrıca öğretmenlerin algısının çeşitli değişkenler açısından nasıl farklılaştığını ortaya koymaktır. Nicel araştırma yöntemlerinden tarama modeli ile yürütülen bu çalışmanın örneklemini Mardin ili Kızıltepe ilçesinde görev yapan 77 öğretmen oluşturmaktadır. Farklılaşmaya ilişkin analizlerde *t*-testi ve ANOVA kullanılmıştır. Elde edilen sonuçlara göre öğretmenlerin önemli bir kısmının Türkçe derslerinde okuma amaçlı elektronik kitapları tercih ettikleri görülmüştür. Öğretmenlerin bu tercihlerinin cinsiyete göre ve öğretmenlik deneyimine göre farklılaşmadığı görülmüştür. Ayrıca hem eğitim fakültesi hem de diğer fakülte mezunu öğretmenlerin elektronik kitap tercihlerinin benzer olduğu tespit edilmiştir. Kırsal veya merkezi okulda görev yapan öğretmenlerin elektronik kitap tercihleri de farklılaşmamaktadır. Ayrıca sınıflardaki öğrenci sayısının farklılaşması da öğretmenlerin bu tercihlerini değiştirmediği görülmüştür. Sonuç olarak öğretmenlerin yaklaşık %70'i derste okuma amaçlı elektronik kitapları tercih etmekte ve yaklaşık %90'ı günlük hayatta elektronik kitapları tercih etmektedir. Elektronik kitap tercihinin cinsiyet, mezun olunan fakülte, öğretmenlik deneyimi, okulun merkezi veya kırsal olması ve sınıflardaki öğrenci sayısına göre farklılaşmadığı sonucuna varılmıştır.

Anahtar Kelimeler: Türkçe dersi, elektronik kitap, e-kitap, öğretmen algısı

Teachers' Perception on the Use of Electronic Books in Turkish Courses

Abstract

This study aims to determine the perceptions of Classroom Teachers and Turkish Teachers regarding the use of electronic textbooks in Turkish courses. It also aims to reveal how teachers' perceptions differ regarding various variables. The sample of this study, which was conducted with the survey model, one of the quantitative research methods, consists of 77 teachers working in Kızıltepe district of Mardin province. We used *t*-test and ANOVA in the analysis regarding differentiation. According to the results obtained, it was seen that a significant part of the teachers preferred electronic books for reading purposes in Turkish courses. It has been observed that teachers' preferences do not differ according to gender and teaching experience. In addition, it was determined that the e-book preferences of teachers who graduated from both the faculty of education and other faculties were similar. Electronic book preferences of teachers working in rural or central schools do not differ. In addition, it was observed that the variation in the number of students in the classes did not change the preferences of the teachers. As a result, approximately 70% of teachers prefer electronic books for reading purposes in class, and approximately 90% prefer electronic books in daily life. It was concluded that the preference for electronic books does not differ according to gender, faculty graduated from, teaching experience, whether the school is central or rural, and the number of students in the classes.

Keywords: Turkish course, electronic book, e-book, teacher perception

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Giriş

Okumak geçmişte ve günümüzde her zaman önemli bir gereklilik olarak kabul edilmektedir. İnsanların bilgi edinmeleri ve öğrenebilmeleri için okumaya ihtiyaçları vardır. Bu ihtiyacın giderilmesi için eskiden yapılan mağara duvarlarındaki resim ve tabelaların okunmasıydı; yazının icadıyla bunlar kil tabletlere, papirüse, kâğıda, matbaanın icadıyla da kitaplara dönüştü. Şüphesiz ki insanın okumaya yüklediği anlam her gelişmeyle birlikte değişmektedir. Günümüzde bilgisayar, telefon, çok fonksiyonlu tablet gibi teknolojik araçlar okuma amaçlı kullanılmaktadır. Günümüzde bu teknolojik ürünler geleneksel okuma araçları ile beraber kullanılmaya başlanmıştır. Daha kısa anlatımla kil tabletlerin ortaya çıkışından bu yana okuma alışkanlıkları da değişmiştir (Öztürk, 2014).

Ders kitapları, çocukların öğretmenlerinin bulunmadığı yerlerde, yani okul sonrası ev hayatlarında yol gösterici olabilecek en önemli kaynaktır. Ders kitapları, bir çocuğun öğretmeni olmadan ödev yaparken başvurabileceği birincil kaynaktır. Bu durumda ders kitaplarının çocuğun gelişim düzeyine göre düzenlenmesi çok önemlidir. Ders kitapları, çocukların ve öğretmenlerin konuları sınıfta düzenli ve kesintisiz bir şekilde ele almalarına olanak tanır. Eğitimin vazgeçilmez bir aracı olan ders kitaplarının birçok işlevi olmasının yanı sıra öğretim verimliliğinin artırılmasına da önemli katkıları bulunmaktadır. Ders kitaplarının temel işlevleri; bilgiyi sağlama, bilgiyi sistemleştirme, öğrencinin bağımsız öğrenmesine olanak sağlama, koordinasyon ve kişilik geliştirme olarak özetlenebilir. Kitaplar bu amaçlarına, ders kapsamındaki tüm bilgileri bir araya getirerek, çeşitli amaçlara yönelik alıştırmalar yoluyla belirli etkinlikleri gerçekleştirerek, alıcıya bilgiye dayalı olarak gerekli deneyimi sunarak ulaşmaktadır (Ceyhan ve Yiğit, 2003).

Elektronik kitaplara olan talep gün geçtikçe artmakta ve daha geniş kitlelere hitap etmektedir (Rukancı ve Anameriç, 2003). E-kitaplar; internet bağlantısı, grafik, ses ve görüntü vd. pek çok fonksiyonu nedeniyle fiziki kitaplarla rekabet edebilir hale gelmiştir. Elektronik kitapların basılı kitaplara alternatif olabileceği ileri sürülmüştür (Rukancı ve Anameriç, 2003). E-kitaplar sınıf içinde, öğrenciler arasında ve öğretmenlerle öğrenciler arasındaki etkileşimi artırmaya elverişli araçlardır. E-kitaplar, uygun şekilde tasarlandığında ve teknik sorunlara karşı korunduğunda günümüz eğitim öğretim sürecinde önemli bir parça olarak oldukça verimli sonuçlar üretmeye aday materyaller olarak değerlendirilmektedir (Öngöz, 2011). Nitekim Göksu (2012), geliştirdiği web tabanlı öğrenme ortamında öğrencilere sunduğu içerikler arasında ders notu niteliğinde elektronik kitaba da yer vermiş ve ilgili içeriklerin etkililiğini araştırmıştır. İlgili araştırmada öğrencilerin ders notu niteliğindeki elektronik kitap içeriğinden memnuniyetleri yüksek bulunmuştur.

Okuma becerisinin önemi göz önüne alındığında e-kitapların günümüzde eğitim materyallerinden biri olması önemli bir fırsat olarak görülmektedir. Günümüzde bilgisayar ve ağ teknolojisinin kullanılmaya başlanmasıyla birlikte öğretim teknikleri de farklılaşmakta ve öğrencilerin ekranlardan okuması önemli hale gelmektedir. Dijital olarak hazırlanmış metinleri okuyabilmek için öğrencilerin ekran okuma becerilerine de sahip olması gerekir. Okuma becerilerini geliştirmek, derinlemesine öğrenme ve öğrencilerin eleştirel düşünmelerinin gelişmesini sağlamak için dijital teknolojilerin öğrenme ortamına dahil edilmesi amaçlanmaktadır (Hyun, 2004). Ayrıca Hyun (2004), bilgisayar tabanlı bu tür teknolojilerin anlamlı öğrenme sürecine katkı sağlayabileceğini ileri sürmektedir. Öğrencilerin okuma becerilerinin gelişmesi eğitim yaşamları boyunca başarılı olmaları ve kişisel gelişimlerinin sağlanabilmesi açısından önemli bir faktördür. Okuma, çocukların okuryazarlık gelişiminin önemli bir parçasıdır. Çocuğun okuma yazma etkinliklerine harcadığı zaman, başarılı bir okuma motivasyonunun belirleyicisi olmaktadır (Wigfield vd., 2008).

Bu anlamda okuma becerisi eğitimsel deneyim açısından oldukça önemlidir. Kitaplar, okuma becerisini geliştirmek için sıklıkla kullandığımız eğitim malzemeleri olmasından, zamanımızda kullandığımız e-kitapların okuma becerisini ve tutumunu ne şekilde etkilemekte olduğu cevap aranan bir sorudur. Okuma zihinsel gelişime önemli katkı sağlayan öğrenme alanıdır. Okuma sırasında metin zihinsel kavramlara dönüştürülerek beyinde anlam ve yapı kazanır. Ayrıca eğitimde öğrenci ile birebir ilgilenmekte olan öğretmenlerin elektronik kitaplara yaklaşımı öğrencilerin de bu konudaki tutumu üzerinde etkili olmaktadır. Öğretmenler, sınıf içerisinde ve dışında öğrenci için yol gösterici ve rol model olmalarından dolayı, elektronik kitapları eğitime dahil etme tutumu içerisinde olurlarsa öğrencilerin de elektronik kitaplara ilişkin algısını olumlu anlamda geliştirmesi muhtemeldir. Bu açıdan bakıldığında öğrencilerin, farklı bir anlatımla gelecek nesillerin okumaya ve elektronik kitaplara olan tutumunda öğretmenlerin elektronik kitaplara ilişkin algısının etkili olduğu düşünülmektedir.

Teknolojinin gelişmesine paralel olarak, mevcut öğretim programları (Millî Eğitim Bakanlığı [MEB], 2018) öğrencilere dijital yeterliklere göre bilgi ve iletişim teknolojilerini (BİT) kullanmayı, bilgiyi elde etmeyi ve bilgiyi değerlendirmeyi öğretmeyi amaçlamaktadır. BİT geliştikçe teknolojinin eğitim ve öğretim ortamlarına entegrasyonu giderek önem kazanmaktadır (Aydın ve Soyer, 2020). Türkiye, eğitim alanında çeşitli ülkelerin yeniliklerine uyum sağlamak, geri kalmamak ve teknolojinin sağladığı fırsatlardan yararlanmak için birçok yeniliği hayata geçirmiştir. Bu projelerden biri de Fırsatları Artırma ve Teknolojiyi İyileştirme Hareketi (FATİH) projesidir. 2012 yılında hayata geçirilen projeyle Millî Eğitim Bakanlığı'na bağlı okul ve kurumlardaki bölgesel

farklılıkların giderilmesi, eğitimde fırsat eşitliğinin sağlanması ve okul teknolojisinin geliştirilmesi amaçlanmaktadır.

Elektronik kitap kullanımına ilişkin literatür incelendiğinde çok sayıda araştırma olduğu görülmektedir (Kelley, 2011; Maden, 2012; Maynard ve Cheyne, 2005; Öngöz, 2011; Yee ve Zainuddin, 2018). Maden (2012), Türkçe öğretmen adaylarıyla yaptığı araştırma sonucunda öğretmen adaylarının ekran okumaya ilişkin hem olumlu hem de olumsuz algılara sahip olduğunu tespit etmiştir. İlgili çalışmada öğretmenler, elektronik kitapları; bilgi kaynaklarına kolay erişim imkânı sunması açısından olumlu, bilgiye ulaşırken hazırcılık/ bilgiye ulaşma çabasını ortadan kaldırması açısından ise olumsuz bulmuşlardır. Başka bir çalışmada Kelley (2011), elektronik kitapların öğrencilerin okuma becerilerini geliştirebileceğini ortaya koymuştur. Yee ve Zainuddin (2018) ise e-kitapların kullanımının öğrencilerin okuduğunu anlama becerilerini ve motivasyonlarını geliştirdiğini ortaya koymuştur. Maynard ve Cheyne (2005) ise yaptığı araştırmada elektronik kitapların öğrenciler tarafından ilgi gördüğünü ve motivasyonlarını arttırdığını tespit etmiştir. Elektronik kitapların öğrencilerin gelişimine ve eğitimine birçok faydası bulunmaktadır ve önümüzdeki yıllarda eğitimde yaygın olarak kullanılan araçlardan biri haline gelecektir (Farrokhı, 2015). Dolayısıyla öğretim sürecinde kritik role rahip öğretmenlerin elektronik ders kitaplarını ne düzeyde kullandıklarını, elektronik ders kitaplarına ilişkin algısını ve bu algının çeşitli sosyodemografik değişkenlere göre farklılaşıp farklılaşmadığını tespit etmek önemli görülmektedir.

Bu araştırmada Türkçe dersi elektronik ders kitaplarına ilişkin öğretmenlerin algısını incelemek amaçlanmıştır. Bu bağlamda şu araştırma sorularına yanıt aranmıştır:

1) Öğretmenlerin Türkçe derslerinde teknoloji kullanım sıklığı nedir?
2) Türkçe dersi okuma etkinliklerinde öğretmenlerin teknoloji kullanım sıklığı nedir?
3) Öğretmenlerin elektronik ders kitabı kullanımına ilişkin algısı çeşitli değişkenlere göre farklılaşmakta mıdır?

Yöntem

Araştırma Modeli

Türkçe dersinde elektronik ders kitaplarının kullanımına ilişkin öğretmen görüşlerinin tespit edilmesi amacı ile yapılan bu araştırmada nicel araştırma yöntemlerinden tarama modeli kullanılmıştır. Karasar'ın (2011) belirttiği gibi tarama modeli, geçmişte veya halihazırda var olan bir durumu tanımlayan bir süreçtir. Evrensel tarama modelinde, çok sayıda öğeden oluşan bir evrende, evrenin tamamı veya ondan alınan birtakım örnekler veya örnekler taranma süratiyle evrene ilişkin genel bir yargıya varılır.

Örneklem

Araştırma, Mardin/Kızıltepe ilçesinde 2023-2024 eğitim-öğretim yılında üç farklı okulda yürütülmüştür. Örneklem grubu, 77 öğretmenden (sınıf öğretmeni ve Türkçe öğretmeni) oluşmaktadır. Araştırmaya katılan öğretmenlerin %67'si erkek, %33'ü kadındır. Öğretmenlerden %51'i Eğitim Fakültesi mezunudur. Öğretmenlerin %70'i 10 yıldan daha az öğretmenlik deneyimine sahiptir. Öğretmenlerin %42'si 5 yıldan az bir süredir Türkçe dersine girerken, %25'i 6-10 yıldır Türkçe dersine girmektedir. Öğretmenlerin %75'inin görev yaptığı okul il-ilçe merkezinde, %25'inin ise köy-mahallededir. Öğretmenlerin %56'sının Türkçe dersinde girdikleri sınıfların ortalama mevcudu 23'tür.

Veri Toplama Aracı ve Veri Analizi

Araştırmada veri toplama aracı olarak Elektronik Kitaplara İlişkin İlköğretim Sınıf Öğretmenlerinin Algıları Ölçeği (EKİİSÖA) kullanılmıştır. Öztürk (2014) tarafından geliştirilen ölçek 4 faktörlü yapıdadır. 23 maddeden oluşan ölçek 5'li likert tipindedir. Ölçeğin Cronbach Alfa güvenirlik katsayısı .78 olarak bulunmuştur. Ölçeğin alt boyutlarına ilişkin iç tutarlılık katsayıları ise; 'Elektronik kitabın işlevselliği' alt faktörü için .77, 'Elektronik kitabın sunduğu imkanlar' alt faktörü için .71, 'Elektronik kitabın okumaya olan yararı' alt faktör için .77 ve 'Elektronik kitabın sınırlılığı' alt faktörü için .70 bulunmuştur. Bu çalışmada Cronbach Alfa güvenirlik katsayısı .89 olarak hesaplanmıştır. Alt faktörler ise 0,71-0,91 arasında hesaplanmıştır. Verilerin normal dağılım gösterdiği çarpıklık (Skewness;-0.68 ile -0.29 arasında) ve basıklık (Kurtosis; -0.22 ile -0.87 arasında) analiziyle tespit edilmiştir. Çeşitli sosyodemografik değişkenlere göre istatistiki olarak anlamlı farklılık olup olmadığını belirlemek için parametrik analizler *t*-testi ve ANOVA kullanılmıştır. İstatistiksel analizler için anlamlılık seviyesi $p<0.05$ olarak kabul edilmiştir.

Bulgular

Bu çalışmada 77 öğretmenden toplanan nicel veriler t-testi ve ANOVA ile analiz edilmiştir. Elde edilen bulgular başlıklar halinde sunulmuştur.

Öğretmenlerin Türkçe derslerinde teknoloji kullanımı

Öğretmenlerin Türkçe derslerinde teknoloji kullanım sıklığı incelenmiştir. Elde edilen bulgular Tablo 1'de sunulmuştur.

Tablo 1. Öğretmenlerin Türkçe derslerinde teknoloji kullanım sıklığı

Kullanım Sıklığı	f	%
Hiçbir zaman	6	7,8
Bazen	47	61,0
Her zaman	24	31,2
Toplam	77	100,0

Tablo 1'e göre araştırmaya katılan öğretmenlerin %61'i teknolojiyi okuma amacıyla bazen kullandığını belirtirken, %31,2'si her zaman, %7,8'i ise hiç kullanmadığını belirtmişlerdir.

Türkçe dersi okuma etkinliklerinde öğretmenlerin teknoloji kullanımı

Öğretmenlerin Türkçe derslerinde okuma etkinliklerinde elektronik ders kitaplarını ne düzeyde kullandığı incelenmiştir. Elde edilen bulgular Tablo 2'de sunulmuştur.

Tablo 2. Öğretmenlerin Türkçe Dersi Okuma Etkinliklerinde Elektronik Kitap Kullanımı

Kullanım Sıklığı	f	%
Hiçbir zaman	22	28,6
Bazen	38	49,4
Her zaman	17	22,1
Toplam	77	100,0

Tablo 2'ye göre araştırmaya katılan öğretmenlerin %49,4'ü Türkçe dersinde okuma amacıyla elektronik kitapları bazen kullandığını belirtirken, %28,6'sı hiçbir zaman, %22,1'i ise her zaman kullandığını belirtmişlerdir.

Demografik Özelliklere Göre Elektronik Ders Kitabı Kullanımına İlişkin Bulgular

Öğretmenlerin elektronik ders kitaplarının kullanımına yönelik algısı demografik özelliklere göre analiz edilmiş ve istatistiki olarak farklılaşıp farklılaşmadığı tespit edilmiştir. Cinsiyete ilişkin bulgular Tablo 3'te sunulmuştur.

Tablo 3. Cinsiyete göre elektronik ders kitaplarına ilişkin öğretmen algısı

Alt Boyut	Cinsiyet	*n*	$\bar{x}$	*Ss*	*t*	*p*
Elektronik kitabın işlevselliği	Kadın	25	3,936	0,754	-1,188	.239
	Erkek	52	4,158	0,772		
Elektronik kitabın sunduğu imkanlar	Kadın	25	3,967	0,488	-1,384	.170
	Erkek	52	4,173	0,663		
Elektronik kitabın okumaya olan yarar	Kadın	25	3,869	0,865	-1,363	.177
	Erkek	52	4,135	0,770		
Elektronik kitabın sınırlılığı	Kadın	25	3,432	0,952	-0,758	.541
	Erkek	52	3,631	1,132		

Ölçek Toplamı	Kadın	25	3,814	0,528	-1,642	.105
	Erkek	52	4,040	0,583		

n = 77

Tablo 3'e göre öğretmenlerin cinsiyet açısından elektronik ders kitaplarına ilişkin algısında istatistiksel olarak anlamlı bir farklılık bulunmamaktadır (p>.05). Öğretmenlerin mezun olduğu fakülteye göre ise elektronik ders kitabı algısı Tablo 4'te sunulmuştur.

Tablo 4. Mezun olunan fakülteye göre elektronik ders kitaplarına ilişkin öğretmen algısı

Alt Boyut	Fakülte	n	$\bar{x}$	Ss	F	p
Elektronik kitabın işlevselliği	Eğitim Fakültesi	39	4,118	0,716	0,109	.897
	Fen Edebiyat Fakültesi	14	4,100	0,784		
	Diğer	24	4,025	0,867		
	Toplam	77	4,086	0,769		
Elektronik kitabın sunduğu imkanlar	Eğitim Fakültesi	39	4,094	0,603	0,078	.925
	Fen Edebiyat Fakültesi	14	4,071	0,659		
	Diğer	24	4,146	0,638		
	Toplam	77	4,106	0,617		
Elektronik kitabın okumaya olan yarar	Eğitim Fakültesi	39	4,081	0,777	0,380	.686
	Fen Edebiyat Fakültesi	14	3,878	0,808		
	Diğer	24	4,095	0,872		
	Toplam	77	4,048	0,806		
Elektronik kitabın sınırlılığı	Eğitim Fakültesi	39	3,313	1,127	2,287	.109
	Fen Edebiyat Fakültesi	14	3,786	0,850		
	Diğer	24	3,850	1,044		
	Toplam	77	3,566	1,075		
Ölçek Toplamı	Eğitim Fakültesi	39	3,925	0,526	0,295	.746
	Fen Edebiyat Fakültesi	14	3,957	0,602		
	Diğer	24	4,040	0,642		
	Toplam	77	3,967	0,572		

n = 77

Tablo 4'e göre öğretmenlerin mezun olduğu fakülte açısından elektronik ders kitaplarına ilişkin algısında istatistiksel olarak anlamlı bir farklılık bulunmamaktadır (p>.05). Öğretmenlerin öğretmenlik deneyimine göre ise elektronik ders kitabına ilişkin algısı Tablo 5'te sunulmuştur.

Tablo 5. Öğretmenlik deneyimine göre elektronik ders kitaplarına ilişkin öğretmen algısı

Alt Boyut	Öğretmenlik Deneyimi	n	$\bar{x}$	Ss	F	p
Elektronik kitabın işlevselliği	10 yıldan az	54	4,011	0,785	0,915	.405
	11-20 yıl	14	4,214	0,659		
	21 yıl ve daha fazla	9	4,333	0,831		
	Toplam	77	4,086	0,769		
	10 yıldan az	54	4,083	0,628	0,389	.679

Alt Boyut	Öğretmenlik Deneyimi	*n*	$\bar{x}$	*Ss*	*F*	*p*
Elektronik kitabın sunduğu imkanlar	11-20 yıl	14	4,083	0,587		
	21 yıl ve daha fazla	9	4,278	0,629		
	Toplam	77	4,106	0,617		
Elektronik kitabın okumaya olan yarar	10 yıldan az	54	4,021	0,846	0,143	.867
	11-20 yıl	14	4,071	0,776		
	21 yıl ve daha fazla	9	4,175	0,662		
	Toplam	77	4,048	0,806		
Elektronik kitabın sınırlılığı	10 yıldan az	54	3,552	1,068	0,214	.808
	11-20 yıl	14	3,486	1,215		
	21 yıl ve daha fazla	9	3,778	0,977		
	Toplam	77	3,566	1,075		
Ölçek Toplamı	10 yıldan az	54	3,933	0,560	0,549	.580
	11-20 yıl	14	3,978	0,553		
	21 yıl ve daha fazla	9	4,150	0,702		
	Toplam	77	3,967	0,572		

n = 77

Tablo 5'e göre öğretmenlik deneyimi açısından öğretmenlerin elektronik ders kitaplarına ilişkin algısında istatistiksel olarak anlamlı bir farklılık bulunmamaktadır (p>.05). Öğretmenlerin Türkçe dersine girme deneyimine göre ise elektronik ders kitabına ilişkin algısı Tablo 6'da sunulmuştur.

Tablo 6. Türkçe dersine girme deneyimine göre elektronik ders kitaplarına ilişkin öğretmen algısı

Alt Boyut	Süre	*n*	$\bar{x}$	*Ss*	*F*	*p*
Elektronik kitabın işlevselliği	5 yıl	32	4,063	0,759	0,123	.947
	6-10 yıl	19	4,063	0,795		
	11-15 yıl	12	4,050	0,744		
	16 yıl ve üzeri	14	4,200	0,849		
	Toplam	77	4,086	0,769		
Elektronik kitabın sunduğu imkanlar	5 yıl	32	4,089	0,722	0,047	.986
	6-10 yıl	19	4,097	0,637		
	11-15 yıl	12	4,167	0,310		
	16 yıl ve üzeri	14	4,107	0,579		
	Toplam	77	4,106	0,617		
Elektronik kitabın okumaya olan yarar	5 yıl	32	4,067	0,862	0,029	.993
	6-10 yıl	19	4,023	0,936		
	11-15 yıl	12	4,083	0,458		
	16 yıl ve üzeri	14	4,010	0,797		
	Toplam	77	4,048	0,806		
Elektronik kitabın sınırlılığı	5 yıl	32	3,494	1,140	0,129	.943
	6-10 yıl	19	3,600	1,139		

Alt Boyut	Süre	*n*	$\bar{x}$	*Ss*	*F*	*p*
	11-15 yıl	12	3,717	1,113		
	16 yıl ve üzeri	14	3,557	0,878		
	Toplam	77	3,566	1,075		
Ölçek Toplamı	5 yıl	32	3,947	0,579	0,046	.987
	6-10 yıl	19	3,959	0,634		
	11-15 yıl	12	4,018	0,446		
	16 yıl ve üzeri	14	3,978	0,622		
	Toplam	77	3,967	0,572		

n = 77

Tablo 6'ya göre Türkçe dersine girme deneyimi açısından öğretmenlerin elektronik ders kitaplarına ilişkin algısında istatistiksel olarak anlamlı bir farklılık bulunmamaktadır (p>.05). Öğretmenlerin öğretmenlik yaptığı okulun yerleşim yerine göre ise elektronik ders kitabına ilişkin algısı Tablo 7'de sunulmuştur.

Tablo 7. Okulun yerleşim yerine göre elektronik ders kitaplarına ilişkin öğretmen algısı

Alt Boyut	Yerleşim Yeri	*n*	$\bar{x}$	*Ss*	*t*	*p*
Elektronik kitabın işlevselliği	Köy-Mahalle	19	4,084	0,905	-0,010	.992
	İl/İlçe Merkezi	58	4,086	0,728		
Elektronik kitabın sunduğu imkanlar	Köy-Mahalle	19	4,140	0,782	0,278	.782
	İl/İlçe Merkezi	58	4,095	0,559		
Elektronik kitabın okumaya olan yarar	Köy-Mahalle	19	4,007	1,003	-0,252	.802
	İl/İlçe Merkezi	58	4,062	0,741		
Elektronik kitabın sınırlılığı	Köy-Mahalle	19	3,884	1,046	1,498	.138
	İl/İlçe Merkezi	58	3,462	1,072		
Ölçek Toplamı	Köy-Mahalle	19	4,032	0,686	0,571	.570
	İl/İlçe Merkezi	58	3,945	0,535		

n = 77

Tablo 7'ye göre öğretmenlerin görev yaptığı okulun yerleşim yeri açısından elektronik ders kitaplarına ilişkin algısında istatistiksel olarak anlamlı bir farklılık bulunmamaktadır (p>.05). Öğretmenlerin derslerine girdiği sınıfların mevcuduna göre ise elektronik ders kitabına ilişkin algısı Tablo 8'de sunulmuştur.

Tablo 8. Sınıf mevcuduna göre elektronik ders kitaplarına ilişkin öğretmen algısı

Alt Boyut	Sınıf Mevcudu	*n*	$\bar{x}$	*Ss.*	*F*	*p*
Elektronik kitabın işlevselliği	1-20	24	4,058	0,706	0,039	.961
	21-40	43	4,088	0,805		
	41 ve üzeri	10	4,140	0,828		
	Toplam	77	4,086	0,769		
Elektronik kitabın sunduğu imkanlar	1-20	24	4,111	0,603	0,004	.996
	21-40	43	4,101	0,626		
	41 ve üzeri	10	4,117	0,672		
	Toplam	77	4,106	0,617		
	1-20	24	4,012	0,781	0,058	.944

Alt Boyut	Sınıf Mevcudu	*n*	$\bar{x}$	*Ss.*	*F*	*p*
Elektronik kitabın okumaya olan yarar	21-40	43	4,076	0,839		
	41 ve üzeri	10	4,014	0,798		
	Toplam	77	4,048	0,806		
Elektronik kitabın sınırlılığı	1-20	24	3,775	0,989	1,765	.178
	21-40	43	3,367	1,132		
	41 ve üzeri	10	3,920	0,910		
	Toplam	77	3,566	1,075		
Ölçek Toplamı	1-20	24	3,996	0,531	0,211	.811
	21-40	43	3,931	0,583		
	41 ve üzeri	10	4,048	0,667		
	Toplam	77	3,967	0,572		

n = 77

Tablo 8'e göre öğretmenlerin dersine girdiği sınıfların ortalama mevcudu açısından elektronik ders kitaplarına ilişkin algısında istatistiksel olarak anlamlı bir farklılık bulunmamaktadır (p>.05). Demografik değişkenlere ilişkin bulgular öğretmenlerin elektronik ders kitabına ilişkin algısının cinsiyete, mezun oldukları fakülte türüne, öğretmenlik deneyimine, derslerine girdiği sınıfların mevcuduna ve görev yaptıkları okulun yerleşim yerine göre istatistiksel olarak farklılaşmadığını göstermektedir.

Tartışma ve Sonuç

Bu çalışmada Türkçe derslerine giren Türkçe Öğretmenleri ile Sınıf Öğretmenlerinin elektronik ders kitaplarına ilişkin algısının tespit edilmesi amaçlanmıştır. Tarama modeliyle yürütülen bu çalışmada 77 öğretmenden veri toplanmıştır. Bu bağlamda genel anlamda derslerde teknoloji kullanım durumları, okuma etkinliklerinde elektronik ders kitaplarını kullanım sıklığı ve elektronik ders kitabına ilişkin algılarının çeşitli değişkenlere göre farklılaşıp farklılaşmadığı incelenmiştir. Elde edilen sonuçlar, öğretmenlerin elektronik ders kitabına ilişkin algısının cinsiyete, mezun oldukları fakülte türüne, öğretmenlik deneyimine, derslerine girdiği sınıfların mevcuduna ve görev yaptıkları okulun yerleşim yerine göre istatistiksel olarak farklılaşmadığını göstermiştir.

Türkçe dersinde elektronik ders kitaplarının kullanımına ilişkin öğretmen görüşlerinin incelendiği araştırmada öğretmenlerin okuma amacıyla teknolojiyi ve Türkçe dersinde okuma amacıyla elektronik kitapları bazen kullandıkları belirlenmiştir. Özekinci ve Özatay (2022) yaptıkları araştırmada öğretmenlerin çoğunluğunun haftada 1-2 ders saatinde etkileşimli e-kitap kullandıklarını belirlemişlerdir. Tok (2023) akademisyenlerin elektronik kitap veri tabanlarını ders materyali sağlama amacıyla kullandıklarını belirlemiştir. Öztürk (2014) de araştırmasında öğretmenlerin elektronik kitaplara yönelik algının cinsiyete, mezun olduğu fakülte türüne, öğretmenlik deneyimine göre farklılaşmadığını tespit etmiştir.

Görev yapılan okulun yerleşim yeri ve sosyokültürel yapısı öğrencilerin eğitim materyaline ulaşma durumunda belirleyici bir unsur olabilmektedir. Köy-mahallede bulunan okullarda özellikle teknolojik yetersizlikler öğrencilerin bu konudaki gereksinimlerini ortaya çıkartmakta, öğretmenlerin de bu gereksinimden dolayı Türkçe dersinde elektronik kitapların kullanımına yönelik algı düzeyi yükselebilmektedir. Ayrıca sınıf mevcudunun artması öğretmeni sunuş yoluyla öğrenme stratejisini benimsemesine neden olmakta ve elektronik kitap kullanımına yöneltebilmektedir. Ortalamalar incelendiğinde öğrenci sayısının 21-40 olduğu sınıflarda öğretmen algısının daha yüksek olduğu görülmüştür. Ayrıca okuma amacıyla teknolojiyi her zaman kullanan öğretmenlerin Türkçe dersinde elektronik kitap kullanımına yönelik algı düzeyi ortalamasının daha yüksek olduğu belirlenmiştir. Öğretmenlerin teknolojiyi kullanma alışkanlıklarını derslere yansıtmaları sebebiyle elektronik kitapları Türkçe dersinde kullanmaya yönelik algı düzeylerinin yükseldiği söylenebilir.

Okullarda bilgiyi kullanma ve yayma kapsamında öğretmenlere elektronik kitapların eğitime yönelik avantajları konusunda eğitimler verilebilir. Eğitim fakültelerinden mezun olacak öğretmen adaylarına elektronik ders kitaplarının kullanımı yönelik olumlu tutum kazandırılması önemli görülmektedir. Elektronik ders kitaplarına yönelik diğer branş öğretmenlerinin algısı araştırılabilir. Araştırma daha geniş örneklemlerle yapılabilir. Farklı okul türlerinde ve kademelerinde nitel araştırma yöntemleri kullanılarak araştırmalar yapılabilir. Son olarak öğretmenlerin okuma etkinliklerinde ve ders dışında da elektronik kitapları tercih etmesi önerilmektedir.

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Öğrencilerin E-kitap Okuma Davranışlarının Sistematik İncelenmesi

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Özet

Eğitim alanında, çeşitli e-öğrenme sistemlerinin ortaya çıkması ve pratikte uygulanmasıyla birlikte, öğrencilerin ne tür öğrenme etkinliklerini tamamladıklarını gösteren "öğrenme günlükleri" otomatik olarak kaydedilmekte ve kullanımı kolay hale gelmektedir. Öğrenme günlüklerinin uygulama alanları, öğretim içeriklerinin önerilmesi, notların tahmin edilmesi ve düşük not alan öğrencilerin erken tespiti gibi geniş bir yelpazeye yayılmaktadır. Öğrenme analitikleri ve e-kitap sistemleri, öğrenci öğrenmesini desteklemek için giderek daha fazla birlikte kullanılmaktadır. E-kitaplar, geleneksel ders kitapları ile mümkün olmayan öğrencilerin okuma süreçleri ve davranışlarına ilişkin günlük verilerinin toplanmasına ve analizler yapılmasına imkân tanımaktadır. Bu bağlamda bu çalışmada öğrencilerin e-kitap okuma davranışlarının sistematik olarak incelenmesi amaçlanmaktadır. Çalışmanın araştırma boyutu uygulamaya dönük bulguların ve tartışmaların incelendiği sistematik bir literatür taraması olarak desenlenmiştir. Scopus, Web of Science ve ERIC veri tabanlarında "learning analytics veya log" ve "e-book" ve "student" ve "behaviour" anahtar kelimeleri ile yapılan taramada toplamda 56 makale/bildiriye ulaşılmıştır. PRISMA modeli ile filtreleme kriterlerine uygun olacak şekilde 30 çalışma araştırmaya dahil edilmiştir. Sonuç olarak bu çalışmalarda öğrenme davranışlarından geri izleme/atlama, öğrenci katılımı, memnuniyet düzeyi ve algıları, öğrenme performansı, okuma katılımı ve anlama düzeyi, öğrenme stili, kelime bilgisi kazanımı gibi değişkenlerin incelendiği görülmüştür. Ayrıca yapılan literatür taraması çerçevesinde tercih edilen araştırma yöntemi, örneklem grubu, veri toplama araçları, veri analiz yöntemleri, tercih edilen sistem, uygulamanın yapıldığı disiplin ve çalışmaların ülke ve yıla göre dağılımları incelenmiştir. Literatür taraması sürecinde elde edilen bulgular, bu alanda yapılabilecek sonraki araştırmalara yol göstermek ve öğrenme analitiği ve e-kitapların birlikte ve etkili kullanımına yönelik rehberlik sağlamak amacıyla sunulmaktadır. Literatür taraması sonuçları değerlendirildiğinde e-kitapların; öğrencilerin okuma süreçlerini izlenmesine ve okuma sonuçlarını tahmin etmelerine olanak tanıyabilecek gizli bir değerlendirme ortamı oluşturacağı, öğrencilerin gömülü soruları okumaya ne kadar çok zaman harcarlarsa soruları doğru cevaplama olasılıklarının ve kelime bilgisi kazanımlarının o kadar yüksek olacağı, öğrencilerin okuma davranışlarının farklı profillerde belirlenebileceği, risk altındaki öğrencilerin tanımlanabileceği ve öğrencilerin kişiselleştirilmiş öğrenme deneyimlerine katkı sağlayabileceği görülmüştür.

Anahtar Kelimeler: öğrenme analitiği, log, öğrenme günlüğü, öğrenci, e-kitap, okuma davranışı

Systematic Investigation of Students' E-book Reading Behaviors

Abstract

In the field of education, with the emergence and practical implementation of various e-learning systems, "learning logs" that show what kind of learning activities students have completed are automatically recorded and easy to use. The application areas of learning logs are wide ranging, such as suggesting instructional content, predicting grades, and early detection of students with low grades. Learning analytics and e-book systems are increasingly used together to support student learning. E-books enable the collection and analysis of daily data on students' reading processes and behaviors, which is not possible with traditional textbooks. In this context, this study aims to systematically examine students' e-book reading behaviors. The research dimension of the study is designed as a systematic literature review in which practical findings and discussions are examined. A total of 56 articles/papers were found in Scopus, Web of Science and ERIC databases with the keywords "learning analytics or log" and "e-book" and "student" and "behavior". With the PRISMA model, 30 studies were included in the study in accordance with the filtering criteria. As a result, it was seen that these studies examined variables such as backtracking/skipping from learning behaviors, student engagement, satisfaction level and perceptions, learning performance, reading engagement and comprehension level, learning style, vocabulary acquisition. In addition, within the framework of the literature review, the preferred research method, sample group, data collection tools, data analysis methods, preferred system, discipline of the application, and the distribution of studies by country and year were examined. The findings obtained during the literature review process are presented in order to guide future research in this field and to provide guidance for the effective use of learning analytics and e-books together. When the results of the literature review are evaluated, it is seen that e-books can create a confidential assessment environment that can allow students to monitor their reading processes and predict their reading results, the more

time students spend reading the embedded questions, the more likely they are to answer the questions correctly and the higher their vocabulary gains, students' reading behaviors can be determined in different profiles, students at risk can be identified, and students can contribute to personalized learning experiences.

Giriş

E-yayıncılık teknolojilerinin ve standartlarının gelişmesiyle birlikte, giderek artan sayıda geleneksel ders kitapları yerini e-kitaplara bırakmış ve daha fazla insan bu yeni okuma yöntemini tercih etmiştir (Rainie vd., 2012). Geleneksel ders kitaplarıyla karşılaştırıldığında, e-kitaplar maliyet tasarrufu, internetten hızlı erişim, düşük alan tüketimi ve daha yüksek taşınabilirlik gibi çok sayıda fayda sağlamaktadır (Shepperd, Grace ve Koch, 2008). E-kitaplar ve hikâye uygulamaları gibi dijital okuma platformlarının giderek artan etkileşimli özellikleriyle dijital okuryazarlık ortamları, okuyuculardan bilgi toplanmasına olanak tanır, içerik seçenekleri ve bireyselleştirilmiş destek sağlar (McEneaney, 2006). Bunun karşılığında, okuyucular tercih ettikleri içeriği aktif olarak seçebilir (Bryan vd., 2003), anlamalarını izleyebilir (Boteanu vd., 2016) veya gerektiğinde yardım isteyebilirler (Walker vd., 2017). E-kitaplar kullanılarak önemli miktarda günlük öğrenme verisi oluşturulabilir. Bu günlük verileri, okuma, yazma, test çözme ve akranlarla gerçek ya da sanal ortamlarda çeşitli görevleri yerine getirme gibi öğrenme uygulamalarının kaydıdır (Mostow, 2004).

Günlük verileri ve tıklama akışı verileri, eğitim çıktılarına ulaşmak için uygun müdahalelere temel oluşturabilecek kritik bilgiler sağlayarak öğrenme analitiği ve eğitim veri madenciliği alanlarını zenginleştirmiştir (Pacifico-Banawan, 2021). Öğrenme platformları aracılığıyla elde edilen öğrencilerin olay günlükleri ve tıklama akışı etkileşim verilerinin, öğrencilerin öğrenme davranışları, akademik performansları ve öğrenmeyle ilgili diğer yapılar hakkında zengin bir içgörü kaynağı olduğu bulunmuştur (Pacifico-Banawan, 2021).

Araştırmacılar, günlük verilerinin öğrenci performansı ve çıktılarıyla olumlu yönde ilişkili olabileceğini bildirmiştir (Agudo-Peregrina, 2015; Archer, Chetty, & Prinsloo, 2014; Hrastinski, 2009; Iglesias-Pradas, Ruiz-de-Azcárate, & Campbell, DeBlois, & Oblinger, 2007; Macfadyen & Dawson, 2012). Birçok çalışma, çevrimiçi öğrenme tarzlarındaki bireysel farklılıkları açıklamak için kullanılan en tipik ölçütler olan işaretleyici sayısı, oturum açma sıklığı ve sayfaları okumak için harcanan süre gibi öğrenci günlük verilerinin frekans ölçümlerini kullanmıştır (Morris, Finnegan ve Wu, 2005; Yamada vd., 2015; Yin vd., 2017; You, 2016). Araştırmacılar, kullanıcı davranışlarının ve deneyimlerinin analizinin öğrenme sistemlerinin, materyallerinin veya etkinliklerinin tasarımını kolaylaştırabileceğini belirtmiştir (Brajnik & Gabrielli, 2010; Law & Larusdottir, 2015; Sutcliffe & Hart, 2016). Alanyazın incelendiğinde sınıf ortamında e-kitap günlükleri üzerine yapılan araştırmaların genellikle çevrimiçi platformlara yönelik olduğu ve e-kitaplar bağlamında öğrenme günlüklerine olan ilginin sınırlı olduğu görülmektedir.

Bir e-kitap sisteminde öğrenci okuma davranışları, teknolojik ilerleme sayesinde birçok elektronik öğrenme platformu veya sistemi, öğrencilerin bağımsız olarak öğrenmeleri için çeşitli öğrenme materyalleri veya ders materyalleri sağlamakla kalmaz, aynı zamanda öğrenci başarıları ve davranış kalıpları da dahil olmak üzere öğrenci öğrenme verilerini otomatik olarak toplayabilir (Chen vd., 2021). Örneğin, bir e-kitap sistemi genellikle öğrencilere bir derste öğretim veya öğrenme materyalleri sağlamak için kullanılır ve ders öncesi veya sonrası okuma yapmalarını sağlar (Chen vd., 2020). Sistem aracılığıyla dijital öğretim ve öğrenim materyalleri depolanır ve öğrencilerin dijital materyalleri incelemeye dönük davranışları kaydedilebilir. E-kitap okuma davranışları, öğrencilerin bireysel ihtiyaçları, kişisel özellikleri, kullanım amaçları gibi yönlerden farklılık gösterebilir. Bu doğrultuda bu sürecin önceden bilinmesi, öğretim sürecini başarıyla tamamlayan öğrencilerin neleri bileceği, anlayacağı veya yapabileceğini açıklayabilmesi için yani etkili öğrenme çıktılarının sağlanması ve daha nitelikli tasarımlar yapılabilmesi için önemlidir. Bunun yanı sıra kullanılan kitabın formatı, tasarımı, işlevi, içerik yapısı, etkileşim düzeyi, kitabın bulunduğu sistemin özellikleri (yer imi ekleme, yorum ekleme vb.) öğrencilerin okuma davranışları üzerinde belirleyici etkisi olabilir. Buradan hareketle e-kitapların okunması sürecinde öğrencilerin öğrenmesi ve kullanılan e-kitabın özelliklerinin sürece etkisinin belirlenmesinde öğrenme günlükleri önemli rol oynamaktadır. Örneğin Kyoto üniversitesinde yürütülen bir çalışmada, yer imleri, vurgulamaları, ek açıklamaları ve sorguları destekleyen bir e-kitap sistemi kullanılmıştır. Bu e-kitap özellikleri, öğrencilerin okuma ve öğrenmeleri sürecinde kullanılmıştır (Akçapınar vd., 2019; Ogata vd., 2015). İdeal olarak, öğrencilerin okuma günlükleri ve önemli noktaları (Yang vd., 2020) sistem sunucusuna kaydedilerek, öğrencilerin derslerde kullanılan dijital materyalleri okumaya yönelik davranışlarının daha iyi araştırılmasına ve anlaşılmasına olanak sağlanabilir.

Bu doğrultuda bu çalışma öğrencilerin e-kitap okuma davranışlarını sistematik olarak inceleyerek, bu alanda gerçekleştirilecek sonraki çalışmalara rehberlik sağlamayı amaçlamaktadır. Ayrıca 2015-2024 yılları arasındaki araştırmaların incelendiği bu çalışmanın, güncel çalışmaları içermesi bakımından alana katkı sağlayacağı düşünülmektedir.

Bu kapsamda son 10 yılda yapılmış çalışmalardan yola çıkılarak aşağıdaki araştırma sorularına cevap aranmaktadır:

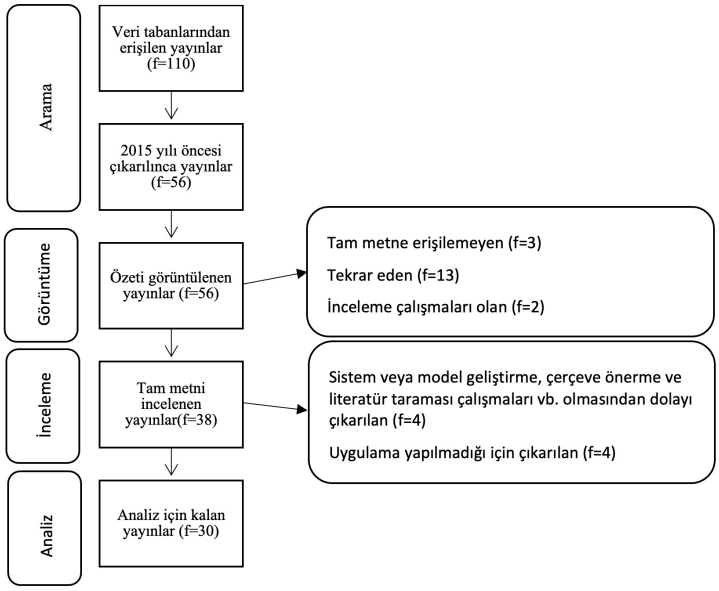
1. Öğrencilerin e-kitap okuma davranışlarını inceleyen çalışmaların metodolojik özellikleri (yöntem, veri toplama aracı, örneklem grubu, örneklem büyüklüğü, veri analizi yöntemi) nedir?
2. Öğrencilerin e-kitap okuma davranışlarını inceleyen çalışmaların yapıldığı yıllar, uygulandığı ülkeler ve uygulamanın yapıldığı disiplinler nelerdir?
3. Öğrencilerin e-kitap okuma davranışlarını inceleyen çalışmalarda tercih edilen sistem/uygulama/platformlar nelerdir?
4. Öğrencilerin e-kitap okuma davranışlarını inceleyen çalışmalarda incelenen değişkenler nelerdir?
5. Öğrencilerin e-kitap okuma davranışlarını inceleyen çalışmaların bulguları/sonuçları nelerdir?

Yöntem

Öğrencilerin e-kitap okuma davranışlarının incelenmesi bağlamında yürütülen bu çalışmada sistematik literatür inceleme yöntemi kullanılmıştır. Sistematik inceleme yönteminin temel özellikleri, önceden belirlenen kriterlerle açık bir şekilde hedeflerinin ve yönteminin olması, dahil olma kriterlerine uyan tüm çalışmaları incelenmesi, bulgularının geçerliliğinin değerlendirilebilir olması, bulguların sistematik bir sunumunun olması şeklinde sıralanabilir (Higgins & Green, 2009).

Araştırma kapsamında incelenecek çalışmalar belirlenirken PRISMA yönergelerine uygun olacak şekilde (Liberati vd., 2009) tarama yapılmıştır. Bu doğrultuda e-kitap öğrenme günlükleri/analitik verileri ile öğrencilerin e-kitap okuma davranışlarının inceleyen tüm çalışmalar incelenmiştir. Scopus, Web of Science ve ERIC veri tabanlarında ve Title, Abstract ve Keywords bölümlerinde "learning analytics veya log" ve "e-book" ve "student" ve "behaviour" anahtar kelimeleri ile arama yapılmıştır. Literatür taraması sonucunda dahil etme/dışlama ölçütlerine göre değerlendirilecek çalışmalar nihai hale getirilmiştir.

Son yıllarda e-kitaplarda öğrenme analitiklerinin kullanım durumunun incelenebilmesi amacıyla 2015-2024 yılları arasında yayınlanan çalışmalar ele alınmıştır. Çalışmalarda araştırma yöntemi veya örneklem grubu ayrımı yapılmamıştır. Bu araştırma kapsamına alınan çalışmaların seçilme sürecine ait akış şeması Şekil 1'de verilmiştir.



Şekil 1. Araştırma kapsamında incelenecek çalışmaların seçilme sürecinin akış şeması (Moher Liberati, Tetzlaff, Altman & Prisma, 2009'dan uyarlanmıştır)

Sistematik literatür taraması çalışmalarında toplanan verilerin tanımlanabilmesi için düzenli bir şekilde kayıt altına alınması gerekir (Goagoses & Koglin, 2020). Bu nedenle araştırmacılar tarafından verilerin düzenli toplanabilmesi ve kayı altına alınması amacıyla veri toplama formu geliştirilmiştir. Araştırma kapsamına dahil edilen çalışmalar incelenerek veri toplama formuna girilmiştir. Scopus, Web of Science ve ERIC veri tabanlarında öğrencilerin e-kitap okuma davranışlarının incelendiği bu çalışma, betimsel içerik analizi kullanılarak analiz edilmiştir. Betimsel analiz yöntemi, çeşitli veri toplama teknikleri ile elde edilmiş verilerin daha belirli temalara göre özetlenmesi ve yorumlanmasını içeren bir nitel veri analiz türüdür. Bu analiz türünde temel amaç elde edilmiş verilerin özetlenmiş ve yorumlanmış bir biçimde sunulmasıdır (Yıldırım ve Şimşek, 2003). Elde edilen sonuçların bazıları frekans ve yüzde hesaplamaları kullanılarak tablolar halinde, bazıları ise grafik ve şekiller kullanılarak sunulmuştur.

Bulgular

Bu çalışmada 2015-2024 yılları arasında öğrencilerin e-kitap okuma davranışlarını incelemek amacıyla toplamda 30 çalışma incelenmiştir. Çalışmalara ait veriler beş araştırma sorusu bağlamında incelenmiş ve sonuç olarak aşağıdaki bulgulara ulaşılmıştır.

Öğrencilerin e-kitap okuma davranışlarını inceleyen çalışmaların metodolojik özellikleri (yöntem, veri toplama aracı, örneklem grubu, örneklem büyüklüğü, veri analiz yöntemi) nedir?

Öğrencilerin e-kitap okuma davranışlarının incelendiği çalışmaların metodolojik özelliklerinin (araştırma yöntemleri, veri toplama araçları, örneklem grubu, örneklem büyüklüğü ve veri analiz yöntemleri) frekans ve yüzde dağılımları Tablo 1'de sunulmuştur.

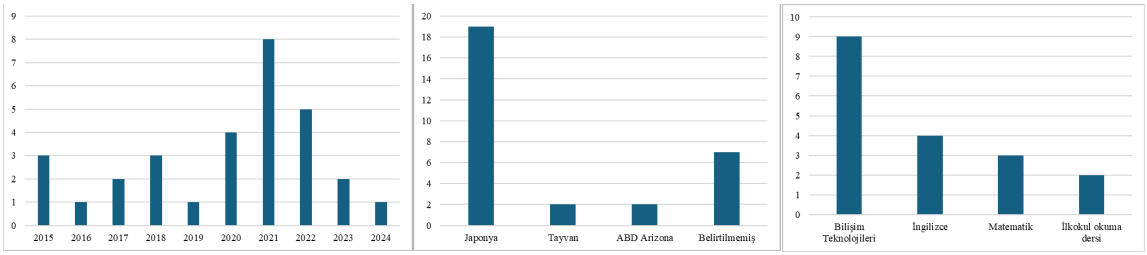
Tablo 1. İncelenen çalışmaların metodolojik özellikleri

Metodolojik Özellikler		***f***	**%**
Araştırma Yöntemi	Nicel	28	7
	Karma	2	93
	Toplam	**30**	**100**
Veri Toplama Aracı	Öğrenme günlükleri	30	60
	Başarı testi	12	24
	Anket	4	8
	Ölçek (algı, bilişsel yük vb.)	2	4
	Görüşme, gözlem	2	4
	Toplam	**50**	**100**
Örneklem Grubu	Lisans	16	53
	Lise	3	10
	Ortaokul	3	10
	İlkokul	2	7
	Lisansüstü	1	3
	Belirtilmemiş	5	17
	Toplam	**30**	**100**
Örneklem Büyüklüğü	1-100 arası	13	43
	101-200 arası	3	10
	201-300 arası	5	17
	300 üzeri	7	23
	Belirtilmemiş	2	7
	Toplam	**30**	**100**
Veri Analizi Yöntemi	Temel istatiksel analizler	9	25
	Makine öğrenmesi yöntemleri	8	22
	Kümeleme analizi	7	20
	Gecikmeli sıralı analiz	3	8
	ANOVA, ANCOVA, T testleri	5	14
	Korelasyon analizleri	4	11
	Toplam	**36**	**100**

Tablo 1 incelendiğinde çalışmalar çoğunluğunda nicel araştırma yönteminin, az sayıda çalışmada ise karma yöntemin kullanıldığı görülmüştür. Veri toplama araçlarına bakıldığında en fazla öğrenme günlüklerinin kullanıldığı, bunun yanı sıra başarı testi, anket gibi araçların tercih edildiği görülmüştür. Örneklem grubunun en fazla lisans öğrencilerinden oluştuğu ve örneklem büyüklüğünün en fazla 1-100 arası, devamında 300 üzeri olduğu görülmektedir.

Öğrencilerin e-kitap okuma davranışlarını inceleyen çalışmaların yılları, uygulandığı ülkeler ve uygulamanın yapıldığı disiplinler nelerdir?

E-kitap okuma davranışlarının incelendiği çalışmaların yılları, uygulamanın yapıldığı ülkeler ve uygulamanın yapıldığı disiplinler Şekil 1'de gösterilmiştir.

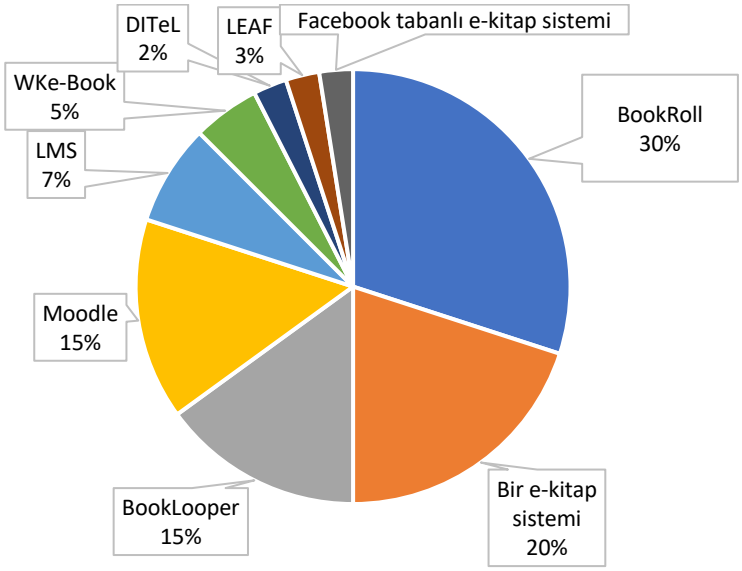


Şekil 1. İncelenen çalışmaların yürütüldüğü yıllar ve uygulamanın yapıldığı ülkeler

Şekil 1 incelendiğinde öğrencilere yönelik e-kitap okuma davranışlarının incelendiği çalışmaların en fazla 2021 yılında yapıldığı, devamında 2020 ve 2022 yıllarında çalışıldığı görülmektedir. Uygulamanın yürütüldüğü ülkelere bakıldığında çalışmaların büyük çoğunluğunun Japonya'da yapıldığı dikkat çekmektedir. Ayrıca uygulama yapılan disiplinlilerin büyük oranla Bilişim Teknolojileri dersi kapsamında yürütüldüğü görülmektedir.

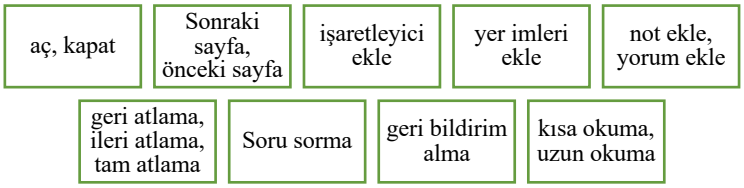
Öğrencilerin e-kitap okuma davranışlarını inceleyen çalışmalarda tercih edilen sistem/uygulama/platformlar nelerdir?

Araştırma kapsamına alınan çalışmalarda öğrencilerin e-kitap okuma davranışlarını incelemek için bazı sistemlerin kullanıldığı görülmüştür. Bu sistemler Şekil 2'de sunulmuştur.



Şekil 2. İncelenen çalışmalarda kullanılan sistemler

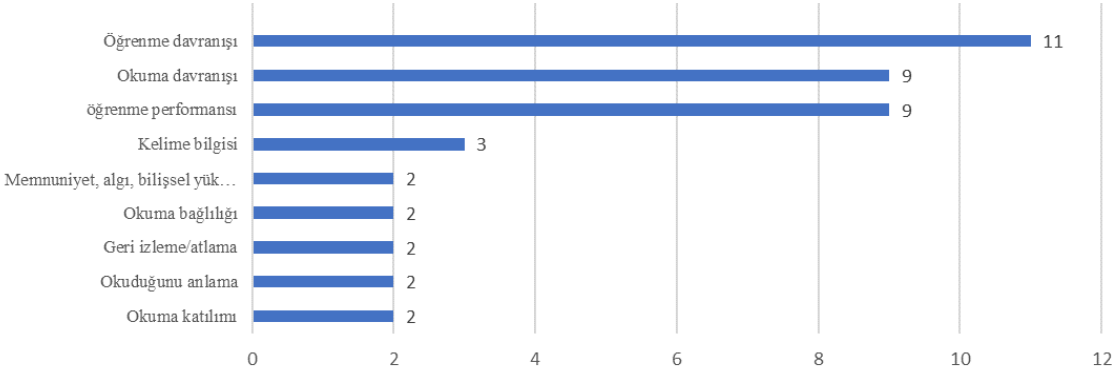
Öğrencilerin e-kitap okuma davranışlarını incelemek için tüm çalışmaların (f=30) bir e-kitap sisteminden yararlandıkları görülmektedir. Çalışmaların çoğunluğunda BookRoll (f=12), devamında BookLooper (f=6) sistemlerinin kullanıldığı görülmektedir. Uygulamaların yapıldığı e-kitap sistemleri incelendiğinde bazı bileşenlerin sıklıkla tercih edildiği dikkat çekmektedir. Bu bileşenlere örnekler Şekil 3'te verilmiştir.



Şekil 3. Uygulamanın yapıldığı e-kitap sistemlerinin bileşenleri

Öğrencilerin e-kitap okuma davranışlarını inceleyen çalışmalarda incelenen değişkenler nelerdir?

Öğrencilerin e-kitap okuma davranışlarının araştırıldığı çalışmalarda en fazla incelenen değişkenler Şekil 4'te gösterilmiştir.



Şekil 4. İncelenen çalışmalarda araştırılan değişkenler

Şekil 4 incelendiğinde araştırma kapsamına alınan çalışmalarda en fazla öğrenme davranışı (%30), devamında okuma davranışı (%29) ve öğrenme performansı (%29) değişkenlerinin incelendiği görülmektedir. Bunların yanı sıra e-kitap okuma davranışlarından okuma bağlılığı, kelime bilgisi kazanımı, geri izleme/atlama, okuduğunu anlama ve okuma katılımı gibi değişkenlerin de incelendiği görülmektedir.

Öğrencilerin e-kitap okuma davranışlarını inceleyen çalışmaların bulguları/sonuçları nelerdir?

Öğrencilerin e-kitap okuma davranışlarının incelendiği çalışmalarda birden çok önemli sonuca ulaşılmıştır. Çalışmalarda elde edilen sonuçlara ait en belirgin temalar Şekil 5'te sunulmuştur.

Öğrencilerin okuma süreçlerinin izlenmesi
Öğrencilerin okuma sonuçlarının tahmin edilmesi
Gömülü değerlendirmelerin yapılabilmesi ve öğrenme üzerindeki etkisi
Öğrencilerin okuma davranış profillerinin/stillerinin/kalıplarının belirlenmesi
Risk altındaki öğrencilerin tespit edilmesi
Öğrencilere kişiselleştirilmiş öneri sunabilmesi
Öğrencilerin duruma göre geribildirim sunabilmesi
E-kitaplarda geri izleme/atlama davranışının sürece olumlu etki sunması

Şekil 5. İncelenen çalışmaların bulgu ve sonuçlarına ait temalar

Tartışma, Sonuç ve Öneriler

Bu çalışma öğrencilerin e-kitap okuma davranışlarını incelemek amacıyla yapılmıştır. Bu doğrultuda 2015-2024 yılları arasında Web of Science, Scopus ve ERIC veri tabanlarında yayınlanmış 30 araştırma sistematik olarak incelenmiştir. Bu kapsamda çalışmaların metodolojik özellikleri, hangi yıl ve ülkede yürütüldüğü, uygulamanın hangi disiplinlerde gerçekleştirildiği, uygulamaların hangi sistem aracılığıyla yapıldığı ve bu sistemlerde hangi bileşenlerin kullanıldığı, çalışmalarda hangi değişkenlerin incelendiği ve çalışmaların bulgu ve sonuçları incelenmiştir.

İncelenen çalışmalarda en fazla nicel yöntemin kullanıldığı görülmüştür. Buna neden olarak çalışmaların çoğunda öğrenme günlüklerinden yararlanılması verilebilir. Sonuç olarak benzer zaman dilimlerinde farklı yazarlar tarafından yapılmış çalışmaların yönteminin farklılaşmaması, bu çalışma kapsamında araştırılan anahtar kelimelerin öğrenme davranışı ve e-kitap şeklinde daraltılmış olması benzerlik göstermesiyle ilgili olabilir. Çalışma kapsamına alınan araştırmaların veri toplama aracı olarak en fazla öğrenme günlüklerinden faydalandıkları sonucuna ulaşılmıştır. Araştırmalar öğrencilerin performansı ve öğrenme çıktılarını incelemek için öğrenme günlüklerini tercih etmişlerdir (Iglesias-Pradas, Ruiz-de- Azcárate, & Agudo-Peregrina, 2015; Campbell, DeBlois, & Oblinger, 2007; Macfadyen & Dawson, 2012; Archer, Chetty, & Prinsloo, 2014; Hrastinski, 2009). Bu doğrultuda bu araştırma ile benzerlik göstermektedir. Buna ek olarak anket, ölçek gibi nicel araçlar kullanılmış ve az da olsa nicel verileri desteklemek için görüşme ve gözlem gibi nitel araçlar tercih edilmiştir. Buna neden olarak anketin araştırma sonuçlarını genelleyebiliyor olmasından dolayı daha fazla tercih edilmesi (Altınuşık & Aktürk, 2021) ve anket ve görüşmelerin eğitim teknolojileri alanında sıklıkla kullanılması (Yazıcı, Ocak & Bozkurt, 2021) verilebilir. Çalışmalarda en fazla temel istatistiksel analizlerin ve makine öğrenmesi yöntemlerinin kullanıldığı ortaya çıkmıştır. Buna neden olarak çalışmalarının büyük çoğunluğunda nicel yöntem ve nicel veri toplama araçlarının tercih edilmesi verilebilir. Çalışmaların örneklem özelliklerine bakıldığında, örneklem grubunun en fazla lisans düzeyinde olduğu ve örneklem büyüklüğünün 1-100 arasında öğrenciden oluştuğu görülmüştür. Bu duruma neden olarak katılımcıların öğrencilere kolay ulaşabilmek için bulundukları okul üzerinden çalışmayı yürüttükleri gösterilebilir.

Öğrencilerin e-kitap okuma davranışlarının incelendiği çalışmaların en fazla 2021 yılında yapıldığı, devamında 2020 ve 2022 yıllarında arasında yürütüldüğü dikkat çekmektedir. Buna neden olarak COVID-19 sürecinin başladığı ve etkisinin devam ettiği yıllarda derslerin çevrimiçi ortamlarda yürütülmesi gösterilebilir. Bu bağlamda yürütülen çalışmaların genellikle Japonya da gerçekleşmesi, ülkenin e-kitap çalışmalarına önem verdiği söylenebilir. Uygulamanın yapıldığı disiplinlerde ise büyük oranla Bilişim Teknolojileri alanının tercih edildiği görülmüştür. Eğitim teknolojileri alanında teknolojik bir aracın kullanılması ve bu bağlamdaki çalışmaların incelenmesi bu durumun beklenen bir sonucu olabilir.

Araştırmaların tümünde bir e-kitap sisteminin kullanılması ve çoğunluğunda BookRoll ve BookLooper ortamlarının tercih edildiği görülmüştür. Bu durum bu ortamların sadece e-kitaplar için tasarlanmış olması ve birçok e-kitap özelliğini içerisinde barındırması ile açıklanabilir. Ogata vd. (2015) ve Akçapınar vd. (2019) tarafından yapılan çalışmalarda yer imleri, vurgulamalar, ek açıklamalar ve sorguları destekleyen bir e-kitap

sistemi kullanılmış ve araştırma kapsamında bu e-kitap özelliklerinin öğrencilerin okuma ve öğrenmeleri sürecinde kullanılmıştır. Bu doğrultuda bu çalışma ile örtüşmektedir.

Araştırma kapsamında ele alınan değişkenlere bakıldığında öğrenme davranışı ve okuma davranışı genelinde, kelime bilgisi kazanımı, geri izleme/atlama, öğrenme performansı, okuduğunu anlama, okumaya katılım ve okuma bağlılığı özelinde bazı değişkenlerin incelendiği görülmüştür. Benzer şekilde Pacifico-Banawan (2021)'ın çalışmasında öğrenme günlükleri ve tıklama akışı etkileşim verileri kullanılarak, öğrencilerin öğrenme davranışları, akademik performansları ve öğrenmeyle ilgili diğer yapılar hakkında zengin bir içgörü kaynağı olduğu bulunmuştur.

Araştırma kapsamına alınan çalışmaların sonuçları incelendiğinde e-kitap sistemleri aracılığıyla bazı okuma davranışlarının elde edilebildiği, bu davranışlara yönelik farklı müdahale yöntemlerinin izlenebildiği, e-kitap sistemleri ve barındırdığı özelliklerin öğrenme sürecini büyük oranda desteklediği ve öğrencilere farklı beceriler kazandırdığı sonuçlarına ulaşılmıştır. McEneaney, (2006)'in yaptığı çalışmada dijital okuryazarlık ortamlarının okuyuculardan bilgi toplanmasına ve duruma göre içerik seçenekleri ve bireyselleştirilmiş destek sağlanmasını yardımcı olmaktadır. Nitekim bu çalışma mevcut sonucu desteklemektedir.

Literatür taraması sonuçları değerlendirildiğinde e-kitapların; öğrencilerin okuma süreçlerini izlenmesine ve okuma sonuçlarını tahmin etmelerine olanak tanıyabilecek gizli bir değerlendirme ortamı oluşturacağı, öğrencilerin gömülü soruları okumaya ne kadar çok zaman harcarlarsa soruları doğru cevaplama olasılıklarının ve kelime bilgisi kazanımlarının o kadar yüksek olacağı, öğrencilerin okuma davranışlarının farklı profillerde belirlenebileceği, risk altındaki öğrencilerin tanımlanabileceği ve öğrencilerin kişiselleştirilmiş öğrenme deneyimlerine katkı sağlayabileceği görülmüştür.

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İngilizce Öğretiminde Uzaktan Eğitimin Etkililiğine İlişkin Öğretim Elemanlarının Görüşleri*

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Özet

Günümüz eğitim dünyasında gereği ve önemi hızla artan uzaktan eğitim ile yabancı dil olarak İngilizce öğrenmenin önemi birlikte düşünüldüğünde, yüksek nitelikte iş gücü sağlayan ve bilimin geliştiği üniversitelerde uzaktan eğitimle yabancı dil öğretiminin niteliği merak konusu olmuştur. Bu araştırmada, yükseköğretim basamağındaki İngilizce öğretiminde uzaktan eğitimin etkililiğine ilişkin öğretim elemanlarının görüşlerini hem senkron hem de asenkron boyutlarıyla belirlemek amaçlanmıştır.

Bu araştırma, nitel araştırma yöntemlerinden durum çalışması deseninde gerçekleştirilmiştir. Araştırma verileri araştırmacılar tarafından oluşturulan görüşme formu kullanılarak elde edilmiştir. Amaçlı örnekleme yöntemlerinden ölçüt örnekleme ve kolay ulaşılabilir örnekleme yöntemleri kullanılarak belirlenen çalışma grubu, Balıkesir Üniversitesi Yabancı Diller Yüksekokulu bünyesinde asenkron ve senkron olarak İngilizce eğitimi veren 10 öğretim elemanından oluşmuştur. Verilerin analizinde içerik analizi ve betimsel analiz yöntemlerinden yararlanılmıştır.

Araştırma sonuçlarına göre, öğretim elemanlarının uzaktan eğitimde yeterli kişisel olanaklara sahip oldukları hem senkron hem asenkron eğitime ilişkin olumlu ve olumsuz görüşleri olduğu saptanmıştır. Öğretim elemanlarının daha çok hibrit eğitimi tercih ettiği belirlenmiştir. Katılımcıların öneri ve beklentilerinin en çok nitelikli araçlar ve internet kullanılması ile materyal çeşitliliğin sağlaması görüşünde toplandığı sonucuna varılmıştır.

Anahtar Kelimeler: Uzaktan Eğitim, Yükseköğretim, Yabancı Dil Öğretimi

The Opinions of the Instructors on the Effectiveness of Distance Education in Teaching English at Higher Education

Abstract

Considering the rapidly increasing necessity and importance of distance education in today's education world and the importance of learning English as a foreign language, the quality of foreign language teaching through distance education in universities that provide a highly qualified workforce and where science is developed has become a matter of curiosity. This research aims to determine the opinions of faculty members and students regarding the effectiveness of distance education in teaching English at the higher education level, both in synchronous and asynchronous dimensions.

This research was carried out in a case study design, one of the qualitative research methods. Research data was obtained using interview form created by the researchers. The study group, which was determined by using criterion sampling and easily accessible sampling methods, which are among the purposeful sampling methods, consisted of 10 faculty members who provide English education asynchronously and synchronously within Balıkesir University School of Foreign Languages. Content analysis and descriptive analysis methods were used to analyze the data.

According to the results of the research, it was determined that the instructors had sufficient personal opportunities in distance education and had positive and negative opinions about both synchronous and asynchronous education. It has been determined that faculty members mostly prefer hybrid education. It was concluded that the participants' suggestions and expectations were mostly centered on the view that qualified tools and the internet should be used, and material diversity should be provided.

Keywords: Distance Education, Higher Education, EFL Teaching

Giriş

Eğitim; yeni nesillerin, sosyal hayatta yer edinebilmeleri için hazırlandıkları süreçte gereken bilgi, beceri ve düşünce tarzına sahip olabilmelerine ve kişiliklerini geliştirmelerine katkıda bulunma süreci olarak tanımlanabilir (Varış, 1988; Ertürk, 1994; Bakırcıoğlu, 2012). Çağımızın vazgeçilmez bir parçası olan teknolojinin hızlı bir şekilde gelişmesiyle birçok alana uygulanan yenilikler eğitim dünyasında da yer bulmuştur. 21. Yüzyılın getirdiği teknolojik gelişmelerle bilgisayar, internet, kitle iletişim araçları, telefon, tablet vb. gibi teknolojik araçlar

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vasıtasıyla bilgiye erişim ihtiyacı süratli bir şekilde giderilmektedir. Teknolojinin etkisiyle ülkelerin değişen eğitim anlayışı (Özer, 2011) ve insanların yüz yüze eğitime nispeten daha düşük maliyetle eğitim almaları ve fırsat eşitliğini sağlama gereksinimiyle (Cansu, 2010) uzaktan eğitim, okullarda gerçekleştirilen yüz yüze eğitime alternatif olarak önem kazanmıştır (Yıldız, 2004).

Uzaktan eğitimde öğretmen ve öğrencilerin ortak bir zamana ve mekâna bağlı kalmadan bilgi alışverişinde bulunabilmek amacıyla kullandıkları farklı teknolojilere son yıllarda internet temelli faaliyetler eklenerek, yoğun olarak kullanılmaya başlanmıştır (Koloğlu, Kantar ve Doğan, 2016). Tek başına kullanılabilmesinin yanı sıra yüz yüze eğitim eşliğinde de kullanılabilen internet tabanlı uzaktan eğitimde (Oral ve Kenanoğlu, 2012) senkron (eş zamanlı), asenkron (eş zamansız) ve hibrit (harmanlanmış, karma) uygulamalar ön plana çıkmaktadır. (Karatepe vd., 2020).

Senkron eğitim, eş zamanlı (canlı) ve genelde belirlenmiş bir program dahilinde yürütülen (Uşun, 2006) öğrenciler ve öğretmenlerin planlanan ortak zamanda gerçekleştirdikleri (Fidalgo vd., 2020) yüksek etkileşimli öğretim süreçleri sağlamaktadır (Yumbul, 2021). Asenkron eğitim, öğrenen ve öğreticinin farklı zamanlar ve farklı mekanlarda öğrenciler ile yazılı belge, görüntü, video, animasyon, ses dosyası halinde paylaşılmsı yoluyla gerçekleşen öğretim süreçleri olarak tanımlanabilir (Yumbul, 2021). Günümüzde popülerliği artmakta olan hibrit eğitim ise yüz yüze eğitim ve internet temelli eğitim ortamlarının olumlu ve etkili taraflarının birleştirilerek uygulandığı bir diğer eğitim türüdür (Horton, 2000; Osguthorpe ve Graham, 2003). Bu eğitim türü uluslararası literatür içinde "blended, mixed" ya da "hybrid" olarak isimlendirilmekle birlikte, Türkçede adı hibrit, harmanlanmış veya karma eğitim olarak geçmektedir (Sungur Alhan, 2020).

Uzaktan eğitim toplumsal, ekonomik ve bireysel bakımdan faydaları bulunmakla birlikte bazı sınırlılıkları da beraberinde getirmektedir (Eygü ve Karaman, 2013). Bilginin kaynağından bütün dünyaya hızla yayılabilmesi, zaman ve mekân bakımından sınırsız olması ile öğrenci motivasyonunu en üst noktada tutabilmesi, değerlendirmenin objektif bir şekilde yapılabilmesi, düşük maliyet fırsatı sağlaması yararlı yönleri olarak sıralanabilir (Dinçer, 2016). Ancak tüm derslerin uzaktan eğitime uygun özellikte olmaması, öğrenme ortamlarında önemsenen göz temasının kurulamaması, öğrenme sürecinde anında dönüt ve düzeltme yapılamaması, bireysel çalışmaya alışkın olmayan bireylerin ders planlama sorunları gibi bazı sınırlılıkları da bulunmaktadır. Ayrıca öğrenci sayısının yüksek olduğu gruplarda doğabilecek iletişim sorunları, uzaktan eğitim için gerekli olan altyapı oluşturma maliyetinin yüksekliği de sınırlılıklar arasında gösterilebilir (Dinçer, 2016).

Uzaktan eğitimin olumlu ve olumsuz yönleri tartışılırken Çin'de ortaya çıkan Koronavirüs (COVID-19) hastalığı nedeniyle dünya ülkelerinde eğitim-öğretime ara verilmiş, dünyadaki çoğu ülkede okullar kapanarak uzaktan eğitime geçirilmiştir (Başaran vd., 2020). Bu acil ve zorunlu durum karşısında üniversitelerde uzaktan eğitim uygulaması başlangıçta genellikle çevrimiçi ortam sağlayan programlar ile uygulanmıştır. Sürecin devamında kimi üniversiteler uzaktan eğitim yöntemi olarak çevrimiçi eş zamanlı yöntemleri kullanırken, kimileri de çevrimdışı eş zamansız yöntemleri kullanmayı seçmiş, hatta bazıları ise karma yöntemleri kullanmada karar kılmıştır (Kurnaz ve Serçemeli, 2020).

Bahsedilen Covid-19 süreci, salgından önceki yıllarda önemi daha da artan yabancı dil öğrenme ortamlarını da etkilemiştir (Özer ve Korkmaz, 2016). Yabancı dil derslerini bilgisayar teknolojileri kullanılarak öğrenenlerin birbirine uzak ortamlardan aynı dil sınıfına erişimini sağlayarak da gerçekleştirebilmek mümkündür. Diğer yandan teknolojik ortam için uygun özelliklere sahip olabilen yabancı dil öğretimi için acil ve zor şartlarda uygulanan uzaktan eğitimin niteliğine ilişkin bir kanıt yoktur (Tümen Akyıldız, 2020). Bunun yanı sıra uzaktan eğitime oldukça hızlı geçildiği için bu süreci öğretim elemanlarının uzaktan eğitimin özelliklerinin gerektirdiği şekilde geçirebildikleri konusunda bir değerlendirme de yapılamamıştır (Iyer, Aziz ve Ojcius, 2020).

Buradan hareketle araştırmanın amacı yükseköğretim basamağındaki yabancı dil (İngilizce) öğretiminde uzaktan eğitimin etkililiğine ilişkin öğretim elemanlarının görüşlerini belirlemektir.

Bu temel amaç doğrultusunda aşağıdaki sorulara yanıt aranmıştır:

1. Öğretim elemanlarının uzaktan eğitimdeki olanaklara, kullanılan araçlara ve iletişim kanallarına ilişkin görüşleri nelerdir?
2. Öğretim elemanlarının uzaktan eğitimin senkron ve asenkron boyutlarının olumlu ve olumsuz yönlerine ilişkin görüşleri nelerdir?
3. Öğretim elemanlarının tercih ettikleri eğitim türü ve nedenine ilişkin görüşleri nelerdir?
4. Öğretim elemanlarının uzaktan eğitim sürecinin niteliğinin arttırılmasına yönelik öneri ve beklentileri nelerdir?

Yöntem

Araştırmanın Modeli

Yükseköğretim basamağındaki yabancı dil (İngilizce) öğretiminde uzaktan eğitimin etkililiğine ilişkin öğretim elemanlarının görüşlerinin gerçekçi ve bütüncül bir biçimde belirlenmesinin amaçlandığı bu çalışmada nitel araştırma yaklaşımı temele alınmıştır. Araştırmada nitel araştırma yöntemlerinden "durum çalışması" deseni benimsenmiştir. Durum çalışması deseninde bir duruma ilişkin faktörler bütüncül bir yaklaşımla araştırılır ve ilgili durumu nasıl etkiledikleri ve ilgili durumdan nasıl etkilendikleri üzerine odaklanılır (Yıldırım ve Şimşek, 2018).

Çalışma Grubu

Nitel araştırmanın amacı yakın özelliklerdeki bireyler, gruplar veya durumlar üzerinden genellemelere ulaşmak (Bogdan ve Biklen, 1992) olmadığında, çalışma grubunun seçiminde nitel araştırmanın doğasına uygun olan amaçlı örnekleme yöntemlerinden kolay ulaşılabilir durum örneklemesi ve ölçüt örnekleme kullanılmıştır. Kolay ulaşılabilir durum örneklemesinde araştırmacı kendisine yakın olan ve erişmesi kolay olan bir durumu seçtiği için, bu yöntem araştırmanın daha hızlı ve pratik olmasına olanak tanır (Yıldırım ve Şimşek, 2018). Bir diğer örnekleme yöntemi olan ölçüt örnekleme, önceden tespit edilen ölçütler çerçevesindeki koşulları karşılayabilecek örneklemin seçilmesini temel alır (Yıldırım ve Şimşek, 2018). Bu çerçevede araştırmanın çalışma grubu, araştırmacılarla aynı üniversitede çalışan, uzaktan eğitimin senkron ve asenkron uygulamalarını ilk kez tecrübe etmiş üniversitenin Yabancı Diller Yüksekokulu'na bağlı olarak farklı fakültelerde İngilizce eğitimi veren 10 öğretim elemanından oluşmuştur.

Tablo 1. Çalışma grubunu oluşturan öğretim elemanlarına ilişkin özellikler

		f
Cinsiyet	Kadın	3
	Erkek	7
Mesleki Kıdem Yılı	10 yıl ve altı	3
	11-15 yıl	5
	16 yıl ve üzeri	2
Eğitim Durumu	Lisans/Yüksek Lisans	5
	Doktora	5
Yürüttüğü Dersler	5i (ortak zorunlu yabancı dil)	2
	Mesleki yabancı dil	1
	5i Mesleki yabancı dil	7

Çalışma grubunda çoğunluğun erkek olduğu öğretim elemanlarının mesleki kıdem yılı daha çok 11-15 yıl aralığındadır. Yarısı lisans ve yüksek lisans düzeyinde, diğer yarısı ise doktora düzeyinde eğitim durumuna sahiptir. 2019-2020 akademik yılı bahar döneminde ve 2020-2021 akademik yılı güz döneminde öğretim elemanlarının yarısından fazlası hem 5'i (zorunlu ortak yabancı dil) İngilizce, hem de mesleki yabancı dil derslerine girmiştir. Az sayıda öğretim elemanı sadece 5i İngilizce dersine girmiş olmakla beraber, yalnızca bir öğretim elemanı ise sadece mesleki yabancı dil dersinden sorumlu olmuştur.

Veri Toplama Araçları

Nitel araştırmada görüşme, etkili ve verimli bir veri toplama yöntemlerinden biridir (Yıldırım ve Şimşek, 2018). Nitel araştırmalarda araştırmayı yapan kişi, görüşme yöntemi aracılığıyla görüştüğü kişinin iç dünyasına ulaşarak olayların onun bakış açısıyla nasıl göründüğünü anlayıp değerlendirmeye çalışır (Patton, 1987). Bu çerçevede bu araştırmada da belirlenen alt problemlere yanıt aramak amacı ile görüşme tekniğinden yararlanılmış, veriler araştırmacılar tarafından geliştirilen yarı yapılandırılmış görüşme formu kullanılarak elde edilmiştir. Taslak görüşme formu eğitim bilimleri alanında uzman iki öğretim üyesinin görüşlerine sunulmuş, soruların ifade şekli, içeriği ve amaca uygunluğu bakımından dönütler alınmış, dönütler çerçevesinde gerekli düzeltmelerin yapılmasıyla görüşme soruları son halini almıştır.

Verilerin Toplanma Süreci

Görüşmeler gönüllülük esasına dayalı ve bireysel olarak yapılmıştır. Her görüşme öncesinde, katılımcılara görüşmenin amacı açıklanmış ve görüşlerini açık bir anlatımla çekinmeden dile getirmelerinin araştırmaya büyük yarar sağlayacağı ifade edilmiştir. Ayrıca zamanı verimli kullanabilmek ve veri kaybını önlemek için görüşme süresince ses kaydının yapılacağı açıklanarak kendilerinden izin alınmıştır. Sorular her katılımcıya aynı sıra ile sorulmuş, görüşme esnasında soruları olabildiğince rahat ve içtenlikle cevaplayabilecekleri bir sohbet ortamı oluşturulmaya çalışılmıştır.

Verilerin Analizi

Bu araştırmada daha önce ifade edilen alt problemlere cevap bulabilmek amacıyla toplanan verilerin analizi için içerik analizi ve betimsel analiz yöntemleri kullanılmıştır. Bu araştırmada, nitel veri analizine ilişkin farklı kaynaklara ve uzman görüşlerine başvurulmuş, araştırmaya özgü bir veri analizi planı yapılmıştır. Aşağıda bu planın oluşum aşamaları ve yapılan işler sunulmuştur:

1. Kavramsal çerçevenin oluşturulması: Öncelikle uzaktan eğitim konusunda literatür taraması yapılarak uzaktan eğitimin belirli açılardan ele alındığı bir kavramsal çerçeve taslağı meydana getirilmiştir. Uzman görüşlerinin alınmasının ardından kavramsal çerçeve oluşturulmuştur. Bu kavramsal çerçeveden; görüşme sorularını şekillendirmede, görüşmelerden edinilen verileri organize etmede ve kodlamada yararlanılmıştır.

***2**. Verilerin kavramsal çerçeveyle ilişkilendirilmesi:* Görüşmelerden toplanan verilerin uzaktan eğitime ilişkin düzenlenen kavramsal çerçevede bulunan kategori, alt kategori ve kavramlara kodlanarak ilişkilendirilmesi sağlanmıştır. Ayrıca nitel araştırmalarda başlangıçta düzenlenen kavramsal çerçeve verilerin analiz sürecinde değiştirilebilir ve geliştirilebilir (Bogdan ve Biklen, 1992; Maxwell, 1996; Yıldırım ve Şimşek, 2018). Bu bağlamda önceden hazırlanan kavramsal çerçeveye son şeklinin verilmesi, bu basamakta yapılan diğer bir işlemdir.

Verileri kodlama sürecinde birbirini kapsadığı görülen birtakım kavram ve alt kategoriler bir araya getirilmiş ve kavramsal çerçeve tamamlanmıştır.

3. Verilerin sunulması: Araştırmada veri analiziyle ortaya konulan kodlar birleştirilip organize edilmiş ve kodlar arasındaki ilişkilere bakılarak ortak temalar oluşturulmuştur. Daha sonra temaların ilgili kategorilere bağlantısı sağlanmıştır. Kodlamalar, bağlı bulundukları tema ve kategoriler, çizelgeler kullanılarak sunulmuştur.

4*. Verilerin yorumlanması:* Elde edilen bulgular, bu alanda yapılan çalışmalar incelenerek yorumlanmıştır. Ayrıca görüşmelerin gizliliğini sağlamak için, görüşme yapılan öğretim elemanlarının isimlerini kullanmak yerine kod numaraları kullanılmıştır. Örneğin, ÖE1 (öğretim elemanı 1).

Çizelgelerde en yüksek düzeyde frekansa sahip olan tema üstte yer almış, diğer temaların frekansları da en yüksekten düşüğe doğru yukarıdan aşağıya inecek şekilde sıralanmıştır. Her çizelge, ilgili temaların frekanslarına göre tanımlanmış ve frekansı en yüksek temadan başlayıp, en aza doğru sırayla yorumlanmıştır.

Geçerlik ve Güvenirlik

Yapılan bilimsel araştırmaların kabul görebilmesi için belirli ölçüde geçerli ve güvenilir olması gerekmektedir (Baltacı, 2019). Araştırmada iç geçerliği sağlamak amacıyla; görüşmeler yoluyla elde edilen bulgular, yorum yapılmaksızın ayrı ayrı belirtilmiş, doğrudan alıntılar ile birlikte sunulduktan sonra tartışma bölümünde bütüncül bir şekilde ele alınıp tartışılmıştır. Çalışmada öğretim elemanları veri kaynağı olarak yer almış; görüşme veri toplama yöntemi olarak kullanılmış, verilerin analiz aşamasında edinilen bilgilerin birbiriyle ilişkisi ve tutarlılığı incelenmiştir. Bulgularda tutarlılığı sağlamak amacıyla hem temaları oluşturan kodların kendi içindeki tutarlılığı, hem de her bir temanın ayrı ayrı kendi aralarındaki tutarlılığı incelenmiştir. Araştırmada dış geçerliği sağlamak amacıyla; araştırmada verilerin toplanması, analiz edilmesi, çalışma grubunu belirleme süreci gibi basamaklar detaylarıyla belirtilmiştir. Görüşme yapılan öğretim elemanlarının kişisel özellikleri de ayrıca açıklanmıştır.

Araştırmada iç güvenirliği sağlamak amacıyla; öğretim elemanlarıyla gerçekleştirilen ön görüşmeler yoluyla araştırmacı gerçek görüşme sürecinden önce deneyim sahibi olmuş, görüşme formlarında bulunan soru ve maddelerin hedef kişilere ve görüşme ortamına uygun olup olmadığını kontrol etmiştir. Nitel araştırmalardaki güvenirliği sağlanıp sağlanmadığını test edebilmek için kullanılan uyuşum yüzdesi (Miles ve Huberman, 1994; Tavşancıl ve Aslan, 2001), bu araştıtmada .91 olarak hesaplanmıştır. Uyuşum değerinin .70 ve üstü çıkmasının araştırmaların güvenirliği için yeterli olduğu kabul edilmektedir. (Tavşancıl ve Aslan, 2001; Yıldırım ve Şimşek, 2004). Araştırmada dış güvenirliği sağlamak amacıyla; araştırma modeli, belirlenen yöntem, veri toplama araç ve teknikleri ile verilerin analiz süreci, bulgular ve yorumları ortaya çıkarmak için izlenen adımlar detaylara yer verilerek açıklanmıştır. Elde edilen tüm veriler saklanmıştır.

Bulgular

Öğretim elemanlarının uzaktan eğitimdeki olanaklara, kullanılan araçlara ve iletişim kanallarına ilişkin görüşleri

Öğretim elemanlarının uzaktan eğitimdeki olanaklara, kullanılan araçlara ve iletişim kanallarına ilişkin görüşleri Tablo 2'de verilmiştir

Tablo 2. Öğretim elemanlarının uzaktan eğitimdeki kişisel olanaklara, kullandıkları araçlara ve iletişim kanallarına ilişkin görüşleri

Temalar	Kodlar	*f*
Uzaktan Eğitimde Kişisel Olanaklar	Yeterli ortam özelliği	9
	Gelişmiş teknolojik yeterlik	9
	Sınırlı teknolojik yeterlik	1
	Yetersiz ortam özelliği	1
Uzaktan Eğitimde Kullanılan Araçlar	Bilgisayar	10
	Kablosuz internet	9
	Telefon	4
	Kablolu internet	3
	Tablet	1
İletişim Kanalları	WhatsApp	4
	E-mail	4
	Öğrenci bilgi sistemi	2

Tablo 2'den öğretim elemanlarının uzaktan eğitimdeki kişisel olanakları incelendiğinde öğretim elemanlarının tamamına yakınının yeterli ortam özelliğine ve gelişmiş teknolojik yeterliğe sahip olduğu, yalnızca bir öğretim elemanının sınırlı teknolojik yeterlik ve yetersiz ortam özelliği noktasında görüşlerini ifade ettiği anlaşılmıştır. Öğretim elemanlarının uzaktan eğitimde kişisel olanaklara ilişkin görüşlerini yasıtan doğrudan alıntı örnekleri aşağıda verilmiştir:

> *"…Bir bilgisayarı donanım, yazılım açısından kimseye ihtiyacım olmadan ileri düzeyde kullanabilirim…" (ÖE10)*

"…Teknolojiye hiç ilgim olmadı, çok basit işlemler haricinde gerekmedikçe kullanmadım. Bu nedenle uzaktan eğitime başladığımızda çok sıkıntı çektim..." (ÖE2)

Tablo 2 incelendiğinde, uzaktan eğitimde öğretim elemanlarının tamamının bilgisayar kullandığı, tamamına yakınının kablosuz internet, yarısına yakınının telefon, bir kısmının kablolu internet, bir öğretim elemanının ise tablet kullandığı görülmüştür. Öğretim elemanlarının kullandıkları araçlara ilişkin ifadeleri aşağıda örneklendirilmiştir:

"…Genellikle derste bilgisayarımı kullanıyorum, ama aynı anda dersteki yazışmaları çift ekranla takip etmek gerekirse tabletimi hatta telefonumu da kullanabiliyorum..." (ÖE1)

"…Kablosuz internet kullanıyoruz. Hatta evde aynı anda üç tane canlı ders olunca 2. internet bağlantısını almak zorunda kaldık…" (ÖE3)

Tablo 2'den öğretim elemanlarının uzaktan eğitimde öğrencilerle iletişim kanallarına ilişkin görüşleri incelendiğinde, öğretim elemanlarının yarısına yakınının WhatsApp ve e-mail yoluyla, az sayıda öğretim elemanının ise öğrenci bilgi sistemi üzerinden öğrencilerle iletişim kurdukları belirlenmiştir. Öğretim elemanlarının bu konudaki görüşlerinden bazıları aşağıda sunulmuştur:

"…Eğitim platformunun beraberinde grup imkânı tanıması ve herkese aynı anda ulaşmak açısından WhatsApp'ta konuşmaya başladık…" (Ö7)

"…Öğrenciler gerekli gördüklerinde bana e-mail ile ulaşabiliyorlar..." (ÖE 9)

Öğretim elemanlarının uzaktan eğitimin (senkron-asenkron) olumlu ve olumsuz yönlerine ilişkin görüşleri

Öğretim elemanlarının uzaktan eğitimin (senkron-asenkron) olumlu ve olumsuz yönlerine ilişkin görüşleri Tablo 3'te verilmiştir.

Tablo 3. Öğretim elemanlarının uzaktan eğitimin (senkron-asenkron) olumlu ve olumsuz yönlerine ilişkin görüşleri

Tema	Kodlar	*f*
Senkron/Olumlu	Donanım kullanımı	10
	Platform kullanışlılığı	10
	Etkileşim	9
	Ortam bağımsızlığı	7
	Materyal çeşitliliği	7
	Yeterli ders süreci	6
Senkron/Olumsuz	Platform kaynaklı sorunlar	10
	Motivasyon eksikliği	9
	Ders süresinin fazlalığı	5
	Materyal çeşitlendirme zorluğu	4
Asenkron/Olumlu	Materyal Erişimi	10
	Platform kullanışlılığı	9
	Ders saatlerinden bağımsızlık	9
	Bireysel çalışmayı destekleme	5
Asenkron/Olumsuz	Etkileşim yetersizliği	9
	Platform kaynaklı sorunlar	8
	Ürün odaklı öğretim	8
	Motivasyon etsikliği	7

Tablo 3'te öğretim elemanlarının senkron eğitimin olumlu yönlerine ilişkin görüşleri incelendiğinde öğretim elemanlarının tamamının donanım kullanımı ve platform kullanışlılığı, tamamına yakınının senkron eğitimde etkileşim sağlanabilmesi, yarısından fazlasının ortam bağımsızlığı, materyal çeşitliliği ve yeterli ders süresi konusunda görüş bildirdikleri, yarısının ise motivasyon ile ilgili düşüncelerini aktardıkları belirlenmiştir. Öğretim elemanlarının bazıları görüşlerini şu şekilde ifade etmişlerdir:

"…Ben alerjisi olan bir insanım, sürekli hapşırıyorum gözlerim yaşlar içinde kalıyor, ekran ve mikrofonu kapatma esnekliği olabilmesi çok güzel..." (ÖE7)

"…Platform ekipleri rahat yönetmemizi sağlıyor, özellikle kanal açıp orada düzenlemeler yapabilmek bakımından çok kullanışlı... Ders kaydını kolayca çalıştırabiliyorsunuz ve öğrenciler de o işareti sol üstte görebiliyor..." (ÖE8)

Tablo 3'te öğretim elemanlarının senkron eğitimin olumsuz yönlerine ilişkin görüşleri incelenmiştir. Öğretim elemanlarının tamamı senkron eğitimde kullandıkları platformdan kaynaklanan sorunlara, tamamına yakını motivasyon eksikliğine, yarısı senkron ders süresinin fazlalığına, yarısına yakını materyal çeşitlendirmedeki zorluklara ve bir kısmı ise ortam bağımsızlığının olumsuzluklarına yönelik açıklamalar yapmıştır. Öğretim elemanlarının bu konudaki görüşlerini yansıtan doğrudan alıntı örnekleri aşağıdaki gibidir:

"…Yüksekokulun paylaşılmaması gereken ortak sunu dosyaları platforma kendiliğinden yükleniyor. Bu nedenle her dersten sonra onları tek tek silmek zorunda kalıyorum..." (ÖE4)

"…Ders anlatırken tek taraflı yani sadece benden sınıfa bir aktarım olunca motivasyonum düşüyor…" (ÖE3)

Tablo 3'te öğretim elemanlarının asenkron eğitimin olumlu yönlerine ilişkin görüşleri incelenmiştir. Öğretim elemanlarının tamamı materyal erişimi, tamamına yakını asenkron eğitimde kullandıkları platformun kullanışlılığı ve ders saatlerinden bağımsız olunması, yarısı bireysel çalışmayı desteklemesi, bir kısmı ise motivasyon ile ilgili görüşlerini belirtmiştir. Çizelge 9'daki bulgulara yönelik öğretim elemanlarının görüşlerini kanıtlayan ifade örnekleri aşağıda listelenmiştir:

"…Materyallere istenilen zaman ulaşmak asenkron eğitimin en iyi özelliklerinden. Çok uzun zamanlı kesintiler olmadığı sürece asenkron eğitim anlık olmadığı için teknik sıkıntıları da kaldırabilen bir sistem..." (ÖE3)

"…Hazırladığım materyalleri platformdaki bir dosyaya yüklüyordum. Haftası geldikçe oradan sınıflarıma rahatça gönderebiliyordum. Kullanımı oldukça rahattı..." (ÖE8)

Tablo 3'te öğretim elemanlarının asenkron eğitimin olumsuz yönlerine ilişkin görüşleri incelendiğinde tamamına yakınının etkileşim yetersizliğine, çoğunun asenkron platformdan kaynaklanan sorunlar ile ürün odaklı öğretime ve yarısından fazlasının motivasyon eksikliğine yönelik görüşlerini ifade ettiği anlaşılmıştır. Öğretim elemanlarının asenkron eğitimin olumsuz yönlerine ilişkin görüşlerini yansıtan doğrudan alıntı örnekleri aşağıda sıralanmıştır:

"…Bizi biz yapan öğrenciyle aramızdaki canlı etkileşim, onları anlamak, yönlendirmek. Bu olmadığında işin ruhu olmuyor…" (ÖE3)

"…Kendi kendine ucunu göremediğin, karanlık bir şeyler yapıyorsun. İşe yarayıp yaramadığını bilmiyorsun ki…" (ÖE7)

Öğretim elemanlarının tercih ettikleri eğitim türü ve nedenine ilişkin görüşleri

Öğretim elemanlarının tercih ettikleri eğitim türü ve nedenine ilişkin görüşleri Tablo 4'te verilmiştir.

Tablo 4. Öğretim elemanlarının tercih ettikleri eğitim türü ve nedenlerine ilişkin görüşleri

Tema	Kodlar	*f*
Tercih Edilen Eğitim Türü	Hibrit Eğitim- Eğitimi Çeşitlendirme	4
	Yüz Yüze Eğitim- Sağlıklı İletişim	3
	Uzaktan Eğitim- Sınıf Yönetimi Kolaylığı	2

Tablo 4'ten öğretim elemanlarının tercih ettikleri eğitim türü ve nedenine ilişkin görüşleri incelendiğinde öğretim elemanlarının yarısına yakınının eğitimi çeşitlendirme nedeniyle hibrit eğitimi, bir kısmının sağlıklı iletişim gerekçesiyle yüz yüze eğitimi, az sayıda öğretim elemanının ise sınıf yönetiminin kolay olması sebebiyle uzaktan eğitimi tercih ettiği görülmüştür. Öğretim elemanlarının tercih ettikleri eğitim türü ve nedenine ilişkin görüşlerinin kanıtı niteliğindeki cümleler aşağıda listelenmiştir:

"…Hibrit eğitimden yanayım çünkü yüz yüze etkileşimin faydaları çok başka. Ancak acil durumlar, çalışanlar ve engelli insanlar için de uzaktan eğitimi hayatımızdan çıkarmamalıyız. Eğitimi çeşitlendirmek, kişiselleştirmek için uzaktan eğitimi destekleyici olarak yüz yüze eğitime entegre edebiliriz…" (ÖE1)

"…Sınıf ortamında konudan ziyade kendimi daha iyi ifade edebileceğime inanıyorum. Öğrencilerimin jest ve mimiklerimi aynı ortamda görebilmeleri, konuşurken onlarla göz teması kurabilmek çok değerli. Bence her türlü yüz yüze eğitim..." (ÖE8)

"…Her birinin artısı eksisi var ama uzaktan eğitimi tercih ederdim. Özellikle 5i derslerinde yüz yüze iken sosyal etkileşimin derse pek katkısı yoktu. Sosyal bir ortam olmasının her zaman derse akademik olarak bir artısı olmuyor..." (ÖE4)

Öğretim elemanlarının uzaktan eğitim sürecine yönelik öneri ve beklentileri

Öğretim elemanlarının uzaktan eğitim sürecine yönelik öneri ve beklentilerine ilişkin görüşleri Tablo 5'te verilmiştir.

Tablo 5. Öğretim elemanlarının uzaktan eğitim sürecine yönelik öneri ve beklentileri

Tema	Kodlar	*f*

	Nitelikli Araçlar ve İnternet Kullanılmalı	9
	Materyal Çeşitliliği Sağlanmalı	9
	Aktif Öğrenme Ortamı Sağlanmalı	7
Uzaktan Eğitim Sürecine	Öğretici Niteliği Geliştirilmeli	6
Yönelik Öneri ve	Süreç Değerlendirilmeli	3
Beklentiler	Öğretim Elemanı Donanımlı Olmalı	2
	"Geçici" Anlayışı Değişmeli	1
	Nitelikli Sınavlar Kullanılmalı	1
	Öğrenci Ortamı İyileştirilmeli	1
	Telif Hakkı Çözülmeli	1

Tablo 5'ten öğretim elemanlarının uzaktan eğitim sürecine yönelik öneri ve beklentilerine ilişkin görüşleri incelendiğinde, öğretim elemanlarının tamamına yakınının nitelikli araçlar ve internet kullanımı ile materyal çeşitliliğine, yarısından fazlası aktif öğrenme ortamına ve öğretici niteliğini geliştirmeye, bir kısmı süreç değerlendirmesine, az sayıda öğretim elemanı ise öğretim elemanının donanımına yönelik öneriler ileri sürdükleri görülmektedir. Bu görüşlere ek olarak birer kez ise uzaktan eğitimin geçici olduğu anlayışının değişmesi, nitelikli sınavlar, öğrenci ortamını iyileştirme ve telif hakkının çözülmesi üzerine görüşler bildirilmiştir. Öğretim elemanlarının uzaktan eğitim sürecine yönelik öneri ve beklentilerine ilişkin görüşlerini yansıtan doğrudan alıntı örnekleri aşağıda verilmiştir:

"…Öğrencilerin güçlü internet bağlantısı ve işlerini görebilecek düzeyde bilgisayarlarla katıldıkları, teknik sorunların az yaşandığı dersler elbette daha verimli olabilir..." (ÖE6)

"…Materyalin öğrenciyi görsel, işitsel anlamda geliştirmesi, konuşmayı da desteklemesi, uzaktan eğitime uygun olması önemli. Bu konuda profesyonel bir ekibin günün ihtiyaçlarına uygun, mümkünse öğrenciye özel tasarladığı çoklu ortam materyalleri ideal olanı." (ÖE7)

Tartışma, Sonuç ve Öneriler

Yükseköğretim basamağındaki yabancı dil (İngilizce) öğretiminde uzaktan eğitimin etkililiğine ilişkin öğretim elemanlarının görüşlerinin incelenmesi amacıyla yapılan araştırmanın sonucunda öğretim elemanlarının uzaktan eğitim sürecinde ortam özelliklerinin yeterli ve teknolojik yeterliklerinin gelişmiş düzeyde olduğu, en çok bilgisayar ve kablosuz internet kullandıkları, iletişim kanallarından whatsapp ve e-mail kullanmayı tercih ettikleri saptanmıştır. Öztaş ve Kılıç (2020)'ın çalışmasından elde edilen uzaktan eğitim sürecinde en çok bilgisayar kullanılmış olma sonucu bu araştırmanın bulgularını desteklemektedir.

Araştırma sonunda öğretim elemanlarının senkron eğitimin olumlu yönlerinden en çok donanım kullanımı ve senkron eğitim platformunun kullanışlılığı görüşünde oldukları saptanmıştır. Senkron eğitimin olumsuz yönlerinden senkron platforma dair sorunlar ve motivasyon eksikliği ise en fazla öne çıkan yönler olmuştur. Araştırmanın sonuçlarıyla benzer şekilde katılımcıların uzaktan eğitimde motivasyon sorunları yaşadığını ortaya koyan çalışmalar mevcuttur (Çetin vd., 2004; Uzoğlu, 2017; Akdemir ve Kılıç, 2020; Bakioğlu ve Çevik, 2020; Karatepe vd., 2020; Özdoğan ve Berkant, 2020). Araştırma sonucunda öğretim elemanlarının asenkron eğitimin olumlu yönüne ilişkin platform kullanışlılığı ve materyal erişimi konusunda yoğunlaştığı, asenkron eğitimin olumsuz yönüne ilişkin olarak ise en fazla etkileşim yetersizliğinin vurgulandığı saptanmıştır. Karaca Akkan, Gürsoy ve Gümüş (2021) tarafından yapılan çalışmada da benzer şekilde uzaktan eğitimde materyallerine erişimin avantajlı bir durum olduğu saptanmıştır. Bu sonuç ile alanyazındaki benzer araştırmaların (Çetin vd., 2004; Bilgiç ve Tüzün, 2015; Uzoğlu, 2017; Başaran vd., 2020; Hebebci vd., 2020; Özdoğan ve Berkant, 2020; Sungur Alhan, 2020; Karaca Akkan, Gürsoy ve Gümüş, 2021) uzaktan eğitimde etkileşimin sınırlı olduğu yönünde ulaştıkları sonucun turarlı olduğu görülmektedir.

Araştırma sonucunda öğretim elemanlarının eğitimi çeşitlendirme gerekçesiyle en çok hibrit eğitimi tercih ettikleri ortaya çıkmıştır. Bu sonuç, Usta ve Mahiroğlu'nun (2008) çalışmasındaki hibrit eğitim gören öğrencilerin senkron eğitim gören öğrencilere nispeten daha kalıcı öğrendikleri ve derslerde daha başarılı oldukları sonucu ile örtüşmektedir. Buna karşın Dolmacı ve Dolmacı (2020) öğretim elemanlarının beden dili ve göz temasından faydalanabilmeleri, öğrencilerle bireysel olarak ilgilenebilmeleri, derse aktif katılımı ve motivasyonu sağlamanın kolaylığı gibi artılarının olması nedeniyle tercihlerini yüz yüze eğitimden yana kullandıkları sonucuna ulaşmıştır. Garrison (1993) da benzer şekilde uzaktan eğitime ilişkin araştırmasında uzaktan eğitimin yüz yüze eğitimle benzerlik gösteremeyeceği ve yüz yüze eğitim düzeyine yaklaşamayacağını belirtmiş olsa da, Hamzaee (2005) uygun teknoloji ve yöntemler kullanıldığı takdirde uzaktan eğitimin yüz yüze eğitim düzeyine çıkabileceğini ifade etmiştir.

Araştırma ile öğretim elemanlarının uzaktan eğitim için en çok vurguladıkları önerilerin nitelikli araçlar ve internet kullanılması ile uzaktan eğitimde aktif öğrenme ortamının sağlanması olduğu sonucuna ulaşılmıştır. Alanyazında yapılan araştırmalar da uzaktan eğitimdeki teknolojik araçların niteliğini vurgulayarak uzaktan eğitim teknolojisinde nitelik arttıkça materyallerin de aynı oranda nitelikli ve kullanışlı hale geldiğini ortaya koyarak elde edilen bulguları desteklemektedir (Şakar, 1997; Gujjar ve Malik, 2007; Simonson vd. 2015;). Öğretim elemanları

yoğun olarak materyal çeşitliliğinin de sağlanması gerektiği görüşünde birleşirken, Kör, Çataloğlu ve Erbay (2013) tarafından yürütülmüş olan çalışmada da uzaktan eğitimde video, animasyon ve simülasyon türündeki çeşitli materyallerin öğrenmeyi olumlu yönde etkilediğine ilişkin benzer bir sonuca ulaşılmıştır.

Genel olarak bu araştırmada, öğretim elemanı görüşlerinin uzaktan eğitimdeki kişisel olanaklarının yeterli olduğu; en çok bilgisayar, kablosuz internet, WhatsApp ve e-mail kullandıkları hem senkron hem asenkron eğitime ilişkin olumlu ve olumsuz görüşlere sahip oldukları saptanmıştır. Öğretim elemanlarının çoğunun hibrit eğitimi tercih ettikleri; nitelikli araçlar ve internet kullanılması ile aktif öğrenme ortamının sağlanmasının uzaktan eğitime yönelik öneri ve beklentilerinden başlıcaları olduğu saptanmıştır.

Bu sonuçlardan hareketle teknolojik okuryazarlığın da içinde bulunduğumuz bilgi çağında eğiticileirn her daim uzaktan eğitimin uygulanma ihtimalini dikkate alarak teknolojik anlamda öğretim elemanlarının kendilerini geliştirmeleri önerilebilir. Senkron ve asenkron platformlardaki sorunlar için sık aralıklarla güncellemeler yapılabilir, dezavantajlı yönlerin belirlenmesiyle platform ve uygulamalar geliştirilebilir. Uzaktan eğitimde yabancı dil için yeni öğretim yöntemleri ve bu yöntemlere uygun yeni materyaller geliştirilebilir. Yükseköğretimde uzaktan eğitim farkındalığını sürdürebilmek adına, koşullar yüz yüze eğitime uygun olsa da bazı dersler uzaktan eğitim ya da hibrit eğitim ile sürdürülebilir.

Çalışma daha geniş örneklem gruplarıyla ve karma yöntemler kullanılarak tekrarlanabilir. Yükseköğretim kademesi dışında diğer eğitim kademelerindeki öğretmen ve öğrenci görüşlerinin alındığı ve sonuçlara göre çözümler üretilebilecek daha geniş kapsamlı araştırmalar yapılabilir.

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Yapay Zeka Okuryazarlık Testi (Artificial Intelligence Literacy Test)'nin Türkçe'ye Uyarlanması ve Uygulanması

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Özet

Yapay zekanın hızlı gelişimi, yaşama, öğrenme ve çalışma şeklimizin değişimine sebep olmuştur. Yapay zeka, insan zekasını taklit eden, öğrenme ve sorunları çözme yeteneğine sahip bir teknolojidir. Yapay zeka okuryazarlığı bireylerin yapay zeka modelleri oluşturma uzmanlığına sahip olmasa bile yapay zeka uygulamalarını anlama, kullanma, izleme ve bunlar üzerinde eleştirel düşünme becerisini ifade eder. Yapay zeka çağı, öğrencilerin çeşitli işlevsel, sosyal ve teknik yeterliliklerinin geliştirilmesini gerektirir. Zorluklarla başa çıkmak ve yapay zeka ile ilgili fırsatlardan yararlanmak için üniversite öğrencilerinin yapay zeka hakkında temel bir anlayışa (yapay zeka okuryazarlığı) sahip olmaları gerekir. Bu yalnızca yapay zekanın geliştirilmesinde yer alabilecek bilgisayar bilimi ile ilgili disiplinlerdeki öğrenciler için geçerli değildir. Çalışacakları sektör ne olursa olsun, yapay zeka araçlarını muhtemelen mesleki yaşamlarında kullanacakları için bu, tüm disiplinlerdeki öğrenciler için geçerlidir. Bu hususta, öğrencilerin yapay zeka okuryazarlık düzeylerinin tespiti için değerlendirme araçlarına gereksinim duyulmaktadır. İlgili alanyazın incelendiğinde üniversite öğrencilerinin yapay zeka okuryazarlık düzeylerini değerlendirmeye yönelik bir ölçme aracına rastlanmamıştır. Bu ihtiyaçtan hareketle araştırmada Hornberger, Bewersdorff ve Nerdel (2023) tarafından geliştirilen Yapay Zeka Okuryazarlık Testi (Artificial Intelligence Literacy Test)'nin Türkçe'ye uyarlanması ve uygulanması amaçlanmıştır. Araştırmanın çalışma grubunu yükseköğrenim kurumlarına devam eden lisans öğrencileri oluşturmaktadır. Araştırmada veri toplama aracı olarak Türkçe'ye uyarlaması yapılacak olan ve orijinali Hornberger, Bewersdorff, Nerdel (2023) tarafından geliştirilen AI Literacy Test- Yapay Zeka Okuryazarlık Testi kullanılmıştır. Elde edilen veriler, gerekli istatistiksel analizler ışığında tartışılmış ve araştırmanın sonuçlarına göre uygun olarak öneriler sunulmuştur.

Anahtar Kelimeler: Yapay zeka, yapay zeka okuryazarlığı, yapay zeka eğitimi

Abstract

The rapid development of artificial intelligence has transformed the way we live, learn and work. Artificial intelligence is a technology that mimics human intelligence and is capable of learning and solving problems. AI literacy refers to the ability of individuals to understand, use, monitor and think critically about AI applications, even without the expertise to build AI models. The AI era requires the development of a variety of functional, social, and technical competencies of learners. To cope with the challenges and take advantage of the opportunities associated with AI, university students need to have a basic understanding of AI (AI literacy). This does not only apply to students in computer science-related disciplines who may be involved in the development of AI. It applies to students in all disciplines, as they will likely use AI tools in their professional lives, regardless of the sector they will work in. In this regard, assessment tools are needed to determine students' AI literacy levels. When the related literature was examined, no measurement tool was found to assess the AI literacy levels of university students. Based on this need, the study aimed to adapt the Artificial Intelligence Literacy Test developed by Hornberger, Bewersdorff and Nerdel (2023) into Turkish and apply it. The study group of the research consists of undergraduate students attending higher education institutions. The AI Literacy Test, originally developed by Hornberger, Bewersdorff, Nerdel (2023), was used as the data collection tool. The data obtained were discussed in the light of the necessary statistical analyzes and recommendations were presented according to the results of the study.

Keywords: Artificial intelligence, artificial intelligence literacy, artificial intelligence education

Giriş

Yapay zekanın günlük yaşamın çeşitli yönleri üzerinde giderek artan bir etkisi vardır. Akıllı ev aletleri, akıllı telefonlar, Google, Siri gibi Yapay zeka uygulamaları günlük hayatımızın birçok yerinde mevcuttur. Bireylerin çoğu bu ve benzeri yapay zeka hizmetlerinin ve cihazlarının varlığını kabul eder; ancak, nadiren yapay zekaya ilişkin kavramları ve teknolojiyi bilirler (Burgsteiner, Kandlhofer & Steinbauer, 2016). Yapay zeka okuryazarlığı terimi, yapay zekaya ilişkin temel bilgi ve analitik değerlendirmenin yanı sıra yapay zeka uygulamalarının uzman olmayan kişiler tarafından kritik kullanımını içeren yeterlilikleri tanımlar (Laupichler, Aster, Haverkamp & Raupach, 2023).

Yapay zeka potansiyel olarak yirmi birinci yüzyılın önemli teknoloji becerilerinden biri haline gelecektir. Bu nedenle, yapay zeka ve okuryazarlığı birleştirmek için yapay zeka okuryazarlığı, insanların yapay zeka odaklı teknolojiler aracılığıyla dijital dünyamızda yaşaması, öğrenmesi ve çalışması için ihtiyaç duyduğu temel yeteneklere sahip olması anlamına gelir (Steinbauer, Kandlhofer, Chklovski, Heintz & Koenig, 2021). Yirmi birinci yüzyılda bu becerilerle donatılmış öğrenciler, akranlarıyla birlikte yeni bilgi ve beceriler öğrenmek için ilgili teknolojileri ve bilgisayarları çok ileri düzeylerde kullanabilme imkanına sahip olurlar (Bell, 2010). Öğrencilerin yapay zeka teknolojilerini nasıl akıllıca kullanacaklarını öğrenmeleri ve aynı zamanda etik ve etik olmayan uygulamalar arasında ayrım yapabilmeyi öğrenmeleri gerekir (Robinson, 2020; Rodríguez-García, Moreno-León, Román-González & Robles, 2020).

Tüm bunların yanı sıra yapay zeka uygulamaları insanlar ve toplum için risk oluşturmaktadır. Bu nedenle yapay zeka ile ilişkili fırsatlar ve zorluklarla başa çıkmak için, bireylerin temel bir yapay zeka anlayışı ile birlikte yapay zeka sistemlerini kullanma ve değerlendirme becerisi geliştirmeleri gerekir (Long & Magerko, 2020). Bu beceriler yalnızca yapay zekanın geliştirilmesinde yer alabilecek bilgisayar bilimleriyle ilgili disiplinlerdeki öğrenciler için geçerli değildir. Çalışacakları sektör ne olursa olsun, profesyonel yaşamlarında yapay zeka araçlarını kullanacakları için tüm disiplinlerdeki öğrenciler için geçerlidir (Southworth & diğerleri, 2023). Diğer bir ifade ile yüksek öğrenimdeki öğrencilerin kariyerlerinde yapay zekayı etkili bir şekilde kullanabilmeleri için gerekli becerileri geliştirmeleri gerektiğinden, bu öğrenciler yapay zeka eğitimi için önemli bir hedef kitledir (Ng, Leung, Chu & Qiao, 2021).

Yapay zeka okuryazarlığı değerlendirme araçları araştırmalar için katkı sağlar. Bu katkılardan biri de farklı alt grupların (örneğin lise veya tıp öğrencileri) yapay zeka okuryazarlığını karşılaştırma, onların güçlü ve zayıf yönlerini belirleme ve bu bulgulara dayanarak öğrenme fırsatları geliştirme yeteneği olacaktır (Verma, 2019).

Yapay zeka okuryazarlığını ölçme çalışmaları oldukça yenidir ve daha fazla çalışmaya ihtiyaç duyulmaktadır (Chiu, 2024). Mevcut çalışmalar incelendiğinde, son yıllarda yapay zeka okuryazarlığına yönelik öz değerlendirme ölçeklerinin sayısının giderek arttığı görülmüştür (Carolus & diğerleri, 2023; Laupichler ve diğerleri, 2023; Lin ve diğerleri, 2023; Ng ve diğerleri, 2023; Pinski & Benlian, 2023; Wang ve diğerleri, 2022); ancak, öz değerlendirme sübjektif olabileceğinden (Dunning ve diğerleri, 2004), Laupichler ve diğerleri, (2023) öğrencilerin yapay zeka okuryazarlığını değerlendirmek için geçerli ve objektif bir bilgi testine ihtiyaç duyulduğunu ifade etmiştir. Bu doğrultuda Hornberger, Bewersdorff ve Nerdel (2023) tarafından yüksek öğrenimde yapay zeka okuryazarlığını değerlendirmek için çoktan seçmeli bir test geliştirilmiştir.

Türkiye'de yapay zeka okuryazarlığının ölçülmesine ilişkin sınırlı sayıda (Çelebi, Yılmaz, Demir & Karakuş, 2023; Karaoğlan-Yılmaz & Yılmaz, 2023; Polatgil & Güler, 2023) çalışmaya rastlanmıştır. Bu çalışmalar incelendiğinde üniversite öğrencilerinin yapay zeka okuryazarlık düzeylerini değerlendirmeye yönelik bir ölçme aracına rastlanmamıştır. Bu ihtiyaçtan hareketle araştırmada Hornberger, Bewersdorff ve Nerdel (2023) tarafından geliştirilen Yapay Zeka Okuryazarlık Testi (Artificial Intelligence Literacy Test)'nin Türkçe'ye uyarlanması ve uygulanması amaçlanmıştır. Araştırmanın bu temel amacı doğrultusunda aşağıdaki sorulara yanıt aranmıştır:

1) Yapay Zeka Okuryazarlık Testi (Artificial Intelligence Literacy Test) yüksek öğrenim öğrencileri için geçerli bir ölçüm aracı mıdır?

2) Yapay Zeka Okuryazarlık Testi (Artificial Intelligence Literacy Test) yüksek öğrenim öğrencileri için güvenilir bir ölçüm aracı mıdır?

3) Yüksek öğrenim öğrencilerinin yapay zeka okuryazarlık düzeyleri ile cinsiyetleri arasında anlamlı bir farklılık var mıdır?

4) Yüksek öğrenim öğrencilerinin yapay zeka okuryazarlık düzeyleri ile sınıf düzeyleri arasında anlamlı bir farklılık var mıdır?

Yöntem

Araştırma modeli, çalışma grubu, veri toplama araçları, veri toplama süreci ve veri analizi bu bölümde açıklanmıştır.

Araştırma Modeli

Yapay Zeka Okuryazarlık Testi (Artificial Intelligence Literacy Test) 'nin Türkçe'ye uyarlanmasını ve uygulanmasını amaçlayan bu çalışma bir tarama çalışmasıdır. Tarama modeli geçmişte ya da halen var olan bir durumu var olduğu haliyle betimlemeyi amaçlayan, araştırmaya konu olan olay, birey ya da nesneyi kendi koşulları içinde olduğu gibi tanımlamaya

çalışan bir yaklaşımdır. Farklı türdeki tarama modellerinden bu çalışmada genel tarama modeli kullanılmıştır. Bu modelde, çok sayıda elemandan oluşan bir evrende, evren hakkında genel bir yargıya varmak amacı ile evrenin tümü ya da ondan alınacak bir grup örnek üzerinde çalışılır (Karasar, 2012). Bu araştırmada tarama modeline uygun betimlenecek olan özellik yapay zeka okuryazarlık düzeyidir.

Çalışma Grubu

Yapay Zeka Okuryazarlık Testi (Artificial Intelligence Literacy Test) 'nin Türkçe'ye uyarlanması ve uygulanması kapsamında çalışma grubunu, Yüksek öğrenim kurumlarına devam eden 472 lisans öğrencisi oluşturmaktadır. Çalışma grubu kolay ulaşılabilir örnekleme tekniğiyle belirlenmiştir. Kolay ulaşılabilir örnekleme yöntemi, araştırmacının hedefi olan evrenden örneklemini oluştururken ulaşabileceği en kolay ögelere yönelmesi olarak tanımlanabilir (Patton, 2005). Veri toplama aracı Google Form olarak lisans öğrencilerine online olarak ulaştırılmıştır. Ardından lisans öğrencilerinin formu tanıdıkları başka öğrencilere ulaştırmaları istenmiştir. Ayrıca veri toplama aracı, yüksek öğretim kurumlarında görev yapmakta olan öğretim elemanlarına da ulaştırılmış, onların da lisans öğrencilerine iletmeleri istenmiştir. Bu nedenle kolay ulaşılabilir örnekleme yöntemi tercih edilmiştir. Google Formda araştırmaya ilişkin açıklamalara yer verilmiş ve araştırmaya gönüllü katılım gösterme seçeneği eklenerek katılımcılara onam formu sunulmuştur. Katılımcılar onam formunu onaylaması durumunda çalışma grubuna dahil edilmiştir.

Tablo 1. Çalışma Grubunun Demografik Özellikleri

Değişken		***f***	**%**
Cinsiyet	Kadın	401	85
	Erkek	71	15
Sınıf Düzeyi	1.Sınıf	168	36
	2.Sınıf	139	29
	3.sınıf	67	14
	4.sınıf	98	20
Toplam		472	100

Tablo 1'e göre araştırmaya 472 yükseköğrenim kurumlarına devam eden lisans öğrencisi katılmıştır. Öğrencilerin 401'i (%85) kadın ve 71'i (%15) erkektir. Çalışma grubunda yer alan öğrencilerin 168'i (%36) 1.sınıf, 139'u (%29) 2.sınıf, 67'si (%14) 3.sınıf ve 98'i (%20) 4.sınıf düzeyinde öğrenim görmektedir.

Veri Toplama Araçları

Araştırmada yüksek öğrenim kurumlarındaki lisans öğrencilerinin kişisel bilgilerine ilişkin veriler "Demografik Bilgi Formu" aracılığıyla elde edilmiştir. Lisans öğrencilerinin yapay zeka okuryazarlık düzeylerini ölçmeye yönelik veriler ise (Artificial Intelligence Literacy Test) tarafından geliştirilen "Yapay Zeka Okuryazarlık Testi" ile toplanmıştır.

Demografik Bilgi Formu: Araştırmacılar tarafından, araştırmaya dahil edilen üniversite öğrencilerinin cinsiyeti ve sınıf düzeyleri hakkında bilgi edinmek için demografik bilgi formu hazırlamıştır.

Yapay Zeka Okuryazarlık Testi (Artificial Intelligence Literacy Test): Artificial Intelligence Literacy Test (Yapay Zeka Okuryazarlık Testi) Long ve Magerko'nun (2020) yapay zeka okuryazarlığı kavramsallaştırmasıyla

uyumlu, teori tabanlı bir yapay zeka okuryazarlık testi geliştirmek ve doğrulamak amacıyla Hornberger, Bewersdorff ve Nerdel (2023) tarafından Almanya'da geliştirilmiştir. Bu test üniversite öğrencilerinin yapay zeka okuryazarlığının mevcut durumu hakkında değerlendirme yapabilmek için çoktan seçmeli bir formatta (dört cevaptan biri doğrudur) hazırlanmıştır. Yapay Zeka Okuryazarlık Testi (Artificial Intelligence Literacy Test) 31 maddeden oluşmaktadır. Testin güvenirlik çalışması için iç tutarlık katsayısı hesaplanmıştır. Teste ait Cronbach alfa güvenirlik katsayısının $\alpha = 0.82$ olduğu tespit edilmiştir.

Verilerin Analizi

Yapay Zeka Okuryazarlık Testi ve Demografi Formu aracılığıyla toplanan veriler SPSS 20 paket programı ile analiz edilmiştir. Demografi Formundan elde edilen verilerin analizinde frekans ve yüzde istatistikleri kullanılmış ve veriler yorumlanmıştır. Yapay Zeka Okuryazarlık Testinin (Artificial Intelligence Literacy Test) Türkçe'ye uyarlanması testi geliştiren Hornberger ve arkadaşlarından mail yoluyla alınan izin doğrultusunda yapılmıştır. İzin sürecinin tamamlanmasından sonra ölçeğin uyarlama süreci başlatılmıştır. Yapay Zeka Okuryazarlık Testinin uyum katsayısı hesaplanmıştır. Yapay Zeka Okuryazarlık Testi tek boyutlu olduğu için tek boyut altında yer alan maddelerin, madde toplam korelasyonu, madde ayırt ediciliği ve güvenirlik katsayısı incelenmiştir. Güvenirlik çalışmaları kapsamında Kuder-Richardson 20 (KR-20) katsayısı hesaplanmıştır. Testin değişkenler arasındaki anlamlılığına ilişkin t-testi ve ANOVA testleri yapılmıştır.

Bulgular

Yapay Zeka Okuryazarlık Testi (Artificial Intelligence Literacy Test)'nin Türkçe'ye Uyarlanma Süreci

Testin İncelenmesi ve Anlaşılması: Araştırmacılar, öncelikle Yapay Zeka Okuryazarlık Testi'nin İngilizce versiyonu detaylı bir şekilde incelenmiş ve testin içeriği, yapısı ve amacı anlaşılmıştır.

Kültürel ve Dilbilimsel Uyumun Sağlanması: Testin Türkçe adaptasyonunda, Türk kültürü ve dil yapısı göz önünde bulundurularak, terimlerin ve ifadelerin doğru bir şekilde Türkçe'ye çevrilmesi ve uygunluğunun değerlendirilmesi sağlanmıştır.

Profesyonel Çevirmen ve Uzmanlarla İş birliği*:* Adaptasyon sürecinde, testin profesyonel bir çevirmen ve yapay zeka alanında uzmanlaşmış kişilerle işbirliği içinde çevirisi gerçekleştirilmiştir. Türkçe çeviri sonrasında alanında uzman beş doktoralı bilim insanı tarafından ölçme aracının yapısı incelenmiştir.

1. Uzmanların Değerlendirmeleri: Beş uzmanın, Yapay Zeka Okuryazarlık Testi'nin Türkçe adaptasyonuyla ilgili bağımsız olarak değerlendirmelerini alınmıştır. Her uzman, testin Türkçe çevirisinin doğruluğu, anlaşılırlığı ve uygunluğu gibi konularda kendi görüşlerini belirtmişlerdir.

2. Değerlendirmelerin Kodlanması: Uzmanların değerlendirmeleri belirli kriterlere göre kodlanmıştır. Örneğin, her bir uzmanın her madde için değerlendirmesine bir kod verilmiştir: "1" testin maddesinin uygun olduğunu belirtirken, "0" uygun olmadığını belirmiştir.

3. Uyum Katsayısının Hesaplanması: Uyum katsayısı (Cohen's kappa coefficient), uzmanların değerlendirmeleri arasındaki uyumu ölçer. Uyum katsayısı, aşağıdaki formülle hesaplanabilir:

$$\kappa = \frac{p_0 - p_e}{1 - p_e},$$

Burada: Po, gözlemcilerin gözlemlediği özellikler üzerinde anlaşma oranını (gözlenen uyumu) temsil eder. Pe, rasgele anlaşma oranını (beklenen uyumu) temsil eder. Bu formül, beş gözlemci arasındaki uyumu değerlendirmek için kullanılmış ve uyum katsayısı 0.90 bulunmuştur (Cohen, 1960). Uyum katsayısı genellikle 0 ile 1 arasında değer alır. 1'e ne kadar yakınsa, uzmanların değerlendirmeleri arasındaki uyum o kadar yüksektir. 0.8 ve üzeri çok iyi uyum şeklinde yorumlanmaktadır.

İlk Çeviri ve Geri Çeviri*:* Testin İngilizce versiyonunun Türkçe'ye çevirisi yapılmış ve ardından bu çeviri bir başka dilde yetkin bir kişi tarafından tekrar İngilizce'ye geri çevrilerek çevirinin doğruluğu ve tutarlılığı kontrol edilmiştir.

Uyum ve Geçerlilik Çalışmaları: Türkçe adaptasyonu tamamlandıktan sonra, testin Türkçe versiyonunun uyumunu ve geçerliliğini değerlendirmek üzere uyum ve geçerlilik çalışmaları gerçekleştirilmiştir. Yapay Zeka Okuryazarlık Testi tek boyutlu olduğu için geçerlik çalışmaları kapsam geçerliği ve uzman görüşü açısından incelenmiştir. Tek boyut altında yer alan maddelerin, madde toplam korelasyonu, madde ayırt ediciliği ve güvenirlik katsayısı incelenmiştir.

Revizyon ve İyileştirme: Adaptasyon sürecinde elde edilen geri bildirimler doğrultusunda, testin Türkçe versiyonunda gerekli revizyonlar yapılarak test daha da iyileştirilmiştir. Bu aşamaların başarıyla tamamlanması, Yapay Zeka Okuryazarlık Testi'nin güvenilirlik ve geçerliliğini sağlamak adına önemli bir adımdır.

Yapay Zeka Okuryazarlık Testi'nin Uyarlanmasına İlişkin Bulgular

Tablo 2. Madde toplam korelasyonu

	Mean	**Std. Deviation**	**Corrected Item-Total Correlation**
M1	,71	,456	,940
M2	,70	,457	,920
M3	,70	,458	,923
M4	,70	,458	,914
M5	,71	,454	,938
M6	,58	,493	,418
M7	,44	,496	,233
M8	,72	,450	,916
M9	,71	,456	,928
M10	,70	,457	,927
M11	,70	,457	,927
M12	,71	,454	,923
M13	,58	,493	,414
M14	**,43**	**,496**	**,213**
M15	,72	,451	,911
M16	,71	,456	,923
M17	,71	,456	,917
M18	,71	,455	,920
M19	,72	,448	,924
M20	,58	,493	,417
M21	,72	,451	,932
M22	,72	,451	,914
M23	**,57**	**,495**	**,194**
M24	**,31**	**,462**	**,263**
M25	,72	,449	,923

M26	,71	,453	,915
M27	,58	,494	,428
M28	**,42**	**,495**	**,223**
M29	,70	,459	,882
M30	**,57**	**,495**	**,194**
M31	**,29**	**,455**	**,262**

Tablo 2'ye göre, madde toplam korelasyonu, bir madde ile toplam puan arasındaki ilişkiyi ölçer. Bu değer, bir maddenin toplam test skoruna ne kadar katkıda bulunduğunu gösterir. Yüksek bir madde toplam korelasyonu, maddenin testin genel güvenirliğine katkıda bulunduğunu gösterir. Tablodaki maddelerin çoğunun oldukça yüksek madde toplam korelasyonlarına sahip olduğunu görüyoruz (örneğin, 0.9'a yakın değerler). Ancak bazı maddelerin (M14, M23, M24, M28, M30, M31) madde toplam korelasyonları diğerlerine göre daha düşük. Bu maddelerin testin genel güvenirliğine katkısı daha düşük olabilir veya başka faktörlerle ilişkili olabilir. Özellikle çok düşük madde toplam korelasyonları olan maddeler (örneğin, M23, M24, M30, M31) değerlendirmenin güvenirliğini sorgulayabilir ve bu maddelerin yeniden incelenmesi gerekebilir. Büyüköztürk (2011) ve Tavşancıl (2005)'a göre madde toplam korelâsyon analizinde r değeri. 30'dan küçük ise (r<.30) ilgili maddenin korelasyonu zayıf demektir ve bu madde ölçekten çıkarılmalıdır. Eğer r değeri .30 ile .70 arasında değerler alıyorsa orta düzeydedir. r değeri .70'ten büyükse iyi düzeyde ilişkilidir. Genel olarak, madde toplam korelasyonları değerlendirilirken, yüksek korelasyonların .30 puan ve üzeri kabul edilir. Ancak, düşük korelasyonlar, maddenin ölçtüğü konunun test içindeki diğer faktörlerle ilişkisinin zayıf olduğunu veya maddenin kendisinin güvenilir olmayabileceğini gösterebilir. Ancak ilgili veri toplama aracı tek boyutlu olduğu için faktörler arası ilişkinin düşmesini sağlamaz. Bu nedenle, düşük korelasyonlara sahip maddelerin yeni örneklemler için gözden geçirilmesi ve gerekirse revize edilmesi için kalmasına karar verilmiştir.

Tablo 3. Madde Ayırt ediciliği

	Grup	N	Mean	Std. Deviation	t	df	P
M1	%27 Alt Grup	128	,06	,243	3,350	254	,001
	%27 Üst Grup	128	,12	,330			
M2	%27 Alt Grup	128	,18	,385	3,342	254	,001
	%27 Üst Grup	128	,36	,482			
M3	%27 Alt Grup	128	,13	,341	2,336	254	,020
	%27 Üst Grup	128	,25	,432			
M4	%27 Alt Grup	128	,15	,357	3,360	254	,001
	%27 Üst Grup	128	,32	,469			
M5	%27 Alt Grup	128	,52	,501	7,112	254	,000
	%27 Üst Grup	128	,89	,311			
M6	%27 Alt Grup	128	,38	,486	6,784	254	,000
	%27 Üst Grup	128	,76	,428			
M7	%27 Alt Grup	128	,28	,451	5,993	254	,000
	%27 Üst Grup	128	,63	,484			
M8	%27 Alt Grup	128	,05	,212	5,660	254	,000
	%27 Üst Grup	128	,30	,460			
M9	%27 Alt Grup	128	,23	,420	3,431	254	,001
	%27 Üst Grup	128	,42	,496			
M10	%27 Alt Grup	128	,08	,269	3,359	254	,001
	%27 Üst Grup	128	,13	,338			
M11	%27 Alt Grup	128	,23	,425	3,537	254	,000
	%27 Üst Grup	128	,44	,498			
M12	**%27 Alt Grup**	**128**	**,20**	**,404**	**1,524**	**254**	**,129**
	%27 Üst Grup	128	,28	,453			
M13	%27 Alt Grup	128	,09	,281	2,790	254	,006
	%27 Üst Grup	128	,21	,407			
M14	**%27 Alt Grup**	**128**	**,18**	**,385**	**,567**		**,571**

	%27 Üst Grup	128	,21	,407		**254**	
M15	%27 Alt Grup	128	,23	,425	4,850	254	,000
	%27 Üst Grup	128	,52	,502			
M16	%27 Alt Grup	128	,12	,323	3,136	254	,002
	%27 Üst Grup	128	,27	,445			
M17	**%27 Alt Grup**	**128**	**,20**	**,404**	**1,796**	**254**	**,074**
	%27 Üst Grup	128	,30	,460			
M18	%27 Alt Grup	128	,01	,088	3,495	254	,001
	%27 Üst Grup	128	,11	,311			
M19	%27 Alt Grup	128	,12	,323	2,275	254	,024
	%27 Üst Grup	128	,22	,418			
M20	%27 Alt Grup	128	,15	,357	6,475	254	,000
	%27 Üst Grup	128	,50	,502			
M21	%27 Alt Grup	128	,33	,471	4,945	254	,000
	%27 Üst Grup	128	,62	,486			
M22	%27 Alt Grup	128	,48	,502	5,583	254	,000
	%27 Üst Grup	128	,80	,402			
M23	**%27 Alt Grup**	**128**	**,13**	**,341**	**,977**	**254**	**,330**
	%27 Üst Grup	128	,18	,383			
M24	%27 Alt Grup	128	,16	,365	7,003	254	,000
	%27 Üst Grup	128	,54	,500			
M25	%27 Alt Grup	128	,13	,341	2,761	254	,006
	%27 Üst Grup	128	,27	,445			
M26	%27 Alt Grup	128	,16	,365	7,003	254	,000
	%27 Üst Grup	128	,54	,500			
M27	%27 Alt Grup	128	,13	,341	2,192	254	,029
	%27 Üst Grup	128	,24	,428			
M28	%27 Alt Grup	128	,20	,398	2,489	254	,013
	%27 Üst Grup	128	,33	,472			
M29	%27 Alt Grup	128	,29	,455	7,709	254	,000
	%27 Üst Grup	128	,72	,449			
M30	%27 Alt Grup	128	,14	,349	2,298	254	,022
	%27 Üst Grup	128	,25	,437			
M31	%27 Alt Grup	128	,20	,398	4,196	254	,000
	%27 Üst Grup	128	,43	,497			
YZ Okuryazarlığı	%27 Alt Grup	128	5,9297	,99751	39,916	254	,000
	%27 Üst Grup	128	12,2615	1,49705			

Madde ayırt ediciliği, bir testteki her bir maddenin farklı performans düzeylerindeki bireyleri ayırt edip edemediğini ölçer. Bu, bir maddenin, yüksek başarı düzeyindeki bireyler ile düşük başarı düzeyindeki bireyler arasında farklı cevaplar veren bir maddenin istatistiksel olarak daha ayırt edici olduğunu gösterir. Maddenin ayırt ediciliğini ölçmek için yaygın olarak kullanılan bir ölçüt, maddenin üst ve alt gruplar arasındaki farklılıkta korelasyonun mutlak değeridir. Yani, maddenin üst ve alt gruplar arasındaki puan farkları ile maddenin puanları arasındaki korelasyonu incelenir. Tablodaki verilere dayanarak, her bir madde için alt ve üst gruplar arasındaki puan farkları ile maddenin puanları arasındaki korelasyonları hesaplanabilir. Bu korelasyonlar ne kadar yüksekse, madde o kadar ayırt edicidir. Ancak, bu analiz için gerekli olan alt ve üst gruplar arasındaki puan farklarının verilmediğini gözlemliyorum. Bu nedenle, maddenin ayırt ediciliğini doğrudan değerlendirmek için yeterli veri bulunmamaktadır. Ancak, tablodaki t-testi sonuçları, bazı maddelerin (%27 Alt Grup ile %27 Üst Grup arasında) istatistiksel olarak anlamlı farklılıklar gösterdiğini göstermektedir. Bu, bu maddelerin potansiyel olarak ayırt edici olabileceğini düşündürebilir, ancak kesin bir değerlendirme yapabilmek için alt ve üst gruplar arasındaki puan farklarının da bilinmesi gerekir.

Her bir madde için iki grup arasında (örneğin, %27 Alt Grup ve %27 Üst Grup) anlamlı farklılıkların olduğu görülüyor. Örneğin, M1 için %27 Alt Grup ve %27 Üst Grup arasındaki ortalama farklılığının istatistiksel olarak anlamlı olduğu ($p < 0.001$) ve t-değeri 3.350 olarak bulunmuştur. Ancak, bazı maddelerde (örneğin, M12, M14, M17, M23), gruplar arasındaki ortalama farklılığın istatistiksel olarak anlamlı olmadığı ($p > 0.05$) görülüyor. Ölçme aracının toplam puanı üzerinden madde ayırt edicilik incelendiğinde ölçeğin genelinin ayırt edici özellik gösterdiği için, ayırt ediciliği düşük olan maddeler revize edilmek üzere ölçme aracında kalmasına karar verilmiştir.

Tablo 4. KR-20 İç tutarlık katsayısı

Kuder-Richardson 20	N of Items
,861	31

KR-20 (Kuder-Richardson 20) iç tutarlılık katsayısı, bir testin iç tutarlılığını değerlendirmek için kullanılan bir istatistiksel ölçüdür. Değer, testteki maddelerin birlikte tutarlı bir şekilde ölçtüğü varsayılan bir yapıya dayanır. KR-20 değeri, testin maddelerinin birbirleriyle ne kadar uyumlu olduğunu gösterir. KR-20 değeri, genellikle 0 ile 1 arasında olup, 1'e ne kadar yakınsa, testin iç tutarlılığının o kadar yüksek olduğunu gösterir. Yani, 0.861 oldukça yüksek bir KR-20 değeridir ve testin maddelerinin birbirleriyle uyumlu bir şekilde ölçüm yaptığını gösterir Güvenirlik katsayısının .70 ve daha yüksek olması test puanlarının güvenirliği için genel olarak yeterli görülmektedir (Büyüköztürk, 2004). Bu doğrultuda testin güvenilir olduğu ve test puanlarının tutarlı bir şekilde ölçüldüğü ifade edilebilir. 0.861 gibi yüksek bir KR-20 değeri, testin iç tutarlılığının güçlü olduğunu gösterir. Hornberger, Bewersdorff ve Nerdel (2023) tarafından geliştirilen orijinal testin (Artificial Intelligence Literacy Test) güvenirlik çalışması için iç tutarlık katsayısı hesaplanmıştır. Teste ait Cronbach alfa güvenirlik katsayısının α = 0.82 olduğu tespit edilmiştir. Ölçeklerin Cronbach's alfa (α) güvenirlik katsayısının .70'in üzerinde olması uygun ve kabul edilebilir düzeydir (George & Mallery, 2019). Buna göre, sonuçların örtüştüğü söylenebilir.

Yapay Zeka Okuryazarlık Testi'nin Uygulanmasına İlişkin Bulgular

Tablo 5. Cinsiyete göre bağımsız t-testi sonuçları

Cinsiyet	N	Mean	Std. Deviation	Std. Error Mean	t	df	p
Kadın	401	8,9651	2,53353	,12652	,105	470	,917
Erkek	71	9,0000	2,90320	,34455			

Bağımsız örneklem t-testi analizi sonuçlarına göre, cinsiyetin okuryazarlık düzeyi üzerinde anlamlı bir etkisinin olmadığı bulunmuştur ($t(470)=0.105$,$p=0.91$, p>.050). Bu bulgu, kadın ve erkek katılımcıların okuryazarlık düzeylerinin istatistiksel olarak benzer olduğunu göstermektedir. Bu sonuca benzer olarak Kong, Cheung ve Zhang (2021) araştırmalarında lisans ve lisansüstü eğitim almakta olan erkek ve kadın katılımcıların, "Zeka Okuryazarlık Testi" puanlarının istatistiksel olarak anlamlı bir farklılık göstermediği sonucuna ulaşmıştır. Makarova, Aeschlimann ve Herzog (2019) araştırmalardan elde edilen bu sonuçların yapay zekanın erkekler için daha uygun bir konu olduğu yönündeki geleneksel imajın değiştirilmesine yardımcı olabileceğini ifade etmiştir. Bu hususta araştırma bulgularının cinsiyet stereotiplerine ilişkin geleneksel inançların aşılması, kadın katılımcıların motivasyonunun arttırılması ve her iki cinsiyetten öğrenciler için eğitim seçeneklerinin genişletilmesi açısından önemli olabilir (Thomas, 2017).

Tablo 6. Sınıf düzeyine göre ANOVA testi sonuçları

Sınıf	N	Mean	Std. Deviation		Sum of Squares	df	Mean Square	F	p
1	168	8,6964	2,69788	Between Groups	32,089	3	10,696	1,602	,188
2	139	8,9712	2,34348	Within Groups	3125,496	468	6,678		
3	67	9,4925	2,55469	Total	3157,585	471			
4	98	9,0816	2,72701						
Total	472	8,9703	2,58921						

ANOVA analizi sonuçlarına göre, sınıf düzeyinin okuryazarlık düzeyi üzerinde anlamlı bir etkisinin olmadığı bulunmuştur ($F(3,468)=1.602$,$p=0.188$, p>.050). Bu bulgu, farklı sınıf düzeylerine sahip bireylerin okuryazarlık düzeylerinin istatistiksel olarak benzer olduğunu göstermektedir. Bu bulgular, sınıf düzeyinin okuryazarlık düzeyi üzerindeki etkisini değerlendirmek için daha geniş bir araştırma yapılmasının gerekliliğini ortaya koymaktadır.

SONUÇ

Hornberger, Bewersdorff ve Nerdel (2023) tarafından geliştirilen Yapay Zeka Okuryazarlık Testi (Artificial Intelligence Literacy Test)'nin Türkçe'ye uyarlanması ve uygulanmasını amaçlayan bu araştırma sonucunda Yapay Zeka Okuryazarlık Testi (Artificial Intelligence Literacy Test)'nin geçerli ve güvenilir bir ölçüm aracı olduğunu kanıtlamıştır.

Üniversite öğrencilerinin cinsiyetinin yapay zeka okuryazarlık düzeyleri üzerinde anlamlı bir etkisinin olmadığı saptanmıştır.

Üniversite öğrencilerinin sınıf düzeylerinin yapay zeka okuryazarlık düzeyleri üzerinde anlamlı bir etkisinin olmadığı sonucuna ulaşılmıştır.

ÖNERİLER

Mevcut araştırmanın sonuçlarına dayanarak aşağıdaki önerilerde bulunulabilir:

1. Yapay Zeka Okuryazarlık Testi'nin farklı örneklem grupları için uyarlanmasına yönelik geçerlilik ve güvenilirlik çalışmaları yapılabilir.
2. Yapay Zeka Okuryazarlık Testi, üniversite öğrencilerinin yapay zeka okuryazarlık gelişimlerine yönelik planlanacak bilimsel araştırmalarda geçerli ve güvenilir bir araç olarak kullanılabilir.
3. Mevcut çalışmanın sonuçları göz önünde bulundurulduğunda, Yapay Zeka Okuryazarlık Testi'nin hem kültür içi hem de kültürler arası güvenilirliği ve geçerliliği konusunda ek araştırmalar yapılabilir.

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Üstün yetenekli öğrencilerin Unity platformu için hazırlayacakları 3B oyunlar için yazdıkları oyun senaryolarının analizi*

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Özet

Oyunlar, amaçları, kuralları, ödülleri ve senaryosu gibi dinamikleri ile birlikte ilgi çekici özellikler barındırmaktadır ve bu dinamikleri sayesinde öğrenme deneyimlerine entegre edilebilmektedir. Dijital oyunlar, öğrenme deneyimi boyunca öğrenciler tarafından oynanarak veya tasarlanarak eğitim ortamlarına entegre edilebilmektedir. Tasarımcı olan öğrenciler, senaryo yazma, kodlama, problem çözme gibi farklı becerilerini ortaya koyarak ürün geliştirme süreçlerinde rol oynamaktadır. Alanyazında öğrencilerin dijital oyun geliştirmesi ile ilgili pek çok çalışmaya rastlanmaktadır. Buna rağmen akranlarına göre üstün zekâ, üstün yaratıcılık ve üstün başarı özellikleri ile tanımlanan üstün yetenekli öğrencilerle bu bağlamda yapılan çalışmalar sınırlıdır. Aynı zamanda üstün yetenekli öğrencilerin yaratıcılık becerilerini ortaya çıkarabileceği etkinlikler yapmak, bilişim teknolojileri araçlarını kullanmak, üst düzey kodlama ve tasarlama imkânına sahip olmak gibi beklentilerinin olduğu bilinmektedir. Bu çalışmada talep edilen beklentileri karşılayabilecek özellikleri olan Unity adlı oyun platformu kullanılmıştır. Bu sayede kendi yazdıkları üç boyutlu oyun senaryolarını hayata geçirebileceklerdir. Yedi üstün yetenekli öğrenci ile yapılan çalışmada, yöntem olarak içerik analizi kullanılmıştır. Yazılı olarak alınan oyun senaryolarından elde edilen veriler analiz edilmiştir. Bulgulara göre bir oyunda bulunması gereken on temel tanımlayıcı unsurun, tüm senaryolarda yer aldığı görülmektedir. Yazılan senaryolarda, tanımlayıcı temel unsurlardan en çok zorluk, kurallar, etkileşim gibi temalar yer alırken; rekabet, fantastik araçlar ve eş zamanlı oynanan kişiler gibi temalara daha az rastlanılmaktadır. Senaryoların platform, macera ve spor alanlarında yapıldığı, yapılan kurgularda yaratıcı fikirlerin ve araçların ortaya çıktığı görülmektedir.

Anahtar Kelimeler: Unity, üstün yetenekli öğrenciler, 3B oyun tasarımı, oyun senaryoları, tasarım odaklı öğrenme.

*Bu çalışma, yayınlanmamış lisansüstü tezden üretilmiştir.

Analysis of general game scenarios for the games that gifted games will prepare for the Unity platform *

Abstract

Games contain interesting features with dynamics such as rules, characters and scenarios, and thanks to these dynamics, they can be integrated into learning experiences. Digital games can be included in educational context by either playing or designing them during learning experiences. There are many studies on digital game development of students in the literature. However, studies focusing on gifted students, who can be distinguish from their peers because of their high creativity success, are very limited in number. Accordingly, there are models made in these countries with unlimited gifted options and superior intelligence, superior creativity and superior success. At the same time, it is known that there are expectations such as being able to offer activities that can reveal gifted student skills, ensuring the use of information technologies, and having the opportunity to design and design at a high level. The game platform called Unity, which has features that can meet these demanding expectations, was used. In this way, they will be able to transfer their own ideas and game scenarios into digital games. Content analysis was used as the method, conducted with seven gifted students. Data obtained from written game scenarios were analyzed. According to the findings, it is seen that the basic defining elements that a game should be played are included in all scenarios. In the written scenarios, the main descriptive elements were themes such as difficulties, rules, and transmission. Themes such as competitive, fantasy tools and simultaneous play are less common. Platform, advanture and sports were the most common genres, and they all consist of creative futures.

Keywords: Unity, gifted students, game design, game scenarios, based on designing learning.

*This study is based on an unpublished master thesis.

Giriş

Öğrenmeyi eğlenceli ve etkileşimli hale getirebilmek için eğitim amaçlı kullanılan oyunlara rastlamak mümkündür. Bilgi ve iletişim teknolojilerinin(BİT) yaygınlaşması ve sonrasında dijital oyunların çoğalmasıyla birlikte eğitim kurumlarının bu yeni öğrenme alanlarını sistemlerine dâhil etme ihtiyacı oluşmuştur(Fujimoto vd., 2016). Öğrencilerin eğitim alma yönelimleri ve istekleri de bu anlamda değişmiştir (Öngöz ve Aksoy, 2015). Oyun oynayarak öğrenme veya oyunu tasarlayarak öğrenme gibi yöntemler öğrenme süreçlerinde kullanılmaya başlanmıştır (Whitton, 2009). Bu değişimler farklı kademede ve yetenekte olan öğrencilerin oyun deneyimleri ve bu bağlamdaki çıktıları birçok çalışmada araştırma konusu olmuştur. Bu çalışmaların bazıları üstün yetenekli olarak tanımlanan öğrencileri kapsamaktadır. Üstün yetenekli öğrenciler entelektüel yetenek, psikomotor yetenek veya akademik yetenek gibi alanların bir ya da bir kaçında üstün performans gösteren kişiler olarak tanımlanmaktadır (Marland, 1971). Ortalamanın üstünde yaratıcı bir yeteneğe sahip olan öğrenciler olarak nitelendirilmiştir (Renzulli, 1978). Bu öğrencilerin uzman kişiler tarafından belirlenerek zenginleştirilmiş okul müfredatlarıyla öğrenim görmeleri gerektiğinin önemi vurgulanmaktadır (Marland, 1971). Türkiye, ABD, Rusya, Kanada, Avustralya başta olmak üzere dünyada pek çok ülkede bu öğrencilere yönelik kapsamlı eğitimler verilmektedir (MEB, 2012). Özel Yetenekli Bireyler Strateji ve Uygulama Planı'nda üstün yetenekli(ÜY) bireylerin eğitimi çerçevesi belirlenmiş olup, Türkiye bu bireylerin okul eğitimlerinin yanı sıra Bilim Sanat Merkezleri (BİLSEM) olarak bilinen eğitim kurumlarında da ayrıca eğitim almaktadır(MEB, 2013). Mevcut durum, istek ve koşullara göre bilişim teknolojileri entegrasyonu ile harmanlanmış eğitimler, bu kurumlarda öncelikli eğitimlerin başında yer almaktadır(MEB, 2013). BİT alanında üstün yetenekli öğrenciler oyun tasarlama, animasyon yapma, çizgi film yapma ve benzeri etkinlikler ile farklı güncel teknolojileri tanıma gibi beklentilere sahiptir (Öngöz ve Aksoy, 2015). Derslerin ilgi alanı ve yeteneklerine hitap etmemesi, eğlenme ortamı sunmaması, materyal eksikliği gibi durumlar, ÜY öğrencilerin öğrenme deneyimlerini olumsuz etkileyebilmektedir (Oruç vd., 2020).

Oyun tasarımı faaliyetlerinin öğrenci gelişimini farklı açılardan desteklediğini, özellikle problem çözme, yaratıcı düşünme ve işbirliği algıları üzerine olumlu bir etkisi olduğu belirten çalışmalara rastlamak mümkündür (Erümit vd., 2020; Hava vd., 2020; O'Grady-Jones ve Grant, 2023). Kullanılan farklı oyun tasarım araçlarının özellikleri farklı öğrenme deneyimleri sunabilmektedir. Örneğin, 3 boyutlu(3B) bir çalışma aracı olan MS kodu kullanılarak yapılan bir çalışmada, MS Kodu 3B görüntü desteği ÜY öğrenciler tarafından beğenilmiştir (Toklu, 2019). Fakat dışardan nesne alınamaması, harici oyun zemini yüklenememesi, görsel yüklenememesi gibi nedenlerin bu platformda ileri düzey oyun tasarımının mümkün olmadığına işaret etmektedir (Hava vd., 2020; Toklu, 2019). Lise seviyesinde öğrenim görmekte olan ÜY öğrencilerle yapılan ve Scratch programı ile yürütülmüş bir diğer çalışmada ise farklı algoritmaları verilen matematiksel projeler yerine, Packman oyunu tasarlamanın ve kodlamanın öğrencilerin motivasyonunu ve derse katılım oranını arttırmaktadır (Erümit vd., 2020).

Bir oyunda bulunması gereken temel unsurların ve oyun kategorisini belirleyen özelliklerin bilinmesi oyun tasarlama sürecini olumlu yönde etkileyebilir. Alanyazında oyunların on tanımlayıcı özelliği vurgulanmaktadır. Bunlar, rekabet, zorluk, keşfetme, fantezi, hedefler, etkileşim, sonuçlar, kişiler, kurallar ve güven ortamı olarak sıralanabilir (Whitton, 2009). Ayrıca oyunlar tür olarak da macera (adventure), platform, bulmaca(puzzle), rol yapma(role play), nişancı(shooter), spor ve strateji olarak sınıflandırılmaktadır (Whitton, 2009). Özetle oyunların sahip olması gereken unsurları ortaya koyulurken hangi sınıfa girebileceği de Whithon (2009) tarafından belirtilmiştir. Yapılan bir oyunda yaratıcılık unsurlarının bilinmesi de önem arz etmektedir. Yaratıcılık, başkaları tarafından çözülen problemlerin farklı yöntemlerle çözülmesi ile orijinal ve yeni ürünler çıkarmak için ortaya koyulan yetenek olarak tanımlanmaktadır (Parkhurst, 1999). Finke vd.(1996)'ye göre yaratıcılık boyutunda ürünün değerlendirilmesi önemlidir ve özgünlük, işlevsellik, üretkenlik, esneklik, uygulanabilirlik, kapsayıcılık ve iç görü gibi boyutlarda değerlendirilmesi gerektiğini vurgulamaktadır.

Bu çalışmada, üstün yetenekli öğrencilerin Unity adlı oyun platformunda oyun tasarlama ve geliştirme süreçlerine odaklanılmıştır. Çalışmanın araştırma soruları şu şekildedir:

1. ÜY öğrencilerin hazırladıkları senaryolarda tanımlayıcı unsurlar nasıl şekillenmektedir?
2. ÜY öğrencilerin hazırladıkları senaryolardaki yaratıcı öğeler nelerdir?

Yöntem

Nitel bir çalışma deseni olan durum çalışması modelinden faydalanılmıştır. Durum çalışması tek bir duruma odaklanarak olayın derinlemesine ve boylamsal incelendiği bir yöntemdir (Davey, 1991). Buna göre

araştırmada, üstün yetenekli (ÜY) öğrencilerin(*n*=7), Unity adlı 3B oyun platformu için hazırlayacakları oyun senaryolarının içeriği analiz edilmiştir. Bu ÜY öğrenciler belirli tanımlamaları ve yetenekleri doğrultusunda bilişim teknolojileri ve yazılım (BTY) alanında özel yetenekleri geliştirme(ÖYG) programına yönlendirilmiş öğrencilerdir. Bu programda iki öğretim döneminde BTY alanında derslere katıldıktan sonra bu çalışmaya gönüllü olarak dahil olmuşlardır. Bu öğrencilerin ortak geçmiş deneyimlerine bakıldığında, python, C++, html gibi kodlama dillerini kullandığı bilinmektedir. Ayrıca photoshop, after effects, camtasia gibi bilişim araçlarını kullanma eğitimleri almışlardır. Her biri daha önce pygame, mblock, scratch gibi platformlarda en az bir oyun tasarlamışlardır. Bu öğrenciler kademe olarak 8. sınıf öğrencilerinden oluşmaktadır. Araştırma öncesinde öğrencilere, Unity adlı 3B oyun platform hakkında 16 haftalık bir eğitim verilmiştir. Bu eğitimlerin ardından Unity platformunda 3B oyun tasarlamaları için oyun senaryo oluşturmaları istenmiştir. Senaryolar öğrencilerden yazılı olarak alınmıştır. ÜY öğrencilerden alınan bu senaryolar, içerik analizi yöntemi kullanılarak çözümlenmiştir. Senaryolar, Whitton (2009)'un tanımladığı bir oyunda olması gereken on temel unsura referans alınarak kodlanmıştır. Bu senaryoların hangi oyun türüne dâhil olduğu, Whitton (2009)'un sınıflandırdığı oyunun türlerine göre belirlenmiştir. Senaryoların yaratıcılık boyutu Finke vd.(1996)'nin yapılandırdığı yedi başlık altında incelenmiş ve buna göre değerlendirilmiştir.

Bulgular

Çalışmada ÜY öğrencilerin hazırladıkları senaryolarda tanımlayıcı unsurların nasıl şekillendiği incelenmiştir. Buna göre ifadelerin temaları ve kodlarının frekansları Tablo 2'de yer almaktadır. Oyun türlerinin de üç ana başlıkta toplandığı görülmektedir. Yazılan senaryolara göre oyun türlerinin, platform(*n*=3), macera(*n*=2), spor(*n*=2) alanlarında olduğu görülmektedir.

Oyunların on tanımlayıcı unsuru (Whitton, 2009) öğrenciler tarafından yazılan tüm oyun senaryolarının içeriğinde yer almaktadır. Senaryolarda en çok zorluk (*n*=10) kategorisinden bahsedilirken, bu kategoride yer alan engeller (*n*=7), tüm oyunlarda yer alan bir unsur olarak ön plana çıkmaktadır. Örneğin;

> "Başlangıçta birkaç farklı yol olacak ve bazı yollar diğer yollara göre daha zorlu olacak. Oyuncu duvara değdiğinde oyunun en başında gönderilecektir" (K7),

cümlesiyle K7, oyunun zorluk kısmından ve engellerden bahsetmiştir. Diğer yandan kurallarda bahsedilen açık talimatlar(*n*=8) ve nesneler (*n*=7) ile etkileşim en sık bahsedilen unsurlardır. Örneğin;

> "Oyunumuzdaki maymunumuz ormanda etrafta dolaşacak. Ormandaki muzları toplayacak, her toplanan muz için bir tokluk puanı olacaktır. Yeterli muz topladığında ve tokluk puanlarının hepsini kazandığında oyun kazanılmış olacaktır" (K1)

şeklinde senaryoların detaylandırıldığı görülmektedir. Klavye yönetimi (*n*=7) her senaryoda yer alan bir unsur olarak ön plana çıkmaktadır. Örneğin,

> "Oyun yön tuşlarıyla ve W,A,S,D tuşlarıyla oynanabilir." (K7)

şeklindeki benzer açıklamalar rastlanılmaktadır. Nesnelerle (*n*=7) veya kişilerle (*n*=1) olan etkileşimde dünyanın ve oyuncunun nasıl etkileneceği çoğu senaryoda belirtilmiştir. Nesne ve oyuncu etkileşiminin açıklandığı her iki durumu da içeren bir alıntı K6'nın yaptığı gibidir.

> "Kırmızı oyuncu W,A,S,D tuşlarıyla hareket edecek ve Q tuşuyla topa vuracak; mavi oyuncu ise yukarı ok, aşağı ok, sağ ok, sol ok tuşlarıyla hareket edip boşluk tuşuyla topa vuracaktır." (K6)

Sonuçlar, puan tablosu(*n*=6) ve ilerleme çubuğu (*n*=1) olarak çözümlenmiştir. Puan tablosuna örnek olarak;

> "Skor tabelasına puanlar eklenecektir." (K3),

ilerleme çubuğuna örnek olarak;

> "İlerlediğimiz mesafe arttıkça yukarıdaki ilerlenen mesafe adlı değişkenin sayısı artacaktır. Yani, 150 birim ilerlediysek, ilerlenen mesafe: 150 m yazacaktır" (K6),

şeklinde açıklamalar yer almaktadır.

Tablo 2. Oyunların Tanımlayıcı Öğeleri

Tema	Kod	Alt Kodlar	*f*	*tf*
Tanımlayıcı Öğeler	Rekabet	Rakip ile mücadele	1	1
	Zorluk	Engeller	7	10
		Seviye	3	
	Keşfetme	Oyun Alanında Gezinme	6	6
	Fantastik Araçlar	Çevre	1	4
		Nesneler	0	
		Oyuncular	1	
		Senaryo	2	
	Hedefler	Yolu tamamlama	6	6
	Etkileşim	Nesneler	7	8
		Kişiler	1	
	Sonuçlar	Puan tablosu	6	7
		İlerleme Çubuğu	1	
	Kişiler	Eş Zamanlı Kişiler	1	1
	Kurallar	Açık Talimatlar	7	8
		Örtük Talimatlar	1	
	Güven	Gerçek hayatı etkilemeyen	7	7
		Gerçek hayatı etkileyen	0	

Özetle, tanımlayıcı unsurların senaryolardaki toplam frekansına bakıldığında 52 kez geçtiği görülmektedir. Bu sonuçlar yazılan senaryoların oyun olma aşamasında alanyazındaki tanımlayıcı on temel unsuru barındırdığını göstermektedir. Bu temel unsurlardan biri olan ve farklı kullanıcıların deneyimlerine göre değişen zorluk (Whitton, 2009) kavramı, her senaryoda barınmaktadır. Kullanıcıların ne gibi engellerle karşılaşacağı, neler yapması gerektiği açık talimat halinde verilmiştir. Hedefler, puan tablosu, etkileşim gibi unsurlar hemen hemen her senaryoda bahsedilen öğeler arasında yer almaktadır.

Diğer yandan senaryolar içinde yaratıcı fikirler ön plana çıkmaktadır. Örneğin nesli tükenmekte olan Bonomo Maymunundan bahseden K1, doğanın ve hayvanların korunması gerektiği temasıyla oyuncunun bu hayvanın yerine koyması ile empati kurabileceği bir oyun senaryosu yazmıştır. Aynı tema ile oyunun ana karakterini Chikipie(Çikipi) adındaki tavuk olarak nitelendiren K6, özgün bir isim kullanmış, yolda gezen hayvanların ezilmemesi adına bir empati kurgulamıştır. Trafik kurallarını öğretmede eğlenceli bir yol sunmayı denemiştir. İki kişilik futbol oyunu yapan K3, Türk futbol takımlarından seçim yapabilme imkanı oluşturması ve yerli seslendirmeler ile oyununu kendine özgün öğeler ile betimlemiştir. K4'ün yazdığı platform oyunu, kendisinin de senaryoda belirttiği gibi problem çözme ile bölümlerin geçilebileceğini dile getirmiştir. Bu hedefleri ile platform, strateji ve bulmaca(puzzle) oyunları arasında olan farklı bir model ortaya koymaktadır. K2'in yaptığı platform oyunu bir yandan labirentleri geçme hedefleri üzerine kurgulanmış olsa da, futbol ile ilişkilendirilmiş bölümleriyle özgün bir yapı ortaya koymaktadır. K7'nin yaptığı oyun senaryosu alışagelmiş bir macera oyunu olarak nitelendirilebilir. Ancak öğrencinin bilgisayar faresi ile yönetilebilen bir yörünge ayarını daha önceden

öğrenmemiş olmasına rağmen böyle bir fikri ortaya koyabilmesi yine yaratıcı bir unsur olarak nitelendirilebilir. Aynı şekilde K1, bu yörünge ayarını kendi oyunu için de kurguladığı görülmektedir.

Sonuçlar

Çalışmada, üstün yetenekli öğrencilerden, Unity adlı üç boyutlu oyun platformunda tasarlayabilecekleri oyunların senaryolarını yazmaları istenmiştir. Elde edilen bulgulara göre ÜY öğrenciler bir oyunda bulunması gereken tanımlayıcı unsurları yazılan senaryolarda ortaya koyduğu görülmektedir. Diğer yandan özgün fikirler geliştirerek yaratıcı fikirlerini ön plana çıkarabildikleri görülmektedir. Bu bulgular özel yetenekleri geliştirme (ÖYG) programlarından biri olan bilişim teknolojileri ve yazılım (BTY) dersinde, öğrenim görmekte olan ÜY öğrencilerinin ileri düzey konularda öğrenim görebileceğine işaret etmektedir. MEB (2021)'in yayınladığı bilim ve sanat merkezleri bilişim teknolojileri ve yazılım dersi öğretim programı, üst düzey, kavramsal anlamda zorlayıcı, derinlemesine çeşitli ve kompleks içerikler barındırmaktadır. Buna göre ÜY öğrencilerin yaratıcı, eleştirel, analitik düşünme gibi ileri düşünme ve bağımsız araştırma becerilerinin gelişimini hedeflemektedir. Bu bağlamda ÜY öğrencilerin ileri düzey konularda ürün ortaya koyabilmeleri ve yaratıcılıklarını ön plana çıkarabileceği çalışmalar, hem eğitim politikasının ihtiyacı (MEB, 2021) hem de öğrencilerin öğrenim ihtiyacı (Öngöz ve Aksoy, 2015) olarak ortaya çıkmaktadır. Bu nedenle ÜY öğrencilerin üst düzey becerilerini zorlayabileceği öğrenim ortamlarında, bu alanda katkı sağlayan çalışmalar, önem arz etmektedir. Alanyazındaki çalışmalara bakıldığında, ÜY öğrenciler ile bu bağlamda yapılan çalışmaların sınırlı olduğu görülmektedir. Her ne kadar ÜY öğrenciler ile 3B oyun ortamlarında yapılan çalışmalara (Hava vd., 2020; Toklu, 2019) rastlanılmış olsa da, bu çalışmaların bulgularında MS Kodu veya Kodu Game Lab gibi oyun platformlarının özgün içerik koymakta sınırlayıcı olduğu görülmektedir. Mevcut çalışmada ise bu sınırlandırıcılığı ortadan kaldırarak özgün bir çalışma ortamı sunabilen ve C# programlama dili ile kodlanabilen Unity (2023), araç olarak kullanılmıştır. Bu bağlamda Unity ile öğrencilerin oyun tasarımlarına yaratıcılık katmaları ve kurguladıkları algoritmaları hayata geçirmeleri kolaylaştırılmaya çalışılmıştır. ÜY öğrencilerin senaryoları analiz edildiğinde bir oyunda olması gereken temel unsurlarla birlikte yaratıcı öğelere de rastlanılmıştır. Bu sonuçlar, ÜY öğrenciler ile ciddi oyunlar tasarlama gibi ileri düzey benzer çalışmaların yürütülebileceği göstermektedir. Senaryoların oyuna dönüştürülme süreci devam ettiği için çalışmanın bulguları burada verilenlerle sınırlı kalmıştır.

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Uzaktan Öğrenmede Dijital Çelinme: Yükseköğretim Düzeyinde Bir Çalışma

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Özet

Alanyazında "Digital Distraction" olarak geçen ve dijital dikkat dağınıklığı olarak bilinen "Dijital Çelinme" kavramı; öğrenenin dikkatinin asıl odaklanılan içerikten, ortamdan aklını çelen dijital araçlara yönelmesi durumudur (Vermaat ve diğ., 2017). Uzaktan eğitim derslerinde öğrenenler, telefon, bilgisayar, tablet gibi dijital araçlarını öğrenme ortamına dahil edebilmektedir. Özellikle, uzaktan eğitim dersine kişisel bilgisayarından katılan öğrenenler, ders esnasında yanlarında telefon veya tablet benzeri dijital araçları bulundurabilmektedir. Öğrenenin derse katılım sağladığı bilgisayardan veya öğrenme ortamına dahil ettiği dijital araçlardan gelen bildirimler onun dikkatini dağıtabilmektedir. Diğer yandan dijital araçların kullanımının yaygınlaşması ile birlikte dijital bağımlılık konusu da önemli bir araştırma konusu haline gelmiştir. Dolayısıyla üniversite öğrencilerinin uzaktan eğitim derslerindeki dijital çelinme durumları ile dijital bağımlılık düzeyleri arasında bir ilişki olabileceği ve bu esnadaki dijital çelinme durumlarının, dijital bağımlılık ve akıllı telefona bağlı dikkat dağınıklık düzeylerine göre nasıl olduğunun belirlenmesi önemlidir. Bu çalışmada, üniversite öğrencilerinin dijital bağımlılıkları ile akıllı telefona bağlı dikkat dağınıklıkları arasındaki ilişki araştırılmıştır. Çalışmada nicel araştırma modellerinden ilişkisel tarama modeli kullanılmıştır. 2023-2024 eğitim öğretim yılında Ege Üniversitesi Eğitim Fakültesi'nin tüm bölümlerinden toplamda 717 öğrenci çalışmaya dahil edilmiştir. Araştırmada; ilk aşamada, içerisinde dijital çelinme durumlarına yönelik anket soruları da içeren kişisel bilgi formu, ardından "Akıllı Telefona Bağlı Dikkat Dağınıklığı Ölçeği", son olarak da "Dijital Bağımlılık Ölçeği" kullanılmıştır. Araştırmada yüz yüze, kağıt üzerinde elde edilen veriler betimsel istatistiklerden, t-testi, tek yönlü varyans analizi (ANOVA), korelasyon analizi, aritmetik ortalama, standart sapma, yüzde ve frekanslardan yararlanılarak çözümlenmiştir. Uzaktan eğitim derslerinde dijital araçlarından bildirim gelmesi durumunda katılımcıların %4'ü hiçbir zaman, %11,2'si nadiren, %22,5'i ara sıra, %38,2'si, çoğunlukla, %24,1'i her zaman dikkatinin dağıldığını belirtmiştir. Analizler sonucunda, katılımcıların dijital bağımlılık düzeyleri ile akıllı telefona bağlı dikkat dağınıklığı düzeyleri arasında anlamlı bir ilişki bulunmuştur. Dijital bağımlılık ve akıllı telefona bağlı dikkat dağınıklığı düzeyleri için, cinsiyete, bölüme, sınıfa, yaşa göre anlamlı bir ilişki bulunmamıştır. Dijital bağımlılık ve akıllı telefona bağlı dikkat dağınıklığı düzeyleri için, uzaktan eğitim deneyimini "düşük" olarak belirtenler ile "yüksek" olarak belirtenler arasında anlamlı bir ilişki bulunmuştur. Çalışmanın dijital çelinme ile ilgili alan yazına katkı sağlaması ve dijital çelinmenin önlenmesi konusunda yol gösterici olması beklenmektedir.

Anahtar Kelimeler: Dijital çelinme, uzaktan eğitim, akıllı telefon, dijital dikkat dağınıklığı, dijital bağımlılık.

Digital Distraction in Distance Learning: A Study at Higher Education Level

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Abstract

Digital distraction is when the learner's attention is diverted from the actual content and environment to digital tools that distract the learner (Vermaat et al., 2017). In distance education courses, learners can include their digital devices such as phones, computers and tablets in the learning environment. In particular, learners who attend the distance education course from their personal computers may have digital devices such as phones or tablets with them during the course. Notifications coming from the computer on which the learner participates in the lesson or from the digital tools that the learner includes in the learning environment can distract him/her. On the other hand, with the widespread use of digital tools, digital addiction has become an important research topic. Therefore, it is important to determine that there may be a relationship between university students' digital distraction in distance

education courses and their digital addiction levels and how their digital distraction during this time is according to their digital addiction and smartphone distraction levels. In this study, the relationship between university students' digital addiction and smartphone distractions was investigated. A total of 717 students from all departments of Ege University Faculty of Education in the 2023-2024 academic year were included in the study. In the study; in the first stage, a personal information form including questionnaire questions about digital distraction, then the "Smartphone Distraction Scale" and finally the "Digital Addiction Scale" were used. The data obtained face-to-face and on paper were analyzed using descriptive statistics, t-test, one-way analysis of variance (ANOVA), correlation analysis, arithmetic mean, standard deviation, percentage and frequencies. In case of notifications from their digital devices in distance education courses, 4% of the participants stated that they were never distracted, 11.2% rarely, 22.5% occasionally, 38.2% mostly, 24.1% always. As a result of the analyzes, a significant relationship was found between the participants' digital addiction levels and smartphone-related distraction levels. No significant relationship was found for digital addiction and smartphone-related distraction levels according to gender, department, grade and age. For the levels of digital addiction and smartphone-related distraction, a significant relationship was found between those who stated their distance education experience as "low" and those who stated their distance education experience as "high". The study is expected to contribute to the literature on digital distraction and provide guidance on the prevention of digital distraction.

Keywords: Digital distraction, distance education, smartphone, digital addiction.

Giriş

Alanyazında "Digital Distraction" olarak geçen ve dijital dikkat dağınıklığı olarak bilinen "Dijital Çelinme" kavramını Kurt ve diğerleri (2021) Türkçe alanyazına kazandırmıştır. Eğitimde "Dijital Çelinme" kavramı; öğrenenin dikkatinin asıl odaklanılan içerikten, ortamdan aklını çelen dijital araçlara yönelmesi durumudur (Vermaat ve diğ., 2017). Dijital çelinmeye sebep olabilecek birçok durum vardır. Öğrenenin, uzaktan öğrenme dersine bilgisayarından katılım sağladığını düşünürsek, ders sırasında bilgisayarından işletim sistemi güncelleme bildirimi ya da e-posta bildirimi gelmesi veya tabletinden katılım sağladığı sırada telefonundan mesaj ya da arama gelmesi dijital çelinme örnekleridir. Kuncoro ve diğ. (2023) dijital çelinmenin öğrenme çıktılarına ulaşmayı engelleyen faktörlerden biri olabileceği sonucuna varmıştır.

Dijital çelinme, eğitimin her aşamasında maruz kalınabilecek bir durumdur. Eğitimin yüz yüze ya da uzaktan olması, eşzamanlı ya da eşzamansız olması fark etmeksizin öğrenen dijital çelinmeye maruz kalabilir. Ateş-Çobanoğlu ve diğ. (2023) çevrimiçi öğrenmenin verimliliği için dijital çelinmenin önemli bir konu olduğunu belirtmiştir. Göl ve diğ. (2023) yaptıkları çalışmada, eşzamanlı bir derse odaklanmak yerine daha sonra dersin kaydını izleyenlerde dijital çelinme düzeyinin daha yüksek olduğu sonucuna varmıştır. Dijital çelinme kaynağı olan dijital araçlar, uzaktan öğrenmenin yaygınlaşması ile birlikte derse girmede zorunlu bir araç olarak karşımıza çıkmaktadır. Dijital araçlar, yüz yüze öğrenmede ek bir araçken uzaktan eğitimde zorunlu bir araç konumuna gelmiştir.

Günümüzde dijital araçların yaygınlaşması ile dijital bağımlılık da tartışma ve araştırma konusu haline gelmiştir. Dijital çelinmenin nedenlerinden olan bildirimler bilgisayar, tablet, telefon gibi birçok dijital araçtan birçok kez gelebilmektedir. COVID-19 pandemisi ile birlikte internetin ve dijital araçların kullanım oranları hızla yükselmiş ve kontrolsüz kullanımı dijital bağımlılığın artması açısından bir risk oluşturmuştur (Öztürk, 2021). Bu nedenle öğrenenlerin uzaktan öğrenmede dijital çelinme durumları, dijital bağımlılık düzeyleri, akıllı telefona bağlı dikkat dağınıklık düzeyleri incelenmiştir. Dijital bağımlılık ile akıllı telefona bağlı dikkat dağınıklığı arasında bir ilişki olabileceği ve dijital çelinme durumlarının ortaya çıkarılmasının önemli olduğu düşünülmüştür.

Yöntem

Araştırma Modeli

Nicel bir araştırma olan bu çalışmada tarama modellerinden tekil ve ilişkisel tarama modeli kullanılmıştır.

Evren ve Örneklem

Araştırmanın evreni yükseköğretim düzeyinde olan 2023-2024 eğitim öğretim yılında öğrenim gören Ege Üniversitesi Eğitim Fakültesi öğrencilerdir. Ege Üniversitesi Eğitim Fakültesi'nde toplam yaklaşık 2200 öğrenci bulunmaktadır. Güvenirlik seviyesi %95, hata payı %5 olarak alınmıştır. Bu doğrultuda en az 328 öğrencinin katılımı gerekmektedir. Ege Üniversitesi Eğitim Fakültesi öğrencilerinden oluşan toplamda 717 kişiden (%32,6) veri toplanmıştır.

Veri Toplama Araçları

Araştırmada üç adet veri toplama aracı kullanılmıştır. İlk olarak *kişisel bilgi formu*, daha sonra *dijital bağımlılık ölçeği* ve son olarak *akıllı telefona bağlı dikkat dağınıklığı ölçeği* uygulanmıştır.

Kişisel Bilgi Formu

Toplam 14 maddeden oluşan kişisel bilgi formunda öğrencilerin cinsiyetleri, yaşları, sınıf düzeyleri, okudukları bölüm bilgileri bulunmaktadır. Öğrencilerin uzaktan eğitim derslerinde dijital çelinmeyle ilgili sorular da yer almakta ve konuyla ilgili açık uçlu bir soru eklenmiştir.

Dijital Bağımlılık Ölçeği

Araştırmada, Kesici ve Tunç (2018) tarafından hazırlanan Dijital Bağımlılık Ölçeği kullanılmıştır. Ölçek 5 boyutludur ve 19 maddeye sahiptir. "1= Kesinlikle Katılmıyorum", "2=Katılmıyorum", "3=Kararsızım", "4=Katılıyorum" ve "5=Tamamen Katılıyorum" aralığında derecelendirilen beşli likert tipinde bir ölçek olup en fazla 95, en az 19 puan alınabilen bir ölçektir.

Akıllı Telefona Bağlı Dikkat Dağınıklığı Ölçeği

Araştırmada, Throuvala ve arkadaşları (2021) tarafından hazırlanan ve Bilge ve arkadaşları (2022) tarafından Türkçe'ye uyarlaması yapılan Akıllı Telefona Bağlı Dikkat Dağınıklığı Ölçeği kullanılmıştır. Ölçek 4 boyutludur ve 16 maddeye sahiptir. "1=Hiçbir zaman", "2=Nadiren", "3=Ara sıra", "4=Çoğunlukla" ve "5=Her zaman" aralığında derecelendirilen beşli likert tipinde bir ölçek olup en fazla 80, en az 16 puan alınabilen bir ölçektir. Dijital çelinmeye neden olabilecek en temel boyutlardan biri akıllı telefon boyutu olması nedeniyle bu ölçek kullanılmıştır.

Verilerin Analizi

Yüz yüze ortamda toplanan, kâğıt üzerinde elde edilen veriler öncelikle istatistiksel analiz programına girilmiştir. Daha sonra veriler, betimsel istatistiklerden, t-testi, tek yönlü varyans analizi (ANOVA), korelasyon analizi, aritmetik ortalama, standart sapma, yüzde ve frekanslardan yararlanılarak çözümlenmiştir.

Bulgular

Kişisel Bilgi Formu Bulguları

Uzaktan Eğitime Katılma Deneyimi

Kişisel bilgi formu içerisindeki "Uzaktan eğitime katılma durumunuzu belirtiniz" maddesinde, katılımcıların %3,1'i "Hiç", %18,7'si "Düşük", %50,8'i "Orta", %27'si "Yüksek" olarak belirtmiştir.

Tablo 1. Katılımcıların Uzaktan Eğitime Katılma Deneyimi.

	Hiç	Düşük	Orta	Yüksek	Toplam
F	22	134	364	194	714
%	3,1	18,7	50,8	26,9	99,6

Dijital Araçların Uzaktan Eğitim Sürecinde Kullanımı

Kişisel bilgi formu içerisindeki "Uzaktan eğitim sürecinde kullandığınız araçları işaretleyiniz" maddesinde katılımcılar birden fazla dijital aracı seçebilmektedir. Uzaktan eğitim sürecinde akıllı telefonun kullanım oranı %83, bilgisayarın kullanım oranı %70,4, tabletin kullanım oranı %14,9, diğer araçların kullanım oranı %1 olarak belirtilmiştir.

Tablo 2. Dijital Araçların Uzaktan Eğitim Sürecinde Kullanım Durumları.

	Akıllı telefon	Bilgisayar	Tablet	Diğer
F	594	504	107	7
%	83	70,4	14,9	1

Dijital Araçların Uzaktan Eğitim Dersinde Sessize Alınması

Kişisel bilgi formu içerisindeki "Uzaktan eğitim dersinde dijital araçlarımı (telefon, bilgisayar, tablet vb.) sessize alırım." maddesinde katılımcılar sıklık derecesine göre "Hiçbir Zaman" (%11,9), "Nadiren" (%18,3), "Ara Sıra" (%25,5), "Çoğunlukla" (%27,1), "Her Zaman" (%17,2) seçeneklerinden birini işaretlemiştir.

Tablo 3. Uzaktan Eğitim Sürecinde Katılımcıların Dijital Araçlarını Sessize Alma Durumları.

	Hiçbir Zaman	Nadiren	Ara Sıra	Çoğunlukla	Her Zaman	Toplam
F	85	131	183	194	123	716
%	11,9	18,3	25,5	27,1	17,2	99,9

Uzaktan Eğitim Dersinde Dijital Araçlardan Gelen Bildirimin Katılımcıların Dikkatini Dağıtması

Kişisel bilgi formu içerisindeki "Uzaktan eğitim dersinde dijital araçlarımdan bildirim gelmesi dikkatimi dağıtır." maddesinde katılımcılar sıklık derecesine göre "Hiçbir Zaman" (%4), "Nadiren" (%11,2), "Ara Sıra" (%22,5), "Çoğunlukla" (%38,2), "Her Zaman" (%24,1) seçeneklerinden birini işaretlemiştir.

Tablo 4. Uzaktan Eğitim Sürecinde Katılımcıların Dijital Araçlarından Gelen Bildirimin Dikkatlerini Dağıtma Sıklıkları.

	Hiçbir Zaman	Nadiren	Ara Sıra	Çoğunlukla	Her Zaman	Toplam
F	29	80	161	274	173	717
%	4	11,2	22,5	38,2	24,1	100

Uzaktan Eğitim Dersinde Dijital Araçlardan Gelen Bildirimin Katılımcıların Dikkatini Dağıtması Sonrası Dijital Araçlarla İlgilenilme Durumu

Kişisel bilgi formu içerisindeki "Uzaktan eğitim dersinde dijital araçlarım sebebiyle dikkatim dağılırsa dijital araçlarımla ilgilenmeye başlarım." maddesinde katılımcılar sıklık derecesine göre "Hiçbir Zaman" (%6), "Nadiren" (%24,8), "Ara Sıra" (%35,7), "Çoğunlukla" (%23,8), "Her Zaman" (%9,2) seçeneklerinden birini işaretlemiştir.

Tablo 5. Uzaktan Eğitim Sürecinde Katılımcıların Dijital Araçlarından Gelen Bildirimin Dikkatlerini Dağıtması Sonrasında Katılımcıların Dijital Araçlarıyla İlgilenme Sıklıkları.

	Hiçbir Zaman	Nadiren	Ara Sıra	Çoğunlukla	Her Zaman	Toplam
F	43	178	256	171	66	714
%	6	24,8	35,7	23,8	9,2	99,6

Uzaktan Eğitim Dersinde Katılımcıların Dikkati Dijital Araçlar Sebepli Dağılmasa da Dijital Araçlarla İlgilenilme Durumu

Kişisel bilgi formu içerisindeki "Uzaktan eğitim dersinde dijital araçlarım sebebiyle dikkatim dağılmasa da dijital araçlarımla ilgilenirim" maddesinde katılımcılar sıklık derecesine göre "Hiçbir Zaman" (%15,2), "Nadiren" (%36,8), "Ara Sıra" (%27,9), "Çoğunlukla" (%12,8), "Her Zaman" (%6,6) seçeneklerinden birini işaretlemiştir.

Tablo 6. Uzaktan Eğitim Sürecinde Katılımcıların Dikkati Dijital Araçlar Sebepli Dağılmasa da Katılımcıların Dijital Araçlarıyla İlgilenme Sıklıkları.

	Hiçbir Zaman	Nadiren	Ara Sıra	Çoğunlukla	Her Zaman	Toplam
F	109	264	200	92	47	712
%	15,2	36,8	27,9	12,8	6,6	99,3

Tablo 7. Uzaktan Eğitim Sürecinde Katılımcıların Dikkati Dijital Araçlar Sebepli Dağılmasa da Katılımcıların Dijital Araçlarıyla İlgilenme Sıklıkları.

	Hiçbir Zaman	Nadiren	Ara Sıra	Çoğunlukla	Her Zaman	Toplam
F	109	264	200	92	47	712
%	15,2	36,8	27,9	12,8	6,6	99,3

Dijital Bağlımlılık Ölçeği ve Akıllı Telefona Bağlı Dikkat Dağınıklığı Ölçeği Bulguları

Dijital Bağımlılık Ölçeği ve Akıllı Telefona Bağlı Dikkat Dağınıklığı Ölçeği Toplam Puanlarının İlişkisi

Dijital bağımlılık ölçeği toplam puanları (Cronbach alfa: .884) ile akıllı telefona bağlı dikkat dağınıklığı ölçeği (Cronbach alfa: .868) toplam puanları arasında anlamlı bir ilişki bulunmuştur (r=.626; p<.001).

Uzaktan Eğitim Deneyimi ile Dijital Bağımlılık Ölçeği ve Akıllı Telefona Bağlı Dikkat Dağınıklığı Ölçeği Toplam Puanları Arasındaki İlişkisi

Dijital bağımlılık ölçeği toplam puanları raporlanan uzaktan eğitim deneyimi durumlarına göre farklılaşmaktadır ($F_{(3, 709)}$=4,682; p<.001). Farklılaşmanın kaynağı Scheffe post hoc testi ile incelendiğinde uzaktan eğitim deneyimi düşük ve yüksek olan gruplar arasında anlamlı farklılaşma gözlenmiştir. Benzer şekilde akıllı telefona bağlı dikkat dağınıklığı skorlarının da raporlanan uzaktan eğitim deneyimi durumlarına göre farklılaştığı bulunmuştur ($F_{(3, 703)}$=3,857; p<.001). Scheffe izleme testi ile gerçekleştirilen analizlerde farklılaşmanın yüksek ve düşük gruplar arasında gözlendiği belirlenmiştir (p<.05).

Sonuçlar

Elde edilen bulgulara göre öğrenenler uzaktan eğitim süreçlerinde akıllı telefonu %83, bilgisayarı %70,4, tableti %14,9 oranında kullanmaktadır. Bu durumda uzaktan eğitim süreçlerine destek olması açısından geliştirilecek teknoloji ve uygulamaların özellikle akıllı telefon ve bilgisayara uyumlu olarak geliştirilmesi gerektiği söylenebilir. Öğrenenler, uzaktan eğitim derslerinde dijital araçlarını en az %30,2 oranında nadiren sessize almaktadır. Bu durumda öğrenenlerin dijital araçlarını uzaktan eğitim derslerinde sessize almalarına yönelik uyarılar yapılabilir, bu konuda farkındalık ve bilinç oluşturmaya yönelik çalışmalar yapılabilir.

Uzaktan eğitim derslerinde dijital araçlardan bildirim gelmesi durumunda öğrenenlerin dikkati en az %62,3 oranında dağılmaktadır. Uzaktan eğitim derslerine katılmada vazgeçilmez bir araç olduğu için dijital araçların öğrenenlerde dijital çelinmeye neden olmasına bir çözüm geliştirilmesi gerekmektedir. Öğrenenler, uzaktan eğitim derslerinde dijital araçlardan bildirim gelmesi sonucu en az %33 oranında dijital araçlarla ilgilenmeye başlamaktadır. Bu oran dijital araçların dijital çelinmeye neden olması faktörü dışarıda bırakıldığında yani öğrenenlerin dijital araçlar sebepli dikkatinin dağılmasa da dijital araçlarla ilgilenme oranı en az %21,4'tür. Bu sonuçlara baktığımızda dijital çelinmenin öğrenenin dijital araçlarla ilgilenmeye yönelmesine katkı sağladığı düşünülebilir. Dolayısıyla dijital çelinme, uzaktan eğitim sürecini olumsuz etkileyebilir.

Ölçek bulgularının analizleri sonucunda, akıllı telefona bağlı dikkat dağınıklığı düzeyleri ile dijital bağımlılık düzeyleri arasında anlamlı bir ilişki bulunmuştur. Ayrıca uzaktan eğitim deneyimini "Düşük" olarak belirtenler ve "Yüksek" olarak belirtenler arasında hem akıllı telefona bağlı dikkat dağınıklığı düzeyi hem de dijital bağımlılık düzeyi açısından anlamlı bir ilişki bulunmuştur. Bulguların ve sonuçların dijital çelinme alanındaki alanyazınına katkı sağlaması ve gelecekte yapılacak çalışmalara yol gösterici olması beklenmektedir.

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Açık ve Uzaktan Öğrenmede Eğitsel Videoların Dönüşümü

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Özet

Eğitsel videolar, akademik konulardan beceri geliştirmeye kadar uzanan farklı bilgilerin kavramların veya becerilerin öğrenilmesini kolaylaştırmak, böylece öğrenen katılımını ve performansını geliştirmek amacıyla tasarlanan, esnek, erişilebilir çokluortam kaynaklarıdır. Eğitsel videolar; hedef kitlenin belirli öğrenme hedeflerine ulaşmasını grafikler, animasyonlar, illüstrasyonlardan oluşan görsel unsurlarla; öğrenenin aktif katılımını sağlayan etkileşim unsurlarıyla; altyazı, transkript, sesli açıklamalarla desteklenen erişilebirlik seçenekleriyle destekleyerek; bilgi, tutum ve davranışın kalıcılığına katkı sağlarlar. Eğitsel videoların kullanımı COVID-19 pandemisi sonrasında teknolojik gelişmelerle yapay zekânın sunduğu olanaklar doğrultusunda artma eğilimi sergilemektedir. Çalışma, SCOPUS veri tabanında bütün alanlarda açık ve uzaktan eğitimde video kullanımını temel alan, eğitsel videoların kullanımına yönelik araştırmaları inceleyerek, eğitsel videoların zaman içindeki değişimini değerlendirmeyi, akıllı teknolojilerin sağladığı dönüşümü keşfetmeyi amaçlamaktadır. Bu bağlamda sistematik literatür taraması yöntemiyle SCOPUS veri tabanında 1976 ile 13 Nisan 2024 tarihleri arasında yayınlanan İngilizce makaleler kapsamlı bir arama dizgesiyle taranarak ulaşılan makaleler incelenmiş ve analizlere dahil edilmiştir. Bulgular, önceden pasif ve tek yönlü eğitim olanağı sunan eğitsel videoların, teknolojideki, öğrenen profilindeki, pedagojideki ve iş dünyasının çalışanlardan beklentilerindeki değişikliklere bağlı olarak öğrenenin aktif katılımını destekleyen, etkileşimli, öğrenme yolunu oluşturmasına olanak sağlayan doğrusal olmayan bir yapıya evrildiğini ortaya koymaktadır. 2020'li yıllarla birlikte algı, aktif katılım, iletişim becerileri, öğrenmeyi öğrenme ve erişilebilirlik seçenekleri önem kazanmaktadır. 2021 ve sonrasında 360^0 videolar, sanal çevreler, video temelli öğrenme, 2022'de yapay zekâ, oyunlaştırma, oyun tabanlı öğrenme, 2023'de video öğrenme, dijital öğrenme, dijital hareket öğrenme; 2024 ile birlikte ise 360^0 videolara bağlı olarak sarmalayan (immersive) video, sarmalayan video teknolojileri, çok yönlü video, küresel video, VR video kavramlarına doğru bir eğilim görülmektedir. Özetle, akıllı teknolojilerdeki kritik paradigma değişiklikleri açık ve uzaktan eğitimi yeniden şekillendirerek, eğitim içeriğinin oluşturulmasında, sunulmasında ve deneyimlenmesinde ortaya çıkan değişimlerle, eğitsel videoların dinamik öğrenme araçları olarak dönüşümünde önemli fırsatlar sunmaktadır.

Anahtar Kelimeler: eğitsel video, eğitici video, 360^0 video, çok yönlü video, sarmalayan (immersive) video, video temelli öğrenme, yapay zeka.

Transformation of Educational Videos in Open and Distance Learning

Abstract

Educational videos are flexible, accessible multimedia resources designed to facilitate learning different information, concepts, or skills ranging from academic subjects to skill development, thus improving learner engagement and performance. Educational videos contribute to the permanence of knowledge, attitudes, and behaviors by supporting the target audience to achieve specific learning objectives with visual elements such as graphics, animations, and illustrations; interaction elements that enable active participation of the learner; and accessibility options supported by subtitles, transcripts, and audio descriptions. The use of educational videos increases in line with the opportunities offered by artificial intelligence with technological developments after the COVID-19 pandemic. The study aims to evaluate the change in educational videos over time and to explore the transformation provided by intelligent technologies by examining the research on the use of educational videos based on the use of video in open and distance education in all fields in the SCOPUS database. In this context, the authors searched for English articles published in the SCOPUS database using the systematic literature review method. They analyzed English articles published between 1977 and April 13, 2024, after due diligence. The findings reveal that educational videos, which previously offered passive and one-way education, have evolved into a non-linear structure that supports the active participation of the learner, interactive, and allows the learner to create a learning path due to changes in technology, learner profile, pedagogy, and the expectations of the business world from employees. In the 2020s, perception, active participation, communication skills, learning to learn, and accessibility options gain importance. In 2021 and beyond, 360-degree videos, virtual environments, and video-based learning; in 2022, artificial intelligence, gamification, and game-based learning; in 2023, video learning, digital learning, and digital motion learning; and in 2024, depending on 360-degree videos, there is a

trend towards immersive video, immersive video technologies, omnidirectional video, global video, VR video concepts. In summary, critical paradigm shifts in intelligent technologies reshape open and distance education and offer significant opportunities for transforming educational videos as dynamic learning tools through changes in educational content creation, presentation, and experience.

Keywords: educational video, 360-degree video, omnidirectional video, immersive video, video-based learning, artificial intelligence.

Giriş

Görsel ve işitsel bir çoklu ortam içeriği olarak videolar, uzun yıllardır hemen hemen her alanda olduğu gibi eğitim alanında da etkili bir öğrenme/öğretme ortamı olarak tercih edilmektedir. Bu bağlamda araştırmanın kapsamı gereği mevcut çalışmada eğitim alanına yönelik hazırlanan eğitsel içerikli video materyalleri üzerinde durulacaktır. Geçmişten günümüze yaklaşık bir asırlık dönem ele alındığında video içerikleri hem yüzyüze öğretim ortamlarında hem de açık ve uzaktan öğrenme ortamlarında önemli bir öğretme/öğrenme ihtiyacını karşılamıştır. Bu süreçte bilgi ve iletişim teknolojilerindeki ilerlemeler dikkate alındığında videolar, gelişmelerden doğrudan etkilenerek öğrenme yaşantılarında eski dönemlere göre giderek daha yaygın ve daha etkili kullanıldığı görülebilir. Önceleri video ortamındaki az kullanım, düşük kalite ve sınırlı etkileşim olanakları XXI. yy'ın ilk çeyreğini yaşadığımız günümüzde sözkonusu ilerlemelerle birlikte yaygın kullanıma, yüksek kaliteye ve daha etkileşimli hale dönüşüm gerçekleştirmiştir. Bu dönüşümü sorgulamak ve gelecek araştırmalara fikir vermek adına gerçekleştirilen bu çalışmada, eğitsel videolar ile ilgili araştırma faaliyetleri ve trendler ortaya çıkarılmış; ayrıca, videoların eğitim/öğretim süreçlerindeki etkileri hakkında araştırma sonuçları değerlendirilmiştir.

Açık ve Uzaktan Öğrenmede Eğitsel Video

Videolar genel olarak hedef kitleye herhangi bir içeriğin sunulmasında ticaret, sağlık, pazarlama, reklam, eğitim gibi birçok alanda kullanılan etkili bir araçtır. Özellikle öğrenme alanında önemli bir yere sahip olan videolar bir eğitsel içerik olarak süreçlerde sıklıkla başvurulan kaynaklar arasındadır. Eğitim amaçlı kullanılan her video aslına bakılacak olursa, bir eğitsel videoyu temsil etmektedir. Bu arada eğitsel videonun, hem görsel materyali (video biçiminde) hem de sözlü materyali (sesli ve/veya ekran metni biçiminde) içerdiğinde bunun bir çoklu ortamla öğretim (Fiorella & Mayer, 2018; s:465) olduğu da alan yazında yer almaktadır. Bir çalışmada eğitsel video, kavramların, fikirlerin ya da bilginin derinleştirilmesi ve anlaşılması yoluyla öğrenmeyi geliştirmek için kullanılan hareketli görsel görüntüler olarak tanımlanırken (Harrison, 2020, s:260); diğer bir çalışmada ise eğitsel video, eğitim ve öğretim amacıyla öncelikli olarak bilgi aktarımında kullanılan, fikirlerin/kavramların açıklanması ve süreçlerin gösterimini içeren bir çoklu ortam olarak ifade edilmektedir (Singh, 2022, s:36).

Geleneksel yüzyüze öğretim ortamlarında ya da açık ve uzaktan öğrenme ortamlarında videolar, görsel ve işitsel kanallar aracılığı ile bir mesajın (konu / içerik) hedef kitleye aktarılmasında elverişli bir ortam sağlar. Hedef kitle, K-12 düzeyinden yüksek öğretim düzeyine kadar hemen hemen her seviyede olabileceği gibi mezuniyet sonrasında yetişkin öğrenen düzeyinde de olabilir. Bu aşamada önemli olan hedef kitlenin öğrenme ihtiyacını karşılayan bir tasarımın videolarda benimsenmiş olmasıdır. Öğrenme ihtiyacını karşılamak, öğrenen memnuniyetini sağlamak ve istenen başarı sonuçlarını elde etmek için uygun eğitim durumlarının oluşturulması önemlidir. Bunun için hedef kitlenin iyi analiz edilmesi ve öğrenme ihtiyacının doğru teşhis edilmesi gereklidir ki, bu da hedeflerin oluşturulmasında belirleyici rol oynar. Castillo vd. (2021)' ne göre videonun etkisinin ders boyunca değerlendirilebilmesi için öğrenme hedefi ölçülebilir bir şekilde tanımlanması gerekir. Öğrenenleri hedeflere taşıyacak olan öğretim yöntemlerinde kullanılmak üzere birçok eğitsel video türü bulunur. Bu video türlerinden uygun olanlar öğrenme hedefine göre öğreten ya da öğrenen tarafından seçilebilir. Videolar ile öğrenme, geleneksel yüzyüze bir sınıf ortamında öğreten rehberliğinde ya da ters yüz edilmiş (flipped classroom) bir yaklaşımla bireysel öğrenme ortamında ya da açık ve uzaktan bir öğrenme ile kendi kendine öğrenme sürecini düzenleyen bir yaklaşımla öğrenenin kendisi tarafından gerçekleştirilebilir. Bu süreçlerde öğreneni istenen hedefe etkili bir şekilde taşıyabilecek bir içeriğin kullanılması, eğitsel senaryonun hazırlanması (Oktay & Yüzer, 2022, s:25-32) önemlidir. Bu video içeriğin oluşturulmasında dolayısıyla videonun üretilmesinde izlenebilecek farklı yaklaşımlar vardır (Di Paolo vd., 2017; Ezell, 2023; Gürses vd., 2023; Hansch vd., 2015; Martin & Martin, 2015). Bu farklı yaklaşımlar aynı zamanda videonun türünün (mikro-video, eğitim videosu, canlı ders videosu, ekran kayıtları, etkileşimli video vb.) belirlenmesinde rol oynar. Hangi video türünün/türlerinin hedefe uygun olduğu ya da süreç sonunda en iyi sonucu verebileceği ise uygulayıcılar (öğreten, öğretim tasarımcısı, araştırmacı) tarafından araştırma kanıtlarına dayalı olarak ortaya çıkarılması ve aynı doğrultuda hareket edilmesi gereken zor bir süreçtir.

Eğitim alanında videolar planlanan hedefler doğrultusunda genel olarak öğrenmenin kolaylaştırılması ya da desteklenmesi gibi farklı amaçlar için kullanılabilmektedir. Koumi (2015, s:6) çalışmasında; videolar ile bilişsel işleyişi kolaylaştırma, gerçekçi deneyimler kazandırma, duyuşsal özellikleri besleme ve becerileri gösterme gibi farklı görevlerin rahatlıkla üstesinden gelinebileceğini vurgulamaktadır. Bir başka çalışmada da videolar, öğrenen

odaklı bir dijital öğrenme deneyiminin parçası olarak kullanıldığında oldukça etkili olabilecek bir araç olduğundan bahsedilmektedir (Köster, 2018, s:126). Görsel ve işitsel bir öğrenme ortamının oluşturulmasında oldukça elverişli bir öğrenme materyali olan videolar, belirlenen hedefler doğrultusunda doğru kullanıldığında etkileyici sonuçlar verebilme potansiyelini taşımaktadır. Sözkonusu potansiyeli oluşturabilen eğitsel videolar incelendiğinde ilgiyi canlı tutması, anlaşılır bilgi sunması, öğrenmeye teşvik etmesi gibi tasarım özelliklerine sahip olduğu görülebilir. Videoların, etkili öğrenme yaşantılarını sunması dolayısıyla öğrenen memnuniyetini sağlaması çoğunlukla planlı ve sistematik bir araştırma sürecini gerektirmektedir. Araştırma sürecinden elde edilen bulgular ise videoların üretimi ile ilgili planlamanın yapılmasında belirleyicidir. Eğitsel videoların üretim aşamaları alanyazında da ifade edildiği üzere prodüksiyon öncesi (pre-production), prodüksiyon (production) ve prodüksiyon sonrası (post-production) şeklinde üç aşamadan oluşmaktadır (Castillo vd., 2021) (Bkz.Tablo 1).

Tablo 1. Eğitsel videoların üretim aşamaları

Prodüksiyon Öncesi (Pre-Production)	Prodüksiyon (Production)	Prodüksiyon Sonrası (Post-Production)
• hedef kitlenin teşhis edilmesi, • problemin tanımlanması, • hem mevcut kaynakların hem de ihtiyaç duyulan kaynakların tespit edilmesi, • içeriğin senaryolaştırılması • ekipman kontrolü (donanım, yazılım, stüdyo vb)	• grafiklerin hazırlanması, • çekimlerin yapılması, • seslendirmenin yapılması • ihtiyaç duyulan kurgulamanın yapılması, • çekimin yayına hazır hale getirilmesi,	• gerekli düzeltmelerin yapılması, • altyazıların eklenmesi, • videonun yayınlanması, • güncellemelerin yapılması • dosyaların depolanması (yedekleme, arşiv vb.) • ekipman bakımı

Akıllı teknolojiler konusunda yaşanan gelişmeler, eğitsel videoların üretimine yönelik yeni bakış açılarıyla birlikte çeşitli kolaylıkları gündeme getirmektedir. Yapay zeka; senaryoyu analiz edip bir storyboard oluşturabilir, doğru kamera açılarını belirleyebilir, ışıklandırmayı ayarlayabilir, görsel efektler kullanabilir ve seslendirme ya da müzik ekleyebilir. Dolayısıyla yapay zekanın ile video üretimi çok daha hızlı ve daha verimli bir şekilde, daha az insan müdahalesiyle gerçekleştirilebilir. Son yıllarda gerçekleştirilen çalışmalar (Leiker vd., 2023; Lim, 2024) yapay zekanın video üretimindeki potansiyeline ve yapay zekanın eğitsel video üretiminde dikkat edilmesi gereken unsurlara odaklanmaktadır.

Bu bilgiler bağlamında çalışma, SCOPUS veri tabanında açık ve uzaktan eğitimde video kullanımını temel alan, eğitsel videoların kullanımına yönelik araştırmaları inceleyerek, eğitsel videoların zaman içindeki değişimini değerlendirmeyi, akıllı teknolojilerin sağladığı dönüşümü keşfetmeyi amaçlamaktadır. Araştırmada yanıt aranacak sorular şu şekildedir:

- Açık ve uzaktan eğitimde eğitsel videoların geçmişten 2024 ilk çeyreğine dek değişimi nasıl değerlendirilebilir?
- Eğitsel videolarda akıllı teknolojiler ne gibi bir dönüşüm ortaya çıkarmıştır?

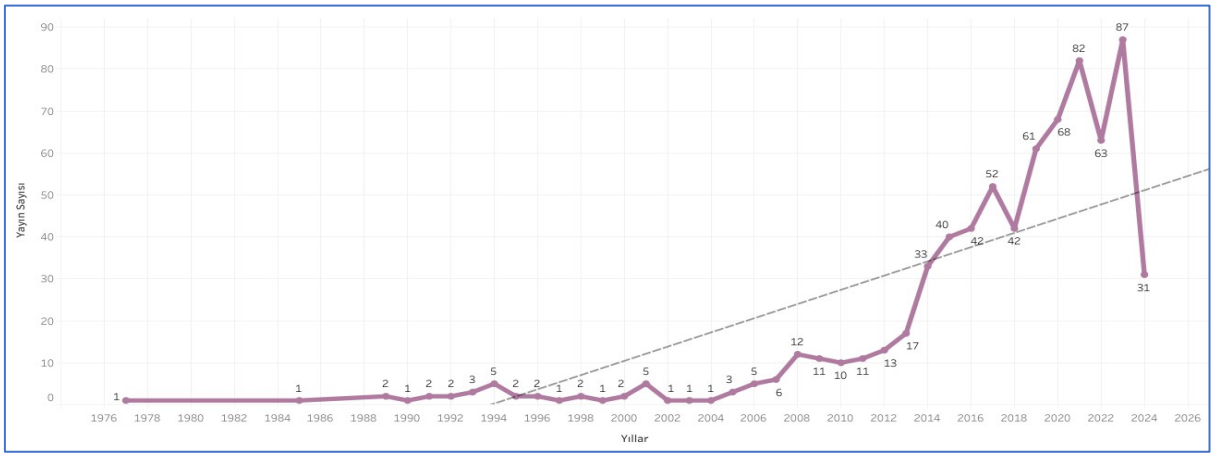
Yöntem

Araştırmanın amacı doğrultusunda araştırma sorularına yanıt bulabilmek için benimsenen yöntem, sistematik tarama yöntemidir. Sistematik inceleme prosedürlerinden PRISMA 2020 Kontrol Listesi (Page vd., 2021) ve PRISMA 2020 Genişletilmiş Kontrol Listesi rehberliğinde gerçekleştirilen araştırmada PRISMA 2020 akış şablonu (Page vd., 2021) kullanılmıştır. Geniş kapsamlı bir yayın grubuna ulaşabilmek için SCOPUS veri tabanında 13.04.2024 tarihinde "video in education", "video in distance education", "video in online learning", "video in e-learning" kelimeleri kullanılarak, veri tabanının bütün alanlarında tarama gerçekleştirilmiş, toplam (n=1194) yayına ulaşılmıştır. Araştırmada yayın dili İngilizce olan hakemli çalışmaların incelenmesi hedeflendiği için, araştırma yayın dili İngilizce olan makalelerle sınırlandırılmıştır. Çalışmanın arama dizgisi aşağıdaki gibidir:

> (ALL ("video in education") OR ALL ("video in distance education") OR ALL ("video in online education") OR ALL ("video in online learning") OR ALL ("video in e-learning")) AND PUBYEAR>1976 AND PUBYEAR<2025 AND (LIMITTO (DOCTYPE, "ar")) AND (LIMIT-TO (LANGUAGE , "English"))

Yukarıda verilen arama dizgisiyle yapılan taramada "SCOPUS Core Collection for 724 results" elde edilmiş, bibliyografik (n=1) ve editöryal (1) makale çıkarılarak toplam n=724 makale araştırmaya dâhil edilmiştir.

Taramaya ilişkin veriler "CSV" formatında "Excel" dosyası olarak indirilmiş, veriler incelenerek gerekli veri temizleme işlemleri gerçekleştirilerek, veri dosyası VOSviewer 1.6.20 programı aracılığıyla analiz edilmiştir. Veri toplama süreci ve analiz süreçlerinde iki araştırmacı aktif olarak yer almıştır. Sınırlamalar bağlamında araştırma kapsamındaki makalelerin yıllara göre dağılımı Şekil 1'de yer almaktadır.



Şekil 1. Araştırma kapsamındaki makalelerin yıllara göre dağılımı

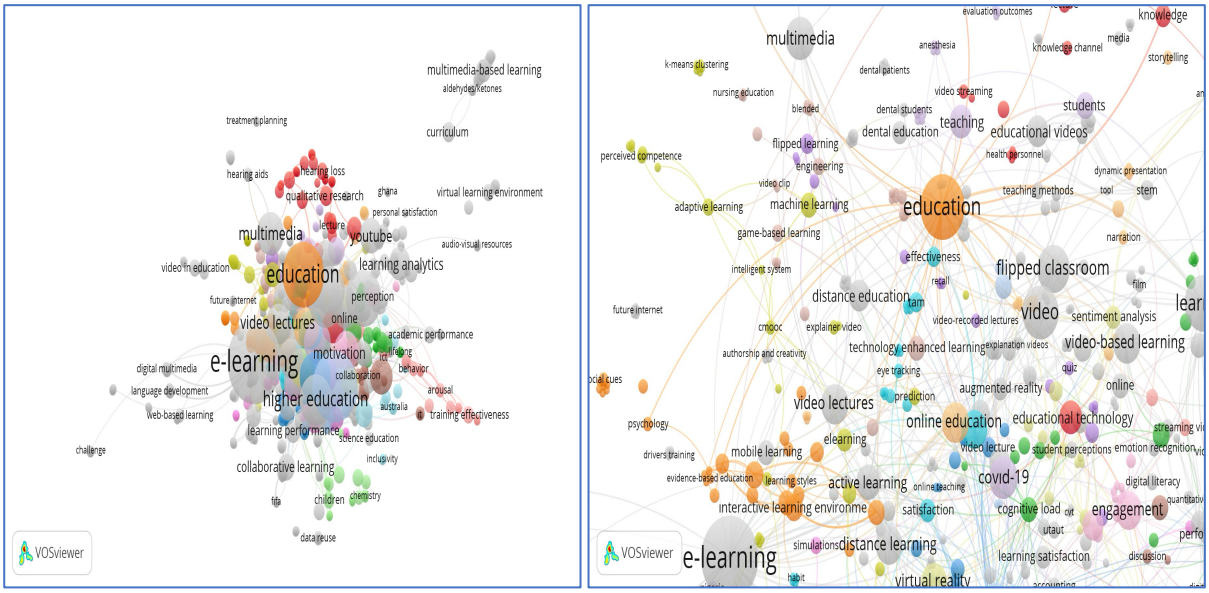
Yılara göre dağılımı Şekil 1.'de yer alan araştırma kapsamındaki makalelerde (n=724) kullanılan anahtar kelimeler analiz edilerek, açık ve uzaktan öğrenmede eğitsel videoların değişim ve dönüşümü incelenmiştir.

Bulgular

SCOPUS veri tabanında bütün alanları kapsayan sistematik alan yazın taramasıyla ulaşılan makalelerden bibliyometrik ağlar açısından, metin madenciliği yaklaşımıyla elde edilen bulgular, araştırma sorularını yanıtlama amacıyla ilgili alt başlıklarda sunulmaktadır.

Açık ve Uzaktan Öğrenmede Eğitsel Videoların Dönüşümü

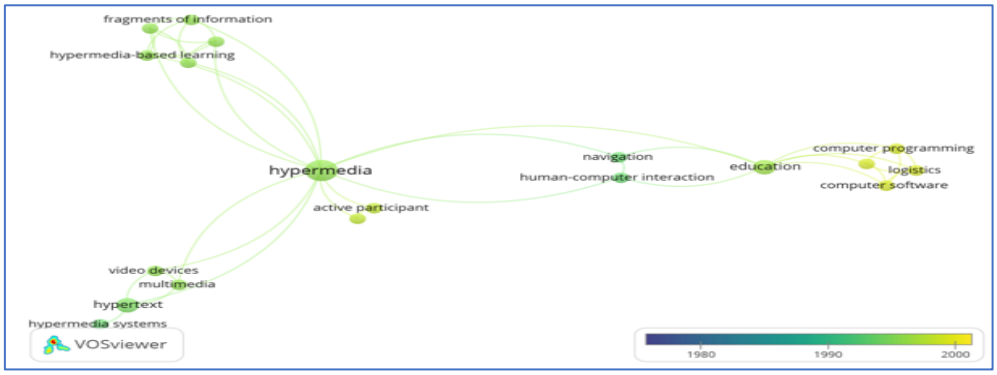
1977 ile 2024 ilk üç ayında yayınlanan makalelerin, yazar anahtar kelemelirinin ağ haritasında "eğitim, yükseköğrenim, e-öğrenme, video dersler, çokluortam, öğrenme analitikleri, ters yüz edilmiş sınıf, video temelli öğrenme, sanal öğrenme ortamları, çokluortam temelli öğrenme, web temelli öğrenme, oyun temelli öğrenme, makine öğrenmesi, artırılmış gerçeklik, duygu analizi, açıklayıcı video anahtar kelimelerinin yer aldığı görülmektedir (Bkz. Şekil 2). Ancak 724 makalenin yazar anahtar kelimelerinin kullanım sıklığı bir olarak belirlendiğinde 939 yazar anahtar kelimesinin 48 kümede toplandığı, en yoğun küme 44 iken en küçük küme 4 anahtar kelime içermektedir.



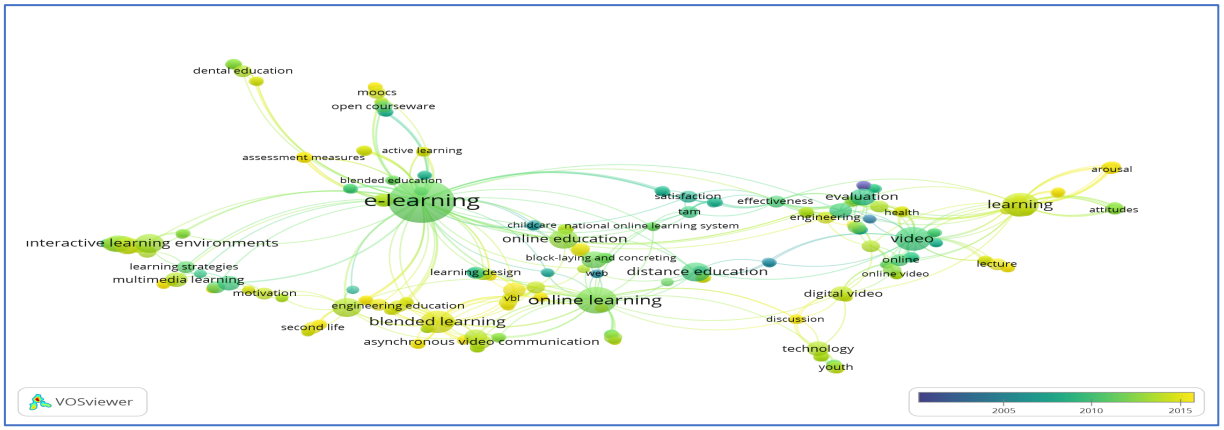
Şekil 2. Bütün yıllara ait makalelerin yazar anahtar kelimeleri ağ haritası ve yakın görünümü

Zaman içinde eğitsel videoların değişimi

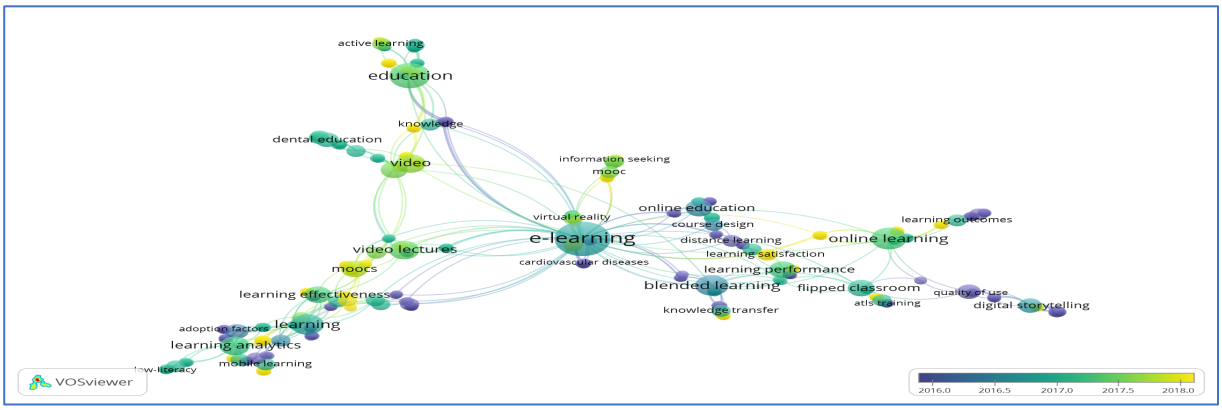
Eğitsel videoların zaman içindeki değişimini incelemek için bütün anahtar kelimelerin oluşturduğu ağ çok yoğun olduğu için SCOPUS very tabanında ulaşılan arama sonuçları yıllar bazında 1972-2000; 2001-2015; 2016-2018; 2019-2020; 2021-2024) ayrı ayrı indirilerek Vosviewer programında analiz edilmiştir. 1975-200 yılları arası yayınlanan makalelerin anahtar kelimeleri incelendiğinde hipermedya, hipermedya tabanlı öğrenme, çokluortam, bilgisayar programları, aktif katılım kavramları (Bkz. Şekil 3) öne çıkarken; Şekil 4'de 2010 sonrasında teknolojideki gelişmelere parallel olarak e-öğrenme, çevrimiçi öğrenme, etkileşimli öğrenme ortamları, kitlesel çevrimiçi öğrenme, harmanlanmış öğrenme, video ve dijital video kavramlarının ortaya çıktığı dikkat çekmektedir.



Şekil 3. 1975-2000 yıllarına ait makalelerin yazar anahtar kelimelerinin ağ haritası

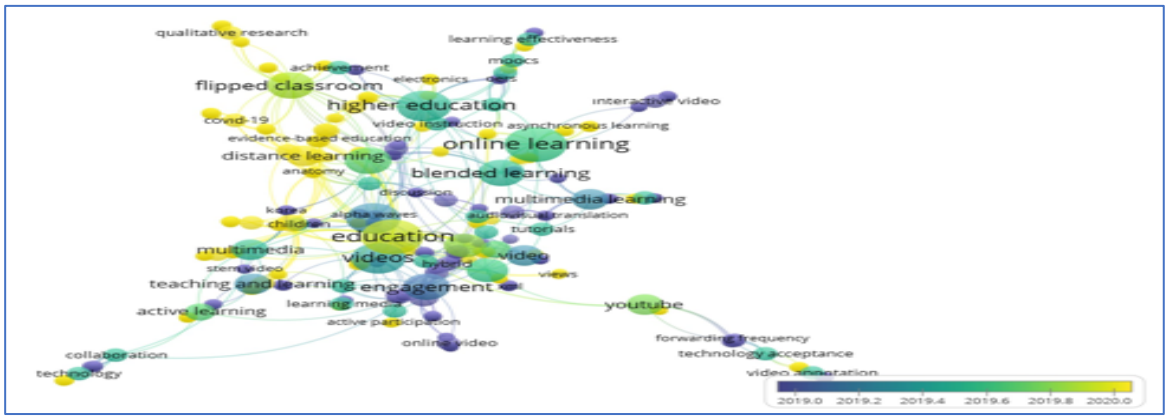


Şekil 4. 2001-2015 yıllarına ait makalelerin yazar anahtar kelimelerinin ağ haritası

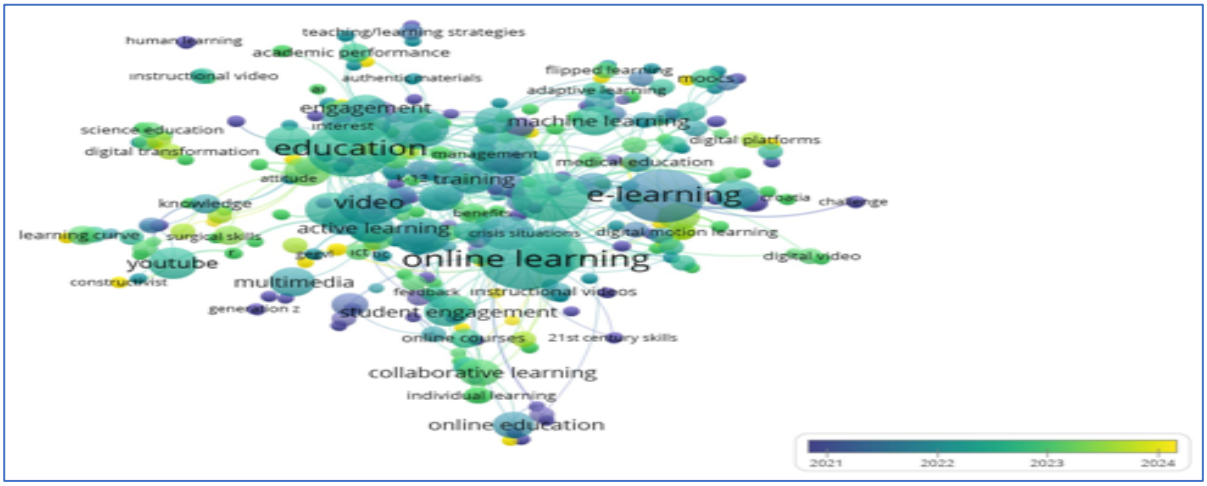


Şekil 5. 2016-2018 yıllarına ait makalelerin yazar anahtar kelimelerinin ağ haritası

Şekil 5'de 2017 sonrasında öğrenme analitiklerinin, öğrenme etkililiğinin, e-öğrenmenin, videonun, çevrimiçi öğrenmeyle harmanlanmış öğrenmenin önemini korumaya devam ettiği, mobil öğrenmenin gündeme geldiği görülmektedir. Şekil 6'da 2019 sonuna doğru aktif öğrenmenin ve videoların önem kazandığı, Covid-19 pandemisinin de etkisiyle uzaktan öğrenmenin, kanıt temelli öğrenmenin 2020 yılında belirgin hale geldiği söylenebilir.



Şekil 6. 2019-2020 yıllarına ait makalelerin yazar anahtar kelimelerinin ağ haritası

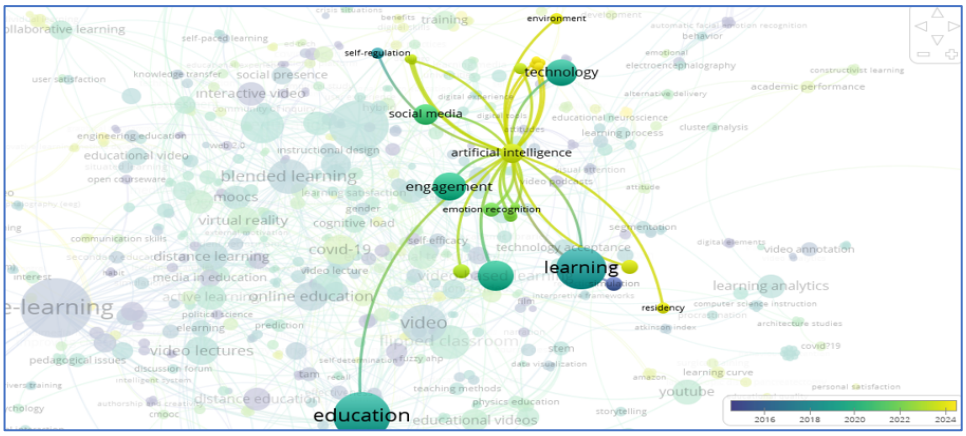


Şekil 7. 2021-2024 yıllarına ait makalelerin yazar anahtar kelimelerinin ağ haritası

Şekil 7'de 2022 sonrasında makine öğrenmesinin, aktif öğrenmenin, videoların, çokluortamın, youtube video kanalının, işbirlikçi öğrenmenin, bireysel öğrenmenin, adaftif öğrenmenin, eğtim videosunun, digital platformların ortaya çıktığı görülebilir.

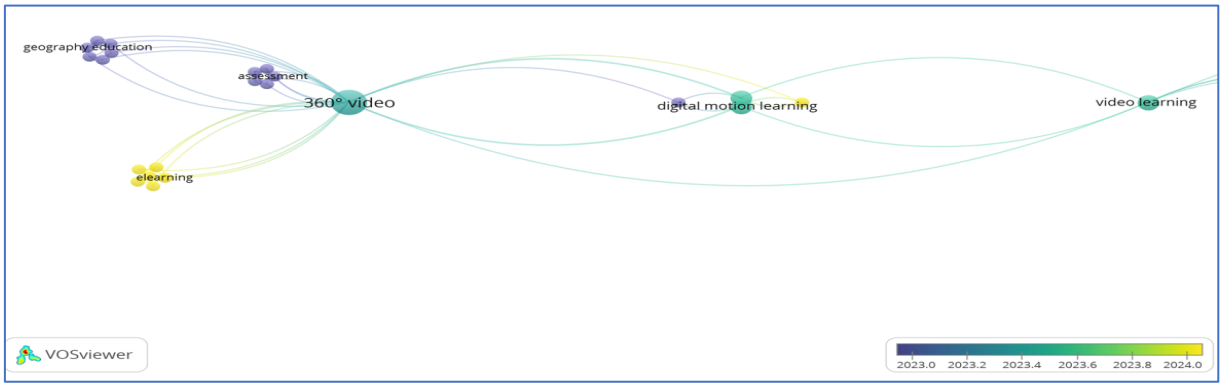
Akıllı teknolojilerin eğitsel videoların dönüşümüne etkisi

Akıllı teknolojilerin eğitsel videoların dönüşümüne etkisinin 2023 sonrasında başladığı, böylece duygu tanıma, ikamet, çevre kavramlarıyla sosyal öğrenme teorisi, pozitif psikoloji, metaverse kavramlarının 2024 ile gündemde yer almaya başladığı ifade edilebilir.



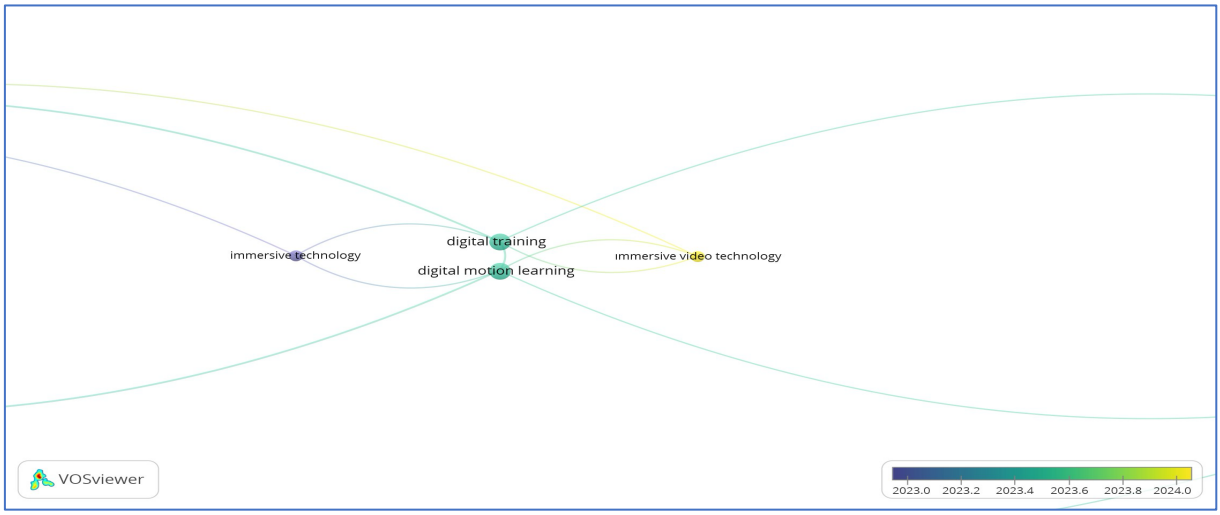
Şekil 8. 2023-2024 (Nisan) eğitsel videoların dönüşümü-1

Yapay zekaya bağlı olarak oluşan ağı büyüttüğümüzde Şekil 9-10-11'de yer alan ayrıntılara ulaşılmıştır. Şekil 9'da 2023 yılının ilk iki ayında coğrafi eğitim, değerlendirme odağında makaleler yer alırken, altıncı ay ve sonrasında 360 derece video, video öğrenme, dijital hareket öğrenme ortaya çıkmış, 2024'e gelindiğinde e-öğrenme odağında çalışmalar yer almaktadır.

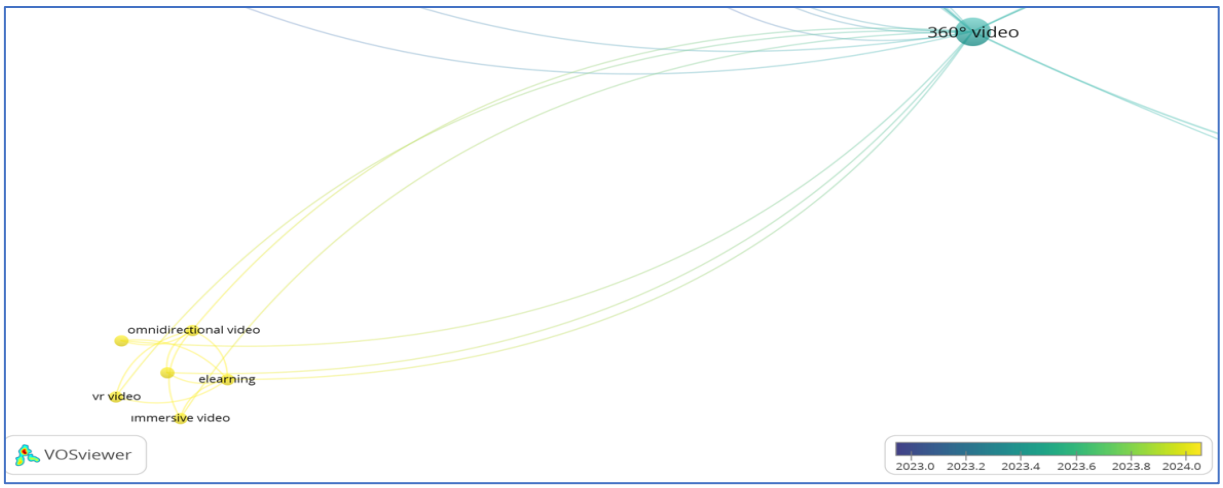


Şekil 9. 2023-2024(Nisan) eğitsel videoların dönüşümü-2

Şekil 10'da yapay zekanın etkisiyle ortaya çıkan dijital hareket öğrenme, dijital çalışma, sarmalayan teknoloji 2023 ortalarında görülürken, immersive video teknolojileri 2024'de gündemdedir.



Şekil 10. 2023-2024(Nisan) eğitsel videoların dönüşümü-3



Şekil 11. 2023-2024 (Nisan) eğitsel videoların dönüşümü-4

Şekil 11, 360^0 videolara bağlı olarak 2024'ün ilk üç aylık diliminde ortaya çıkan çalışmalarda yer alan çok yönlü video, sanal video, sarmalayan video ve e-öğrenme üzerine odaklanmaktadır.

Sonuç ve Öneriler

Bulgular, önceden pasif ve tek yönlü eğitim olanağı sunan eğitsel videoların, teknolojideki, öğrenen profilindeki, pedagojideki ve iş dünyasının çalışanlardan beklentilerindeki değişikliklere bağlı olarak öğrenenin aktif katılımını destekleyen, etkileşimli, öğrenme yolunu oluşturmasına olanak sağlayan doğrusal olmayan bir yapıya evrildiğini ortaya koymaktadır. 2020'li yıllarla birlikte algı, aktif katılım, iletişim becerileri, öğrenmeyi öğrenme ve erişilebilirlik seçenekleri önem kazanmaktadır. 2021 ve sonrasında 360^0 videolar, sanal çevreler, video temelli öğrenme, 2022'de yapay zekâ, oyunlaştırma, oyun tabanlı öğrenme, 2023'de video öğrenme, dijital öğrenme, dijital hareket öğrenme; 2024 ile birlikte ise 360^0 videolara bağlı olarak sarmalayan (immersive) video, sarmalayan video teknolojileri, çok yönlü video, küresel video, VR video kavramlarına doğru bir eğilim görülmektedir. Özetle akıllı teknolojilerdeki kritik paradigma değişiklikleri açık ve uzaktan eğitimi yeniden şekillendirerek, eğitim içeriğinin oluşturulmasında, sunulmasında ve deneyimlenmesinde ortaya çıkan değişimlerle, eğitsel videoların dinamik öğrenme araçları olarak dönüşümünde önemli fırsatlar sunmaktadır.

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Üretken Yapay Zekâ Çağında Uzamsal (Mekânsal) Bilgi İşlem ve Yenilikçi Arayüz Tasarımları

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Özet

Açık ve uzaktan öğrenme, öğrenenlerin ve eğitimcilerin zaman ve/veya mekân olarak ayrı olduğu, uzaktan iletişim teknolojilerinin kullanılmasıyla gerçekleşen etkileşimlere dayanan bir eğitimi betimler. Dolayısıyla açık ve uzaktan öğrenme, öğrenme platformlarının yer aldığı teknolojiye erişimi ve etkileşimi gerektirir. Söz konusu erişim ve etkileşimi sağlayan ise, ilgili platformun yer aldığı teknolojide kullanılan arayüzdür. Arayüzler, içinde yaşadığımız dijital çağda teknolojiyle etkileşimlerimizi ve iletişimimizi şekillendirirler. Bir çeşit köprü görevi gören araçlar olarak arayüzler, öğrenenlere sağladığı kullanım kolaylığına bağlı olarak kullanılabilirlikle ilişkilendirilebilir. Açık ve uzaktan öğrenme deneyimini iyileştirerek etkili bir öğrenme ortamı yaratmak için, kullanıcı dostu, etkileşimli, kişiselleştirilmiş arayüz tasarımları kullanmak artı değer yaratabilir. Üretken Yapay Zekânın geniş kapsamlı verileri gruplandırarak analizini gerçekleştirmeye yönelik sergilediği performans, arayüzlerin hem bağlam, hem işlev, hem de görsel çekiciliği yüksek şekilde tasarlanmasına olanak sağlamaktadır. Ayrıca öğrenenlerin tercihleri ve kalıplarını tanımlayarak, kullanıcı deneyimine ilişkin kapsamlı geribildirim verileri sağlaması, kişiselleştirme noktasında önemli avantajlar sağlama potansiyeli taşımaktadır. Bütün bunlar arayüz tasarımında inovasyon döngüsünü hızlandırarak, yenilikçi arayüzler üzerinde düşünmeyi kolaylaştırmaktadır. Bu bilgiler ışığında çalışmanın amacı, uzamsal bilişim ve arayüz tasarımına yönelik çalışmaları inceleyerek, uzamsal bilişim ve arayüz tasarımının zaman içindeki değişimini değerlendirerek, akıllı teknolojilerin yarattığı etkiyi keşfetmektir. Sistematik literatür taraması yöntemiyle, SCOPUS veri tabanında 1993 ile Nisan 2024 tarihleri arasında yayınlanan 44 çalışma analizlere dahil edilmiştir. Araştırma bulguları, 2017 yılından itibaren konuyla ilgili çalışmaların ciddi bir ivme kazandığını göstermektedir. Ayrıca bulgular 2020 ve sonrasında, karma gerçeklik/artırılmış gerçeklik etkileşim paradigmaları, multimodal arayüz, duyusal altyazı, doğal kullanıcı arayüzü, duygusal bilişim, sensör geribildirimleri, kapsayıcı tasarım, tasarım arayüzler, uzamsal etkileşim, nesnelerin interneti, görev analizi, jestsel arayüz, genişletilmiş gerçeklik, metaverse, insan merkezli bilişim, multimodal 3D etkileşim paradigmaları, uzamsal arayüz kavramlarının uzamsal bilişimle birlikte kullanımına yönelik bir eğilimi işaret etmektedir. Çalışma, akıllı teknolojilerin sunduğu olanaklar doğrultusunda uzamsal bilişim ve yenilikçi arayüz tasarımlarını holistik bir yaklaşımla ele alarak, genel eğilimleri ortaya koyduğu, açık ve uzaktan öğrenmede kullanımına yönelik bir bakış açısı oluşturma katkısı sağladığı için önemlidir.

Anahtar Kelimeler: Üretken Yapay Zeka, Uzamsal (Mekansal Bilişim), Arayüz, Sensör Geribildirimleri, Uzamsal arayüz, İnsan merkezli bilişim, Beyin-makine arayüzü

Spatial Computing and Innovative Interface Designs in the Age of Generative Artificial Intelligence

Abstract

Open and distance learning describes an education based on interactions using communication technologies, where learners and educators are separated in time and/or space. Therefore, open and distance learning requires access to and interaction with technology, including learning platforms. The interface used in the technology in which the relevant platform is located provides this access and interaction. Interfaces shape our interactions and communication with technology in the digital age. As tools that act as a bridge, interfaces can be associated with usability based on the ease of use they provide to learners. Using user-friendly, interactive, personalized interface designs can create added value to provide an effective learning environment by improving the open and distance learning experience. Generative AI can group and analyze extensive data. These characteristics of generative AI provide the opportunity to design interfaces with high context, functionality, and visual appeal. Additionally, identifying students' preferences and patterns and providing comprehensive feedback data on user experience can provide significant advantages in terms of personalization. All of this accelerates the innovation cycle in interface design, making it easier to think about innovative interfaces. In light of this information, the study aims to explore the impact of intelligent technologies by examining the studies on spatial informatics and interface design and evaluating the changes in spatial informatics and interface design over time. With the systematic literature review method, 44 studies published in the SCOPUS database between 1993 and April 2024 were included in the analysis.

According to research findings, studies have shown an upward trend since 2017. Additionally, the findings point to a trend toward using some concepts together with spatial computing in 2020 and beyond. It is possible to list these concepts as follows: mixed reality/augmented reality interaction paradigms, multimodal interface, sensory subtitling, natural user interface, emotional informatics, sensor feedback, immersive design, design interfaces, spatial interaction, internet of things, task analysis, gestural interface, extended reality, metaverse, human-centered computing, multimodal 3D interaction paradigms, spatial interface. The study is critical because it reveals general trends by addressing spatial computing and innovative interface designs with a holistic approach that aligns with the opportunities offered by intelligent technologies. It also contributes to creating a perspective on its use in open and distance learning.

Keywords:Generative Artificial Intelligence, Spatial Computing, Interface, Sensor Feedback, Spatial interface, Human-centered computing, Brain-machine interface

Giriş

İçinde yaşadığımız çağ, teknoloji uzmanı olmasak da en azından teknoloji okuryazarı olma ve teknolojik gelişmeleri anlayarak çalışma alanlarımıza uygulama konusunda çaba göstermeyi gerektiriyor. Bu anlamda çalışma, üretken yapay zeka (Generative AI-GenAI), uzamsal bilgi işlem (Spatial Computing) ve yenilikçi arayüz tasarımlarına odaklanmaktadır. Açık ve uzaktan öğrenme, öğrenenlerin ve eğitimcilerin zaman ve/veya mekân olarak ayrı olduğu, uzaktan iletişim teknolojilerinin kullanılmasıyla gerçekleşen etkileşimlere dayanan bir eğitimi betimler. Dolayısıyla açık ve uzaktan öğrenme, öğrenme platformlarının yer aldığı teknolojiye erişimi ve etkileşimi gerektirir. Söz konusu erişim ve etkileşimi sağlayan ise, ilgili platformun yer aldığı teknolojide kullanılan arayüzdür. Arayüzler, içinde yaşadığımız dijital çağda teknolojiyle etkileşimlerimizi ve iletişimimizi şekillendirirler. Bir çeşit köprü görevi gören araçlar olarak arayüzler, öğrenenlere sağladığı kullanım kolaylığına bağlı olarak kullanılabilirlikle ilişkilendirilebilir. Açık ve uzaktan öğrenme deneyimini iyileştirerek etkili bir öğrenme ortamı yaratmak için, kullanıcı dostu, etkileşimli, kişiselleştirilmiş arayüz tasarımları kullanmak artı değer yaratabilir. Üretken Yapay Zekânın geniş kapsamlı verileri gruplandırarak analizini gerçekleştirmeye yönelik sergilediği performans, arayüzlerin hem bağlam, hem işlev, hem de görsel çekiciliği yüksek şekilde tasarlanmasına olanak sağlamaktadır. Ayrıca öğrenenlerin tercihleri ve kalıplarını tanımlayarak, kullanıcı deneyimine ilişkin kapsamlı geribildirim verileri sağlaması, kişiselleştirme noktasında önemli avantajlar sağlama potansiyeli taşımaktadır. Bütün bunlar arayüz tasarımında inovasyon döngüsünü hızlandırarak, yenilikçi arayüzler üzerinde düşünmeyi kolaylaştırmaktadır.

Yenilikçi arayüzlerle uzamsal bilgi işleme arasındaki ilişkiyi uzamsal bilgi işlem kavramını bilimsel anlamda ilk kez tezinde kullanan Greenwold (2003),

> "Uzamsal hesaplama, fiziksel ve ideal dünyalar arasındaki engelleri aşındıran hibrit gerçek/sanal hesaplamayı önerir. …Uzamsal hesaplama daha çok deneyimin nitelikleriyle ilgilenmektedir. Mümkün olan her yerde makinedeki boşluk ve makinedeki boşluğun birbirine sızmasına izin verilmelidir. Bazen bu, bilgisayara alan kazandırmak anlamına gelir, bazen de nesnelere hesaplama enjekte etmek anlamına gelir. Çoğunlukla bu, ekranın ve klavyenin geleneksel sınırlarını zorlayan, oraya takılıp kalmadan ve arayüze ya da uysal simülasyona dönüşmeyen sistemler tasarlamak anlamına gelir. Yaptığımız aynı nesneler üzerinde çalışmak için, fiziksel sezgilerimizi kullanarak onlar üzerinde çalışmamız gerekecek. …Henüz öyle değilsek, bağlantılı makinelerimizin içine yerleştirilmiş insanlar haline gelmemiz kaçınılmazdır (s.33)".

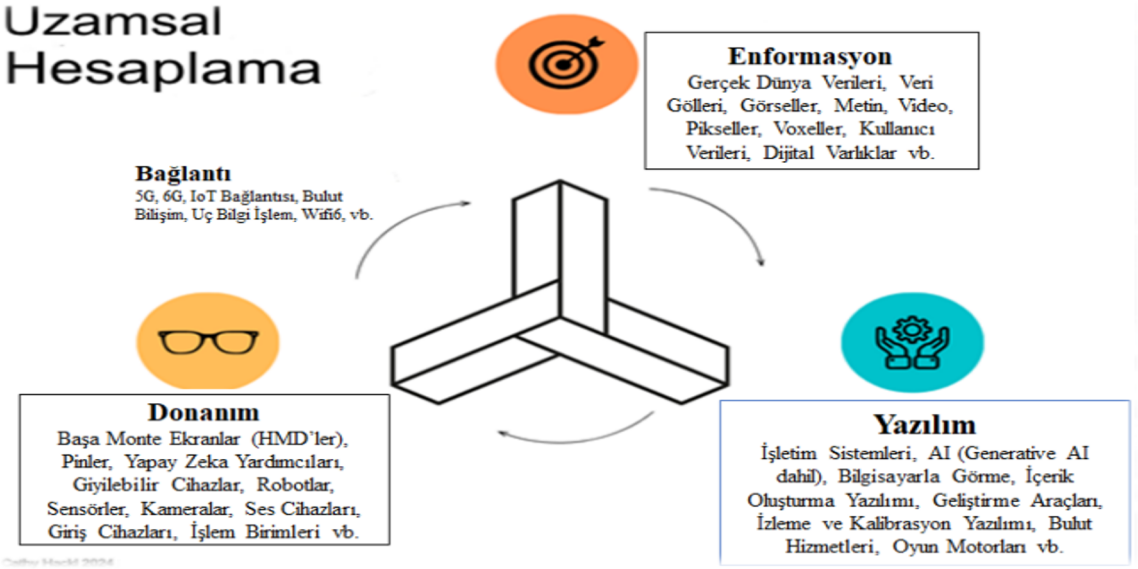
ifadeleriyle bundan 21 yıl önce açıklamaya çalışır. Uzamsal bilgi işlemi "makinenin gerçek nesnelere ve mekânlara ilişkin referansları koruduğu ve manipüle ettiği bir makine ile insan etkileşimidir (Greenwold, 2003)" sözleriyle tezinin özet kısmında tanımlar. Bir başka tanımda uzamsal bilgi işlem, "cihazların fiziksel ortama kusursuz entegrasyonunu kolaylaştıran, daha doğal ve sezgisel bir dijital dünya kullanıcı deneyimi sağlayan teknolojik gelişme (Yenduri vd., 2024)" olarak ifade edilmektedir. Bir diğer tanımda ise uzamsal bilgi işlem, -fiziksel dünya ile sanal deneyimleri çeşitli teknolojiler yardımıyla harmanlayarak, -insanların birbirleriyle ve makinelerle yeni şekillerde etkileşime girerek iletişim kurmasını sağlayan, -makinelere fiziksel çevrede gezinme ve anlama becerileri kazandıran, gelişen bir bilgi işlem şekli (Hackl, 2023) olarak betimlenmektedir. Yenduri vd. (2024, s.7), uzamsal bilgi işlemin dijital bilginin fiziksel dünyayla yenilikçi bir birleşimi olduğunu vurgulayarak, çevremizle etkileşim kurma ve onu anlama şeklimizi değiştirdiğini belirttmektedirler.

Donanım, yazılım, bağlantı, enformasyon/veri şeklinde dört temel üzerinde inşa edilen uzamsal bilgi işlem (Hackl, 2024), yazılım ve donanım aracılığıyla sanal ve fiziksel ortamlar arasında kusursuz bir etkileşim yaratma potansiyeline sahiptir. Başka bir ifadeyle uzamsal bilgi işlem, kullanıcıların gerçeklik algısını değiştirerek genişletir. Bunu sağlayansa Uludoğan (2023) tarafından belirtildiği gibi, kullanıcıların gerçek dünya ile sanal dünya arasında kesintisiz geçiş yapmasını sağlayan, teknolojiyle gerçekçi ve duyusal etkileşim kurmasını sağlayan yenilikçi arayüzlerdir. Genişletilmiş gerçeklik (XR) şemsiyesi altında sanal (VR), artırılmış (AR) veya karma

gerçeklik (MR) teknolojilerinin kullanımıyla kullanıcılar, 3D ortamlara adım atmanın yanında sanal nesneleri gerçek dünyada görerek etkileşime geçme şansına sahip olabilir.

Şekil 1'de Hackl (2024) tarafından oluşturulan görsel, donanım, yazılım, enformasyon ve bağlantı ilişkisini açıkça ortaya koymaktadır. Donanım bileşeni altında yer alan başa monte ekranlar, giyilebilir cihazlar, ses cihazları, giriş cihazları vb. XR teknolojilerini işaret etmektedir. Donanım ve yazılım bileşenlerinin her ikisinin de alt unsurları arasında yapay zekanın bulunduğu dikkatlerden kaçmamalıdır. Enformasyon altındaki unsurlar hangi verilerden hareketle enformasyona ulaşıldığına, hangi verilerin toplandığına işaret etmektedir. Bu noktada özellikle dikkat edilmesi gereken sistemin işlemesi için bağlantı (5G, 6G, Iot Bağlantısı, Bulut Bilişim, Uç Bilgi İşlem, Wifi6 vb) bileşeninin gerekliliğidir.

Bağlantı ile ilgili olarak "Yüksek hızlı insan-bilgisayar etkileşimi için çığır açan teknoloji" olarak tanıtılan IXANA çipi (Wireless for Body Area Network) Vücut Bölgesi için Kablosuz bir ağı (Wi-R) ifade etmekte, dokunma yoluyla diğer bireylerle bağlantıyı mümkün kılmaktadır. Wi-R teknolojisini akıllı telefonlara, giyilebilir cihazlara ve AR/VR kulaklıklara entegre etmek için 12 büyük iş ortağının (IXANA, 2024) varlığı düşünüldüğünde bilim-kurgu filmlerindeki arayüzsüz sahnelerin pek de uzakta olmadığını söylemek mümkün olabilir.



Şekil 1. Uzamsal bilgi işlemin bileşenleri ve bileşenlerin kapsadığı unsurlar (Hackl, 2024)

Uzamsal bilgi işlem sisteminin işleyişi ise şu şekilde özetlenebilir: uzamsal hesaplamayı mümkün kılacak platform, kameralar ve sensörler aracılığıyla gerçek dünya enformasyonlarını algılar. Yakalanan alanın bağlamını anlamak için, bunu gerçek zamanlı olarak işler. İçeriği üst üste bindirmek veya tamamen sanal ortamlar oluşturmak için, fiziksel çevreye içerik görüntüler (Diaz, 2024).

Bu bilgilerden hareketle çalışmanın amacı, uzamsal bilişim ve arayüz tasarımına yönelik çalışmaları inceleyerek, uzamsal bilişim ve arayüz tasarımının zaman içindeki değişimini değerlendirerek, akıllı teknolojilerin yarattığı etkiyi keşfetmektir. Araştırmada yanıt aranacak sorular şu şekildedir:

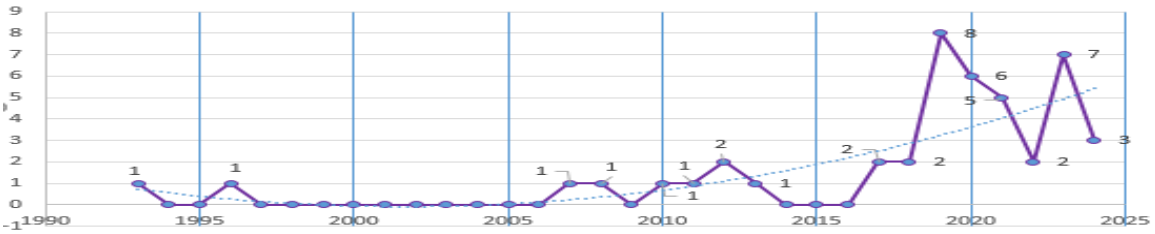
- Uzamsal (mekânsal) bilişim ve yenilikçi arayüz tasarımlarını konu alan çalışmalar ne tür bir eğilim sergilemektedir?

Yöntem

Araştırmanın amacı doğrultusunda araştırma sorularına yanıt bulabilmek için benimsenen yöntem, sistematik tarama yöntemidir. Sistematik inceleme prosedürlerinden PRISMA 2020 Kontrol Listesi (Page vd., 2021) ve PRISMA 2020 Genişletilmiş Kontrol Listesi rehberliğinde gerçekleştirilen araştırmada PRISMA 2020 akış şablonu (Page vd., 2021) kullanılmıştır. Geniş kapsamlı bir yayın grubuna ulaşabilmek için SCOPUS veri tabanında 13.04.2024 tarihinde başlık-özet-anahtar kelimeler alanlarında "spatial computing", "interface", "interfaceless" anahtar kelimeleri kullanılarak tarama gerçekleştirilmiş, toplam (n=46) yayına ulaşılmıştır. Çalışmanın arama dizgisi aşağıdaki gibidir:

(TITLE-ABS-KEY ("spatial computing") AND TITLE-ABS-KEY ("interface") OR TITLE-ABS-KEY ("interfaceless"))

Yukarıda verilen arama dizgisiyle ulaşılan toplam (n=46) yayından, editöryal 1 çalışma ve 1 kitap bölümü kapsam dışında bırakılarak 32 bildiri ve 12 makale toplam 44 (n=44) çalışma araştırmaya dâhil edilmiştir. Taramada ulaşılan veriler "CSV" formatında "Excel" dosyası olarak indirilerek veri temizleme işlemlerinden sonra VOSviewer 1.6.20 programı aracılığıyla analiz edilmiştir. Verilerin toplanarak analiz edilmesine ilişkin süreçlerde iki araştırmacının aktif katılım sağladığı araştırmanın kapsamında yer alan çalışmaların yıllara göre dağılımı Şekil 2'de yer almaktadır.



Şekil 2. Araştırma kapsamındaki makalelerin yıllara göre dağılımı

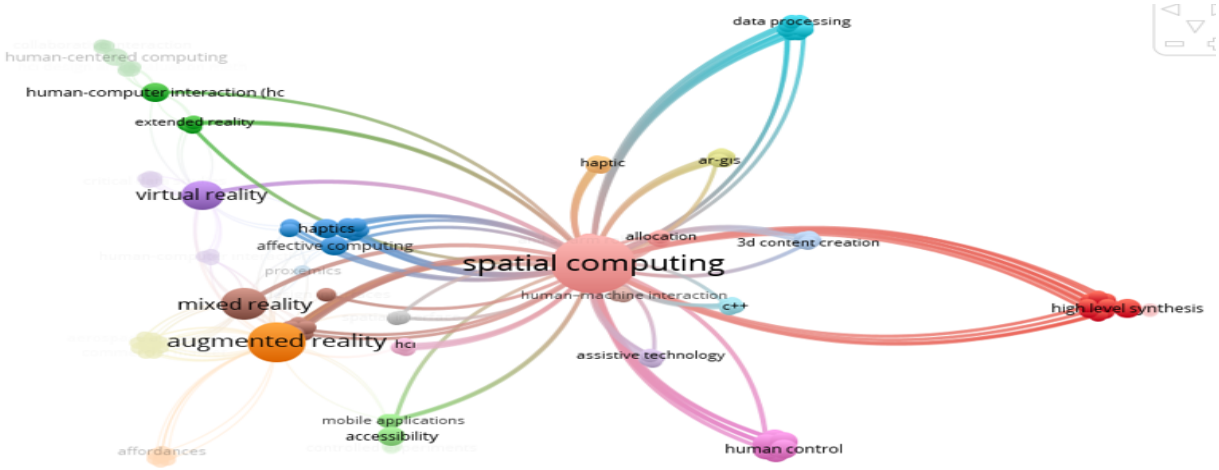
Yılara göre dağılımı Şekil 2.'de yer alan araştırma kapsamındaki (n=44) çalışmaların konu alanları incelendiğinde yoğun olarak bilgisayar bilimleri (%47.4) ve mühendislik (%22.4) alanlarının toplam %69.8 oranla kullanıldığı görülmektedir. Sosyal bilimler (%1.3) ile sanat ve beşeri bilimler (%1.3) alanındaki çalışmaların oldukça az olduğu dikkat çekmektedir. Makale ve bildirilerin yer aldığı (n=44) çalışmada kullanılan anahtar kelimeler analiz edilerek, fzamsal (mekânsal) bilişim ve yenilikçi arayüz tasarımlarını konu alan çalışmaların geçmişten 2024 ilk çeyreğine kadar sergilediği eğilimler incelenmiştir.

Bulgular

SCOPUS veri tabanında bütün alanları kapsayan sistematik alan yazın taramasıyla ulaşılan makalelerden bibliyometrik ağlar açısından, metin madenciliği yaklaşımıyla elde edilen bulgular, araştırma sorusunu yanıtlama amacıyla ilgili alt başlıkta sunulmaktadır.

Uzamsal (Mekânsal) Bilişim ve Yenilikçi Arayüz Tasarımları Eğilimler

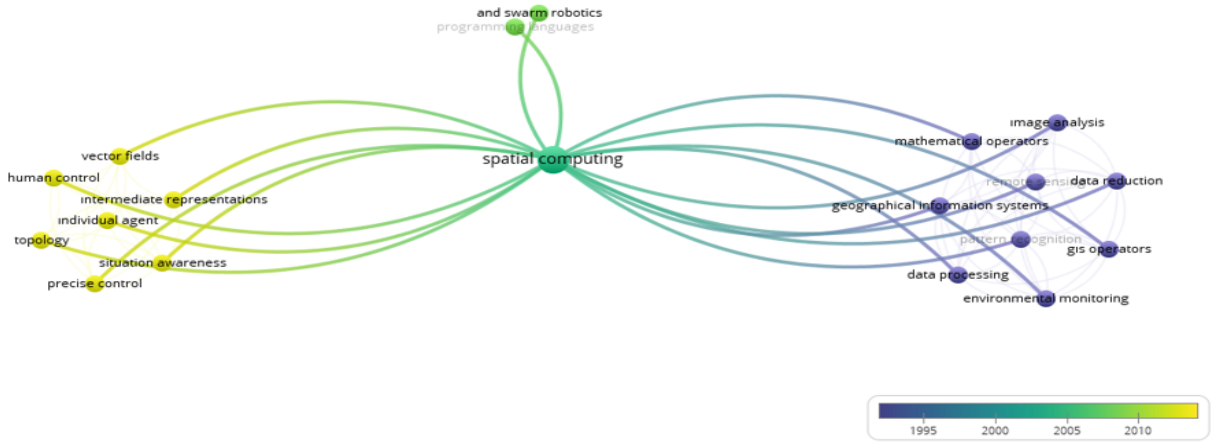
Uzamsal bilgi işlem ve yenilikçi arayüz tasarımlarına ilişkin bütün yıllara ait çalışmaların yazar anahtar kelimelerinin ağ haritasının Şekil 3 incelendiğinde genişletişmiş gerçeklik, sanal gerçeklik, karma gerçeklik, artırılmış gerçeklik anahtar kelimelerinin yanında haptik, duygusal bilgi işlem, veri işleme, 3D içerik üretimi, yüksek seviye sentez, insan kontrolü, erişilebilirlik, mobil uygulamalar, insan bilgisayar etkileşimi, yardımcı teknolojiler anahtar kelimelerin ön planda olduğu görülmektedir.



Şekil 3. Bütün yıllara ait makalelerin yazar anahtar kelimeleri ağ haritası

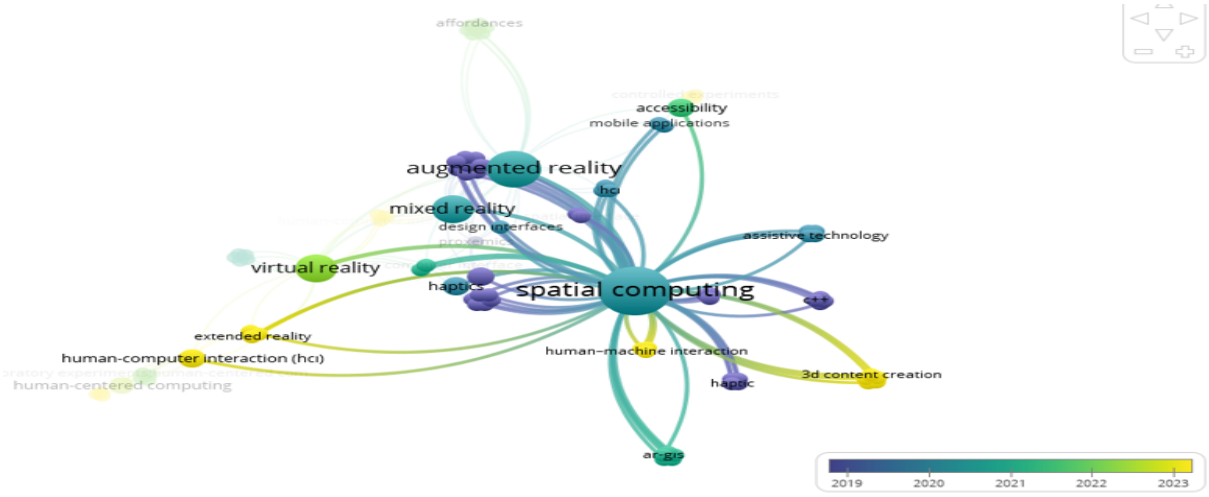
Yıllar içinde anahtar kelimelerin sergilediği eğilimi daha açık olarak görebilmek için, SCOPUS veri tabanından veriler belirtilen zaman dilimleri için ayrı ayrı indirilerek analiz edilmiştir. Böylece yıllar içinde çalışmalarda kullanılan anahtar kelimelerdeki değişim açık bir şekilde görülmektedir. Şekil 4, 1993-2016 yılları arasındaki çalışmaların anahtar kelimelerinin zaman içindeki seyrini ortaya koymaktadır. Görüntü analizi, matematik operatörleri, coğrafi bilgi sistemleri, coğrafi bilgi sistem operatörleri, veri işleme, çevresel izleme, desen tanıma anahtar kelimeleri 1993-2000 yılları arasında çalışmalarda kullanılan kavramlardır. 2016 yılıyla birlikte

çalışmalarda vektör alanları, insan kontrolü, ara temsil, bireysel ajanlar, topoloji, hassas kontrol, durum farkındalığı anahtar kavramları belirgin hale gelmektedir.

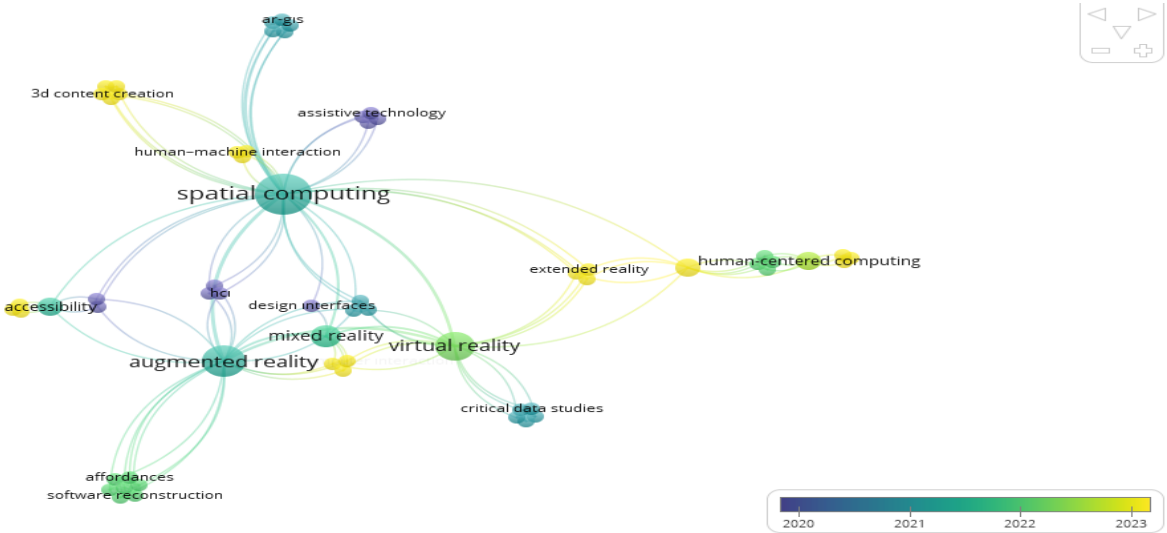


Şekil 4. 1993-2016 yıllarına ait makalelerin yazar anahtar kelimelerinin ağ haritası

Şekil 5 incelendiğinde, genişletilmiş gerçeklik, insan bilgisayar etkileşimi, insan makine etkileşimi ve 3 boyutlu içerik üretiminin 2023 ile birlikte gündeme geldiği görülmektedir. Erişilebilirliğin ve sanal gerçekliğin 2022 ve sonrasında belirgin bir büyüklük sergilemesi nedeniyle 2020 yılı ve sonrasına ilişkin daha detaylı bir inceleme gerekliliği duyulmuştur.

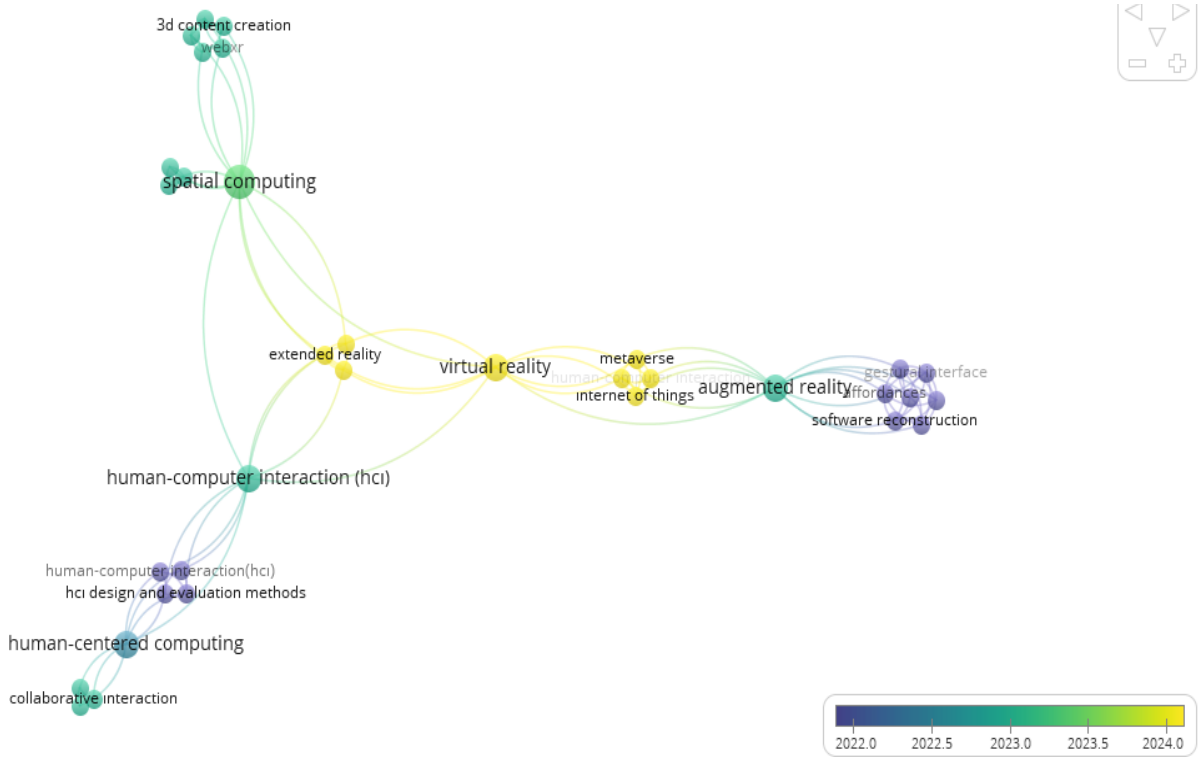


Şekil 5. 2017-2024 yıllarına ait makalelerin yazar anahtar kelimelerinin ağ haritası



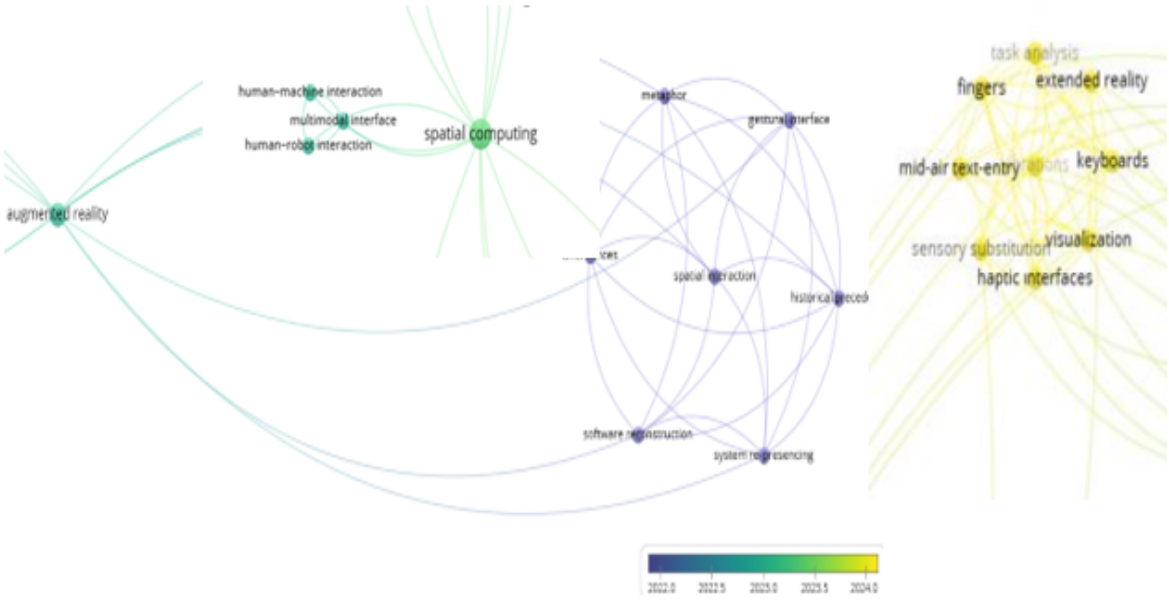
Şekil 6. 2020-2023 yıllarına ait makalelerin yazar anahtar kelimelerinin ağ haritası

2020-2024 yılları arasındaki çalışmaların anahtar kelimelerine odaklanan Şekil 6 incelendiğinde, yardımcı teknolojilerin, insan bilgisayar etkileşiminin, arayüz tasarımlarının 2020 yılı ve sonrasında belirginlik kazandığı, artırılmış ve karma gerçekliğin, artırılmış gerçeklik coğrafi bilgi sistemlerinin, kritik veri çalışmalarının 2021'in sonlarından itibaren 2022'de görünür hale geldiği söylenebilir.



Şekil 7. 2022-2024 yıllarına ait makalelerin yazar anahtar kelimelerinin ağ haritası

2022-2024 yılları arası çalışmaların anahtar kelimelerinin incelendiği Şekil 7 ise, 2023'ün ikinci yarısından sonra 2024'e yaklaşırken genişletilmiş gerçeklik, sanal gerçeklik, metaverse ve nesnelerin internetiyle ilgili çalışmaların varlığına işaret etmektedir. Şekil 8 ise, uzamsal bilgi işleme bağlı olarak çok modlu arayüz, insan makine etkileşimi, haptik arayüz, insan robot etkileşiminin 2023 sonrasında yapılan çalışmalarda görüldüğünü, 2022 sonrasında arttırılmış gerçekliği geliştiren uzamsal etkileşim, metafor, jestsel arayüz, sistem temsili, yazılım yeniden yapılanma, tarihsel emsal anahtar kelimeleri yer almaktadır.



Şekil 8. 2022-2024 yıllarına ait makalelerin yazar anahtar kelimelerinin ağ haritası

Sonuç ve Öneriler

Araştırma bulgularından hareketle uzamsal bilişim ve yenilikçi arayüz tasarımlarına yönelik çalışmaların teknolojik gelişmelerle parallel bir seyir izlediği, özellikle Covid-19 pandemisiyle birlikte arttığını, 2022 yılı sonrasında bir sıçrayış yaptığını, dolayısıyla sürekli gelişen bir alan olduğunu söylemek mümkündür. 2020 ve sonrasında uzamsal bilişimle birlikte , karma gerçeklik/artırılmış gerçeklik etkileşim paradigmaları, multimodal arayüz, duyusal altyazı, doğal kullanıcı arayüzü, duygusal bilişim, sensör geribildirimleri, kapsayıcı tasarım, tasarım arayüzler, uzamsal etkileşim, nesnelerin interneti, görev analizi, jestsel arayüz, genişletilmiş gerçeklik, metaverse, insan merkezli bilişim, multimodal 3D etkileşim paradigmaları, uzamsal arayüz kavramlarının uzamsal bilişimle birlikte kullanımına yönelik bir eğilimi işaret etmektedir. Özetle uzamsal bilişim, teknoloji ile etkileşimi değiştirerek geliştiren bir paradigmadır. Bu eğilimlerin, sınırlı arayüzlerin yerini büyük tuvallere bırakacağı arayüzsüz bir geleceği işaret ettiği söylenebilir. Bu gelecek gerçeklik deneyimleri, etkileşim yöntemleri, çoklu cihaz etkileşimi, çevresel bilgi algılama ile yeni iş modellerinin ortaya çıkmasını sağlayacaktır. Çalışmada incelenen yayınların genel olarak teknik ağırlıklı olması, sosyal bilimler ve eğitim bilimleri alanında da uzamsal bilişimin ortaya çıkaracağı yansımaların incelenmesi gerekliliğine işaret etmektedir.

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Türkiye'de Öğretim Tasarımı Alanında Yapılan Lisansüstü Çalışmaların İçerik Analizi

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Özet

Bu çalışmanın amacı Türkiye'de öğretim tasarımı alanında yapılan lisansüstü çalışmaların yayın yılları, türleri, yayınlandığı anabilim dalı, araştırma yaklaşımları, araştırma grupları, veri toplama araçları ve veri analiz yöntemleri bakımından incelemektir. Çalışma, nitel veri yaklaşımlarından derleme (alanyazın taraması) türünde hazırlanmış ve doküman analizi yönteminden faydalanılmıştır. Çalışmanın örneklemini 2003-2024 yılları arasında Ulusal Tez merkezinde erişime açık şekilde yayınlanmış tezler oluşturmaktadır. Bu kapsamda erişime açık 74 adet tezin içerik analizi yapılmıştır. Araştırmada elde edilen sonuçlar; öğretim tasarımı çalışmalarının son yıllarda arttığı, Yüksek Lisans türünde daha fazla olduğu, Eğitim Bilimleri anabilim dalında, nicel araştırma yaklaşımının daha fazla tercih edildiği, araştırma grubu olarak ortaokul öğrencilerinin daha fazla seçildiği, veri toplama aracı olarak en çok başarı testlerinin kullanıldığı ve veri analizinde içerik analizi yönteminin daha fazla tercih edildiğidir. Çalışmanın bulgularına yönelik önerilerde bulunulmuştur.

Keywords: Öğretim tasarımı, içerik analizi, lisanüstü.

Giriş

Son yıllarda yaşanan teknolojik gelişmeler, tüm Dünya'yı etkileyen pandemi süreci, doğal afetler birçok disiplini etkilediği gibi eğitim-öğretimi de etkilemiştir (Sabuncuoğlu vd., 2023). Yapay zekânın hızla ilerlemesiyle bireylerin öğretim ihtiyaçları değişmiş ve pandemi, doğal afet gibi süreçlerde okulların kapanmasıyla uzaktan ve çevrimiçi öğrenme ortamları oluşmuştur (Albaşkara vd., 2024). Bu ortamlarda çok sayıda kişiye kısa sürede ulaşım, bireysel farklılıklara önem verilmesi gibi avantajların yanı sıra internet erişimindeki aksamalar, teknolojik cihazların yokluğu gibi dezavantajları olmuştur. Bu yüzden gerçekleştirilen öğrenmelerin yönetilmesi ve planlanması konusu gündeme gelmiştir. Değişen ihtiyaçlar, ortamlar, avantajlar ve dezavantajlar öğretim tasarımı kavramının önemini göstermiştir. Öğretim tasarımı kavramı, sadece son yıllardaki gelişmelerden etkilenmemiş insanlığın varoluşundan itibaren var olmuş ve gelişmiştir. Eğitim ve Öğretim, insanlığın ilk zamanlarından günümüze kadar var olan kavramlardır. İnsanlar bilgilerini aktarmak, yeni bilgiler kazanmak ve problemlerine çözümler bulmak için eğitim-öğretim faaliyetleri içinde olmuşlardır. Örneğin, MÖ 500'lü yıllarda Büyük Sofistler, Avrupa'nın eğitim sisteminin temelini oluşturacak grup tartışmaları, sorun çözme ve güzel konuşma sanatını öğretme gibi yöntemleri kullanmışlardır. Sokrates'in öğretim metodu ve sorgulama yöntemi, Aberald'ın Okul ile Öğretim metodu, Comenius'un metodu, Lancaster'ın denetleyici eğitim sistemi, Pestalozzi'nin öğretim metodu, Froebel'in oyunları gibi, bilim insanlarının yöntemleri sayesinde öğretim faaliyetleri gelişmiştir. Yaşanan teknolojik ve sosyal gelişmelerle birlikte eğitim-öğretim faaliyetlerinin yeniden ele alınması gerekmektedir. Bireyselliğin arttığı günümüzde bilişsel ve duyuşsal ihtiyaçlar, bir konuyu öğrenme tarzı, öğrenilecek bilginin ne olduğu ve kazanımları, kullanılacak yöntem ve materyaller önemli hale gelmiştir. Bu faaliyetlerin planlı ve sistematik olması durumunda istenilen davranışlar kazandırılabilir. Değişen ve gelişen eğitim ihtiyaçlarının doğru şekilde planlanması için öğretim tasarımı kavramından faydalanılması yerinde olacaktır (Özerbaş ve Kaya,2017). Ayrıca öğretim tasarımı kavramının yıllar içinde araştırmacılar tarafından nasıl ele alındığı, bu alandaki çalışmaların yönelimlerinin ve ihtiyaçların ne olduğunun belirlenmesinin literatüre katkı sağlayacağı düşünülmektedir.

Öğretim tasarımı kavramının araştırmalarda farklı tanımları bulunmaktadır. Reiser (2001) performansı arttırmak için analiz, tasarım, geliştirme, uygulama ve değerlendirmenin içinde olduğu faaliyetler olarak tanımlamıştır (Keleş, 2016). Tyler'e göre öğretim tasarımı, istenilen davranışlara ulaşmak için gerçekleştirilen öğretim faaliyetlerinin tanımlanmasıdır (Reigeluth, 1983). Çakır ve Karataş (2012) öğretim tasarımını, çevrenin öğretim ihtiyaçlarına ve ilkelerine dikkat edilerek amaçlara göre sistematik olarak düzenlenmesi tanımlamıştır. Bu tanımlardan hareketle öğretim tasarımı, belirli bir konu alanının hedeflerine göre, öğrenme sürecine dahil olan tüm bireylerin özelliklerini dikkate alarak materyal tasarlanması, gruplara uygun öğrenme-öğretme yöntem ve tekniklerinin uygulanması ve çıktıların değerlendirilip sürecin eksikliklerinin belirlenip yeniden planlanması sürecidir. Bu süreç, etkili öğrenme deneyimleri sağlamak ve öğrencilerin başarılı olmasını desteklemek amacıyla önemlidir. Öğretim tasarımı gerçekleştirirken öğrenme dinamiklerine uygun şekilde model seçimi ve seçilen modelin güçlü ve zayıf yönlerini belirlemek önemlidir. Doğru öğretim tasarımı modeli seçmek; sürecin başarısını

etkiler, öğrenme hedeflerine ulaşmak için tasarımcıya yol haritası sunar ve bireysel ihtiyaçları dikkate alarak kalıcı öğrenme ortamları tasarlamaya fırsatı verir. ADDİE (Analyze (Analiz), Design (Tasarım), Develop (Geliştirme), Implement (Uygulama), Evaluate (Değerlendirme)) modeli en yaygın kullanılan, öğrencilerin ihtiyaçlarına uygun materyallerle öğrenme faaliyetlerinin gerçekleştiği sistematik öğretim tasarımı modellerinden biridir (Özerbaş ve Kaya, 2017; Widyastuti, 2019). Bu model, dijital ortamlara kolaylıkla uygulanabilir, bireyselleştirilmiş ve anlamlı öğrenme sağlar. Martatiyana vd. (2023) çalışmalarında ADDİE modelinin dijital öğretim materyali tasarlamak için etkili bir yöntem olduğunu ifade etmişlerdir.

Tablo 1'de bazı öğretim tasarımı modellerinin güçlü ve zayıf yönleri karşılaştırılarak sunulmuştur.

	Model	**Güçlü yönler**	**Zayıf yönler**
Sınıf Odaklı modeller	ASSURE	Başarılı bir ders materyalinin başka dersler için revize edilmesi, öğrenci grubunun özelliklerine göre planlanması mümkündür.	Başka öğrenci grubuna uygulanırken tüm aşamaların yeniden planlanması zaman kaybına yol açabilir.
	Morrson- Ross-Kemp	Esneklik sağlaması ve kolay uygulanabilir olması, ekleme ve düzenleme sağlaması, her öğretim düzeyi, kurs ve hizmetiçi eğitim kurslarında kullanılabilir.	Başlangıç aşamasının olmaması ve Zaman alıcı olması
	Gerlach ve Ely	İçerik, öğretmen, öğrenci, zaman, mekân, medya ve kaynakların modeli şekillendirmesi ve sistemli bir tasarım süreci sunması	Herhangi bir aşamada sorun olduğunda en baştaki kazanımların belirlenmesi adımına geri dönülmekte bu da zaman ve emek kaybına yol açar.
	PIE	Aşamalarının az ve genel olması tasarımcıya hakimiyet sağlar. Öğretmenlerin kendi öğretme durumlarına uygun hale getirmesi ve modelin özelleştirilmesi daha kolay olmaktadır. Teknolojinin sınıfa entegrasyonu, uzaktan eğitim ve sanal sınıf ortamlarının oluşması sağlanır.	Önceden planlanmış eğitim ortamlarına uygulandığı için tasarımcının sezgilerini sınırlandırmaktadır.
Ürün odaklı modeller	Bergman ve Moore	Deneme ve revizyona izin vermesi	Eski bir model, pahalı, teknik ve karmaşık süreçleri içermesi sınırlılık yaratabilir.
	Bates	Online öğrenim için toplam maaliyet hesaplanabilmesi	Sadece e-öğrenme uygulamaları için kullanılması
	Seels ve Glasgow	Üretimin verimliliği için sürekli gözden geçirme ve kalıcı tasarımlar yapılması, Yeni başlayan tasarımcılar için rahatlıkla kullanılması ve öğrencilerde çıktıların kalıcılığını sağlaması	Sürekli revizyon ve yenileme tasarım sürecini uzatabilir.
Sistem	Dick-Carey ve Carey	Aşamaların açıklanmasının net olmasın ve adımların uygulanmasının kolay olması	Örneklerin, okul yönetiminden daha çok iş yaşamına dönük örnek uygulamalar açısından zor

Odaklı modeller		sayesinde yeni başlayan tasarımcılar rahatlıkla kullanabilir.	olabilir. Kaynak ve zaman kısıtlı olduğunda uygulanamaz
	Smith ve Ragan	Öğretim stratejilerine yönelik dikkatli ve özenli çözümler bulunması Her düzeydeki eğitim kurumu için kullanılabilir.	Adımların iç içe geçmesi sebebiyle bir adımdaki değişiklik diğer adımlardaki değişikliğe sebep olmaktadır. Tasarımcıya zor bir durum olabilir.
	Diamond	Ekip çalışması, teknolojiyi ve yeniliği desteklemesi	Sadece yükseköğretimde olması, kullanım alanını ve geliştirilmesini sınırlandırmaktadır.
	IPISD	Tasarlanmış alana bağlı olarak davranışçı, bilişsel ve oluşturmacı yaklaşımları kullanabilmesidir.	Tam olarak uygulanması için gereken sürenin uzun olması, Sadece iş kolları ve personel eğitiminde kullanılması, Basamak sayısının fazla olması
	Genrty	Öğretim geliştirilmesi sürecinde farklı tekniklerin kullanılması Büyük projelerin tasarlanmasında kullanılması	Ana basamak olan geliştirme ve destekleme grubundaki tasarım bileşenlerinin kapsamlı olması nedeniyle karmaşık bir tasarım süreci vardır.

Tablo 1. Öğretim tasarımı modellerinin güçlü ve zayıf yönlerinin karşılaştırması ((Keleş vd., 2016)'dan yararlanılmıştır.)

Öğretim tasarımı modellerinin güçlü ve zayıf yanlarını dikkate alarak, en çok kullanılan modellerin kullanıldığı araştırmaların içerik analizinin gerçekleştiği çalışmalar bulunmaktadır. Çatar ve Özdilek (2022) çalışmasında Türkiye'de ASSURE öğretim tasarımı modeliyle ilgili yapılan araştırmaların betimsel içerik analizini gerçekleştirmiş, 2019 yılından sonra yapılan çalışmaların artış gösterdiği, çalışmaların daha çok doktora tezi olduğu sonucuna ulaşılmıştır. Özerbaş ve Kaya (2017) Türkiye'de ADDİE modelinde yapılan çalışmaların içerik analizini gerçekleştirmiş ve modelin birçok disiplinde ve kültürde uygulanabileceği ayrıca eğitim süreçleriyle teknolojiyi birleştirmek isteyenlerin bu modeli kullanabileceğini ifade etmişlerdir. Palabıyık ve Oral (2023) uzaktan eğitimde ADDİE modelinin kullanılmasına yönelik içerik analizinin gerçekleştirildiği çalışmada uzaktan eğitimin öğretim tasarımı ile entegre olmasının zorunlu olduğu sonucuna ulaşmışlardır. Göksu vd. (2014) Türkiye'de öğretim tasarımı modelleriyle ilgili çalışmaların nicel araştırma yönteminin daha çok olduğu, veri toplama aracı olarak "başarı testi ve görüşme formu" çok kullanıldığı sonucuna ulaşmışlardır. Spatioti vd. (2022) çalışmalarında uzaktan eğitim sürecinde ADDİE öğretim tasarımı modelinin kullanıldığı 23 adet makaleyi incelemiş ve modelin çevrimiçi eğitim ortamlarında farklı öğrenme ihtiyaçlarını karşılamakta olduğunu belirtmişlerdir. West and Broup (2014) öğretim tasarımı ve teknolojisi alanında 10 büyük dergideki son 10 yıl (2001-2010) yapılan araştırmaların analizini gerçekleştirmiş ve teknoloji, uzaktan eğitim alanında çalışmaların olduğu, nicel ve nitel çalışmaların neredeyse eşit olduğunu ifade etmişlerdir. Göksu vd. (2021) öğretim tasarımı alanında 1975-2019 yılları arası Web of Science yayınlanmış çalışmaların bibliyometrik analizini gerçekleştirmiş, kitlesel açık çevrimiçi öğrenme, mobil öğrenme, ters çevrilmiş sınıf, oyunlaştırma, arttırılmış gerçeklik anahtar kelimelerine öncelik verildiği görülmüştür.

Öğretim tasarımının yıllar içinde gelişiminin incelenmesi ve bu alandaki çalışmaların ne yönde ilerlediğinin belirlenmesi araştırmacılara yol gösterici olacaktır. Bu bağlamda bu çalışmanın amacı, Türkiye'de öğretim tasarımı alanında yapılan lisansüstü çalışmaların yayın yılları, türleri, yayınlandığı anabilim dalı, araştırma yaklaşımları, araştırma grupları, veri toplama araçları ve veri analiz yöntemleri bakımından incelemektir.

Problem

Türkiye'de öğretim tasarımı alanında yapılan lisansüstü çalışmaların;

1. Yayın yıllarına göre dağılımı nasıldır?
2. Türlerine göre dağılımı nasıldır?

3. Yayınlandığı anabilim dalına göre dağılımı nasıldır?
4. Araştırma yaklaşımlarına göre dağılımı nasıldır?
5. Araştırma gruplarına göre dağılımı nasıldır?
6. Veri toplama araçlarına göre dağılımı nasıldır?

Veri analiz yöntemlerine göre dağılımı nasıldır?

Yöntem

Bu çalışma, nitel veri yaklaşımlarından derleme (alanyazın taraması) türünde hazırlanmış ve doküman analizi yönteminden faydalanılmıştır. Doküman analizi yöntemi, birincil veya ikincil kaynaklardan elde edilen verilerin gözden geçirilmesi, sorgulanması ve analizidir. (Özkan, 2023). Bu yöntemde amaca yönelik olarak incelenen belgelerden anlam çıkarmak, verilerin incelenmesi ve yorumlanması söz konusudur (Palabıyık ve Oral, 2023).

Verilerin toplanması ve analizi süreci

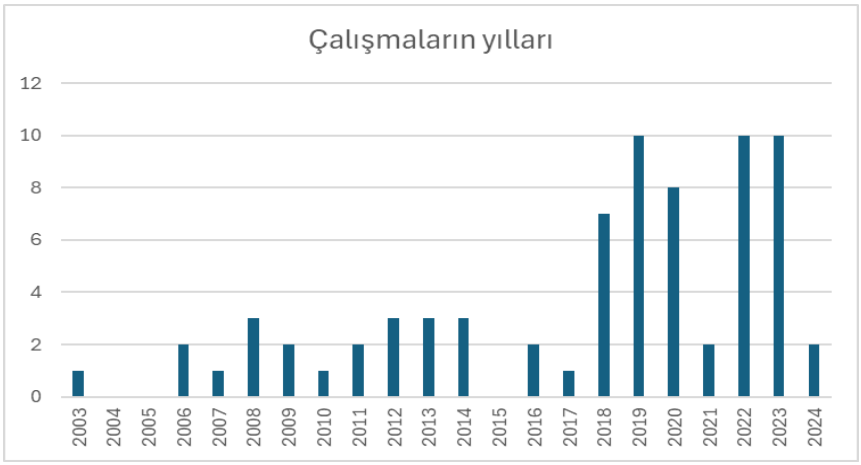
Çalışmanın verilerini, Ulusal Tez Merkezinde "öğretim tasarımı" kelimesi yazılarak erişime açık olan tüm lisansüstü çalışmalar oluşturmaktadır. Bu kapsamda erişime açık yüksek lisans ve doktora tezlerinden 74 tanesi incelenmiştir. Bu çalışmaların özetleri okunmuş Microsoft Word'de tablo haline getirilmiştir. Bu tablo 8 bölümden oluşmaktadır. Tabloda tezlerin künyesi, yılı, yayınlandığı anabilim dalı, araştırma yaklaşımı, araştırma grubu, veri toplama aracı ve veri analiz yöntemleri bulunmaktadır. Bu veriler içerik analizi tekniği ile analiz edilmiştir. İçerik analizi, dokümanların kodlarla özetlenerek anlamlandırıldığı tekniktir. (Büyüköztürk vd., 2019). İçerik analizi gerçekleştirilirken, elde edilen dokümanların incelenen değişkenler açısından kodları oluşturulmuştur. Kodlardan elde edilen veriler düzenlenmiş ve sayısal hale getirilerek grafik halinde sunulmuştur. Miles ve Huberman (1994) veri sunumu için çizelgeler ve grafikler yapılmasının, verileri görünür kılma ve kavramsallaştırmada kolaylık sağladığını savunmaktadır (Baltacı, 2017). Çalışmada verilerin analizinde güvenirlilik iki farklı kodlayıcının (bir araştırmacı ve bir öğretim tasarımı alanı uzmanı) Miles ve Huberman formülüyle hesaplanmış ve uyum oranı %95 olarak bulunmuştur. Miles ve Hubermana göre %80 görüş birliği olması gerekmektedir. (Miles ve Huberman, 1994; Patton, 2002).

Bulgular

Bu bölümde, çalışma kapsamında, Türkiye'de öğretim tasarımı alanında gerçekleştirilen lisansüstü çalışmaların içerik analizi ile ilgili elde edilen bulgulara yer verilmektedir.

İncelenen çalışmaların yayın yıllarına göre dağılımı

"Yayın yıllarına göre dağılımı nasıldır?" alt problemine ilişkin lisansüstü çalışmalar ile ilgili bulgular Grafik 1'de gösterilmektedir.

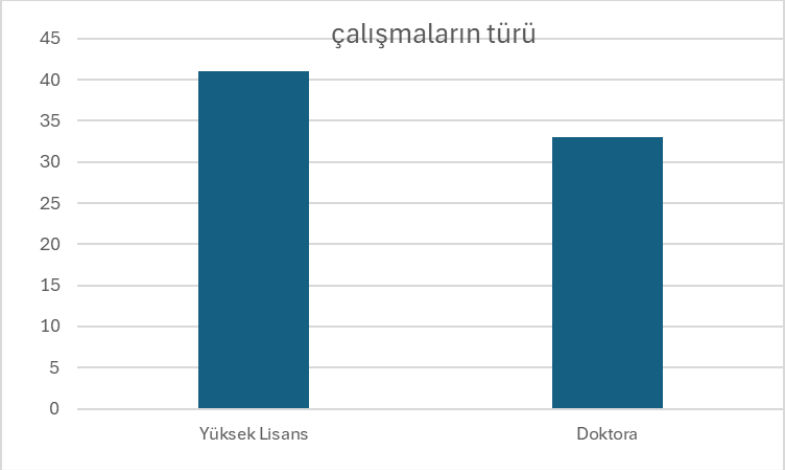


Grafik 1. *Lisansüstü çalışmaların yıllara göre dağılımı*

Grafik 1'den Türkiye'de öğretim tasarımı alanında yayınlanan lisansüstü çalışmaların, 2003-2024 arasında gerçekleştiği; 2019, 2022 ve 2023 yıllarında fazla olduğu ve çalışmaların son yıllarda artmış olduğu görülmektedir.

İncelenen çalışmaların türlerine göre dağılımı

"Türlerine göre dağılımı nasıldır?" alt problemine ilişkin lisansüstü çalışmalar ile ilgili bulgular Grafik 2'de verilmiştir.

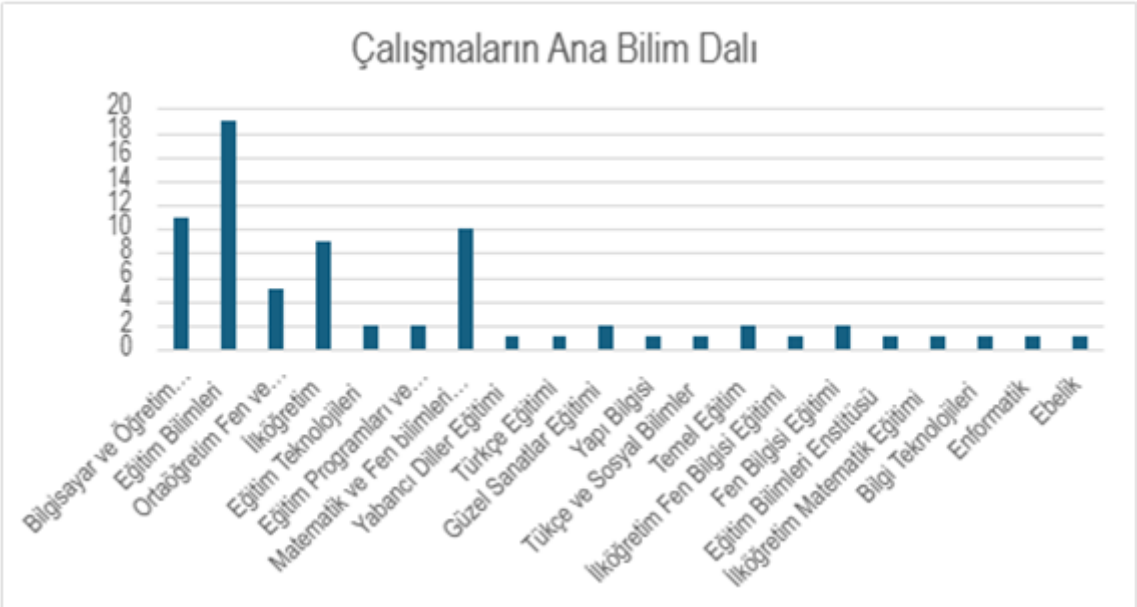


Grafik 2. *Lisansüstü çalışmaların türlerine göre dağılımı*

Grafik 2'den Türkiye'de öğretim tasarımı alanında yapılan lisansüstü çalışmaların türlerine göre dağılımında; Yüksek Lisans çalışmalarının daha fazla olduğu görülmektedir.

İncelenen çalışmaların yayınlandığı anabilim dallarına göre dağılımı

"Yayınlandığı anabilim dalına göre dağılımı nasıldır?" problemine ilişkin lisansüstü çalışmalar ile ilgili bulgular Grafik 3'te verilmiştir.

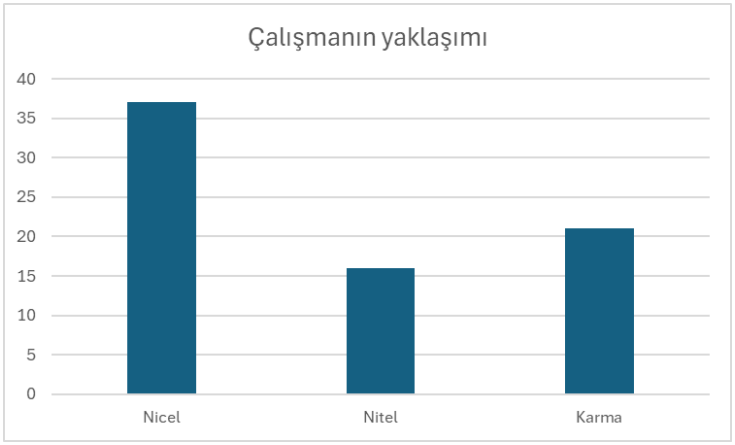


Grafik 3. Lisansüstü çalışmaların Ana Bilim dalına göre dağılımı

Grafik 3'te Türkiye'de öğretim tasarımı alanında lisansüstü çalışmaların Ana Bilim dalına göre dağılımında en çok Eğitim bilimleri ana bilim dalı olduğu görülmektedir.

İncelenen çalışmaların araştırma yaklaşımlarına göre dağılımı

"Araştırma yaklaşımlarına göre dağılımı nasıldır?" alt problemine ilişkin lisansüstü çalışmalar ile ilgili bulgular Grafik 4'te verilmiştir.

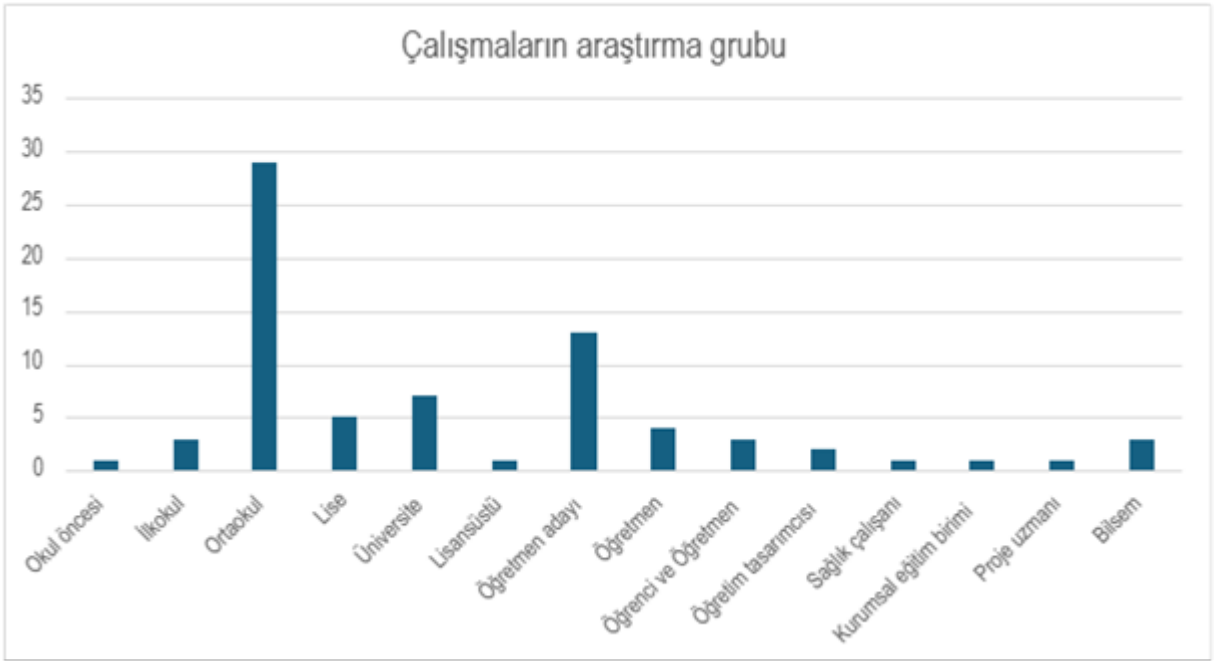


Grafik 4. *Lisansüstü çalışmaların araştırma yaklaşımlarına göre dağılımı*

Grafik 4'te Türkiye'de öğretim tasarımı alanında yapılan lisansüstü çalışmaların araştırma yaklaşımlarına göre dağılımında nicel araştırma yaklaşımlarının fazla olduğu görülmektedir. Nitel araştırma yaklaşımları diğerlerine göre daha az tercih edilen araştırma yaklaşımıdır.

İncelenen çalışmaların araştırma gruplarına göre dağılımı

"Araştırma gruplarına göre dağılımı nasıldır?" alt problemine ilişkin lisansüstü çalışmalar ile ilgili bulgular Grafik 5'te verilmiştir.

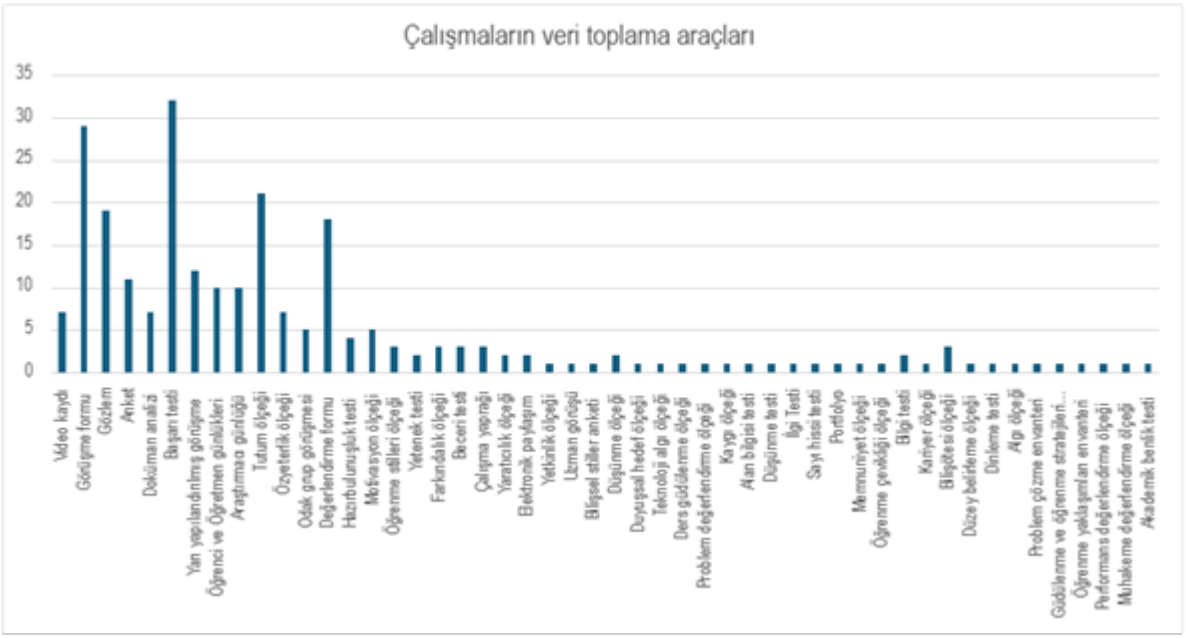


Grafik 5. *Lisansüstü çalışmaların araştırma gruplarına göre dağılımı*

Grafik 5'te Türkiye'de öğretim tasarımı alanında yapılan lisansüstü çalışmaların araştırma gruplarına göre dağılımında en çok ortaokul düzeyinde araştırma grubunun kullanıldığı görülmektedir.

İncelenen çalışmaların veri toplama araçlarına göre dağılımı

"Veri toplama aracına göre dağılımı nasıldır?" alt problemine ilişkin lisansüstü çalışmalar ile ilgili bulgular Grafik 6'da verilmiştir.

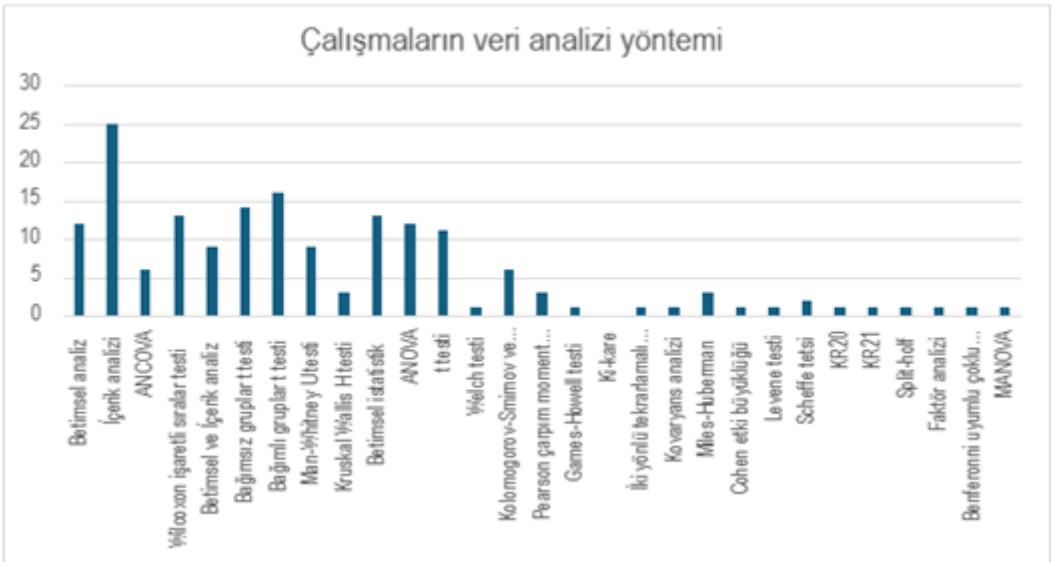


Grafik 6. *Lisansüstü çalışmaların veri toplama araçlarına göre dağılımı*

Grafik 6'da Türkiye'de öğretim tasarımı alanında lisansüstü çalışmaların veri toplama araçlarına göre dağılımında en çok başarı testleri kullanıldığı ve sırasıyla görüşme formu, tutum ölçeği, gözlem ve değerlendirme formunun da diğerlerine göre fazla kullanıldığı görülmektedir.

İncelenen çalışmaların veri analizi yöntemlerine göre dağılımı

"Veri analiz yöntemine göre dağılımı nasıldır?" alt problemine ilişkin lisansüstü çalışmalar ile ilgili bulgular Grafik 7'de verilmiştir.



Grafik 7. *Lisansüstü çalışmaların veri analizi yöntemine göre dağılımı*

Grafik 7'de Türkiye'de öğretim tasarımı alanında lisansüstü çalışmaların veri analizi yöntemlerine göre dağılımında en çok içerik analizi yönteminin tercih edildiği görülmektedir.

Sonuç ve Tartışma

Çalışmanın 1.alt probleminin bulguları incelendiğinde; çalışmaların son yıllarda arttığı ve 2019, 2022 ve 2023' de diğer yıllara göre fazla olduğu görülmektedir. Son yıllarda gelişen teknoloji, yaşanan pandemi ve doğal afetler, öğrenme-öğretme sürecinde yeni yaklaşımları gündeme getirmektedir. Bu nedenle eğitim-öğretim faaliyetlerinin yeniden düzenlenmesi ve planlanması gerektiği sonucuna varılmış ve bu durum öğretim tasarımı

çalışmalarının artmasına neden olmuş olabilir. Bulunan bu sonuç literatürdeki bazı çalışmalarla benzerlik göstermektedir. Çatar ve Özdilek (2022), 2015-2021 yılları arasında ASSURE modeliyle ile ilgili yapılan çalışmaları incelediklerinde 2019 yılından sonra bir artış olduğu görülmektedir.

Çalışmanın 2.alt probleminin bulguları incelendiğinde; yüksek lisans çalışmalarının daha fazla olduğu görülmektedir. Doktora tezi hazırlama süreci daha uzun olduğundan çalışmaların daha az olduğu söylenebilir.

Çalışmanın 3.alt probleminin bulguları incelendiğinde; eğitim bilimleri dalında çalışmaların fazla olduğu görülmektedir. Eğitim bilimleri, öğrenme-öğretme kuram ve yaklaşımlarının incelendiği bir alandır. Öğretim tasarımı bu kuram ve yaklaşımları kullanarak öğrenme ortamlarının düzenlenmesi sağlar.

Çalışmanın 4.alt probleminin bulguları incelendiğinde; nicel çalışmaların daha fazla olduğu görülmektedir. Nicel yaklaşımların istatistiksel ve tarafsız sonuçlarının genellenebilmesi, gruplar arası karşılaştırmalar yapılabilmesi ve büyük örneklemlerden faydalanılması gibi nedenlerden daha fazla tercih edildiği söylenebilir. Göksu vd. (2014) çalışmalarında nicel yaklaşımın daha fazla kullanıldığı sonucuna ulaşmışlardır. Bu çalışmanın sonucuyla parallellik göstermektedir.

Çalışmanın 5. alt probleminin bulguları incelendiğinde; ortaokul öğrencilerinin tercih edildiği görülmektedir. Ortaokul öğrencileri ilköğretim düzeyinde öğrencilerdir bu bakımdan bu çalışmanın sonucu literatürdeki bazı çalışmalarla paralellik göstermektedir (Göktaş vd, 2012; Atalan, 2022). Ortaokul düzeyinde öğrencilerin bilişsel dönemleri dikkate alındığında bu öğrencilere sunulabilecek seçeneklerin çok olmasından bu düzeydeki öğrenciler daha fazla tercih edilmiş olabileceği düşünülmektedir.

Çalışmanın 6.alt probleminin bulguları incelendiğinde; en fazla tercih edilen "başarı testi" olmuştur. Sırasıyla görüşme formu, tutum ölçeği, gözlem ve değerlendirme formu diğer veri toplama araçlarına göre sayıca daha fazladır. Nicel yaklaşımların daha çok tercih edilmesi "başarı testi" kullanımını arttırmış olabilir. Göksu vd. (2014) bu çalışmanın sonuçlarına benzer şekilde "başarı testi" nin daha fazla tercih edildiği sonucuna ulaşmışlardır.

Çalışmanın 7.alt probleminin bulguları incelendiğinde; en çok içerik analizi tercih edilmiştir. İçerik analizi; verilerin sistematik ve derinlemesine inceleme ve anlamlandırma sağlaması ayrıca nicel ve nitel verilerle çalışma olanakları (Metin ve Ünal, 2022) sayesinde daha fazla tercih edilmiş olabilir.

Doktora tezlerinin öğretim tasarımı konu alanında gerçekleştirilmesi önerilmektedir. Böylece yeni gelişen teknolojilerin incelenerek endüstrinin, özel sektörün, üniversitelerin ve hükümetin araştırma ve geliştirme alanındaki uzman ihtiyacının karşılanması sağlanabilir. Bu sayede toplumsal ve ekonomik sorunlara yenilikçi çözümler üretilebilir.

Zengin ve çok yönlü bakış sağlanarak öğretim tasarımı konu alanının kapsamlı analizinin yapılabilmesi için farklı düzeyde araştırma grupları kullanılması önerilmektedir.

Karma araştırma yaklaşımlarının; çok yönlü, kapsamlı ve bütüncül bir bakış açısı sağlaması, verilerin güçlenmesi gibi avantajları olduğundan çalışmaların yaklaşımlarının bu yönde ilerlemesi önerilmektedir.

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Yükseköğretim Öğrencilerinin Uzaktan Eğitimde Derse Devamlılıkları Üzerine Nitel Bir Araştırma

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Özet

Uzaktan eğitim, pandemi sürecinde eğitim uygulamalarının kesintiye uğramadan devam etmesini sağlayarak günümüz eğitim sisteminin vazgeçilmez bir parçası haline gelmiştir. Ancak bu değerli rolüne karşılık uzaktan eğitimde derslere katılımın ve dersi tamamlama oranlarının düşük olması ciddi endişe kaynağı olmaya devam etmektedir. Dolayısıyla uzaktan eğitimde öğrenci katılımının araştırılması ve katılımı teşvik edecek stratejilerin geliştirilmesi büyük önem taşımaktadır. Bu araştırma, nitel yaklaşım benimsenerek yükseköğretim öğrencilerinin uzaktan eğitimde derse devamlılıklarını etkileyen faktörleri belirlemeyi amaçlamaktadır. Araştırmada iki odak grup görüşmesi ile yarı yapılandırılmış görüşmeler gerçekleştirilerek toplamda 24 üniversite öğrencisinden veri toplanmıştır. Görüşmelerden elde edilen veriler içerik analizine tabi tutularak kod ve temalar oluşturulmuştur. Araştırma sonucunda öğrenci, öğretici ve ders süreci boyutlarında toplam 17 faktör belirlenmiştir. Buna göre öğrenci bağlamında ev ortamı, dijital ihtiyaçlar, kamera/mikrofon kullanımı, motivasyon, dersten kalma endişesi, dijital yeterlilik ve öğrenme stili faktörleri ortaya çıkmıştır. Öğretici temasında ise başta öğretim yöntemi olmak üzere öğretici görüntüsünün ders esnasında açık olması ve öğreticinin asenkron paylaşım yapması öğrencilerin derslere katılımlarını ve devamlılıklarını etkilemektedir. Ders süreci ile ilgili olarak devam zorunluluğunun olmaması, sınıf ortamı eksikliği, kaydı sonradan izleyebilme, teknik sorunlar, ders süresinin uzun olması, dersteki öğrenci sayısı ve ders saati faktörlerine ulaşılmıştır. Bu sonuçlar doğrultusunda öğreticilere ve kurumlara yönelik öneriler sunulmaktadır.

Anahtar Kelimeler: Uzaktan eğitim, çevrim içi öğrenme, derse katılım, öğrenci katılımı, yükseköğretim

A Qualitative Study on Higher Education Students' Course Attendance in Distance Education

Abstract

Distance education has become an indispensable part of today's education system by ensuring that educational practices continue without interruption during the pandemic. However, despite this valuable role, low attendance and course completion rates in distance education remain a cause for concern. Therefore, it is important to investigate student attendance in distance education and develop strategies to encourage participation. This research aims to determine the factors affecting higher education students' course attendance in distance education by adopting a qualitative approach. Two focus group discussions and semi-structured interviews were used as data collection tools and data were collected from 24 university students in total. The data obtained from the interviews were subjected to content analysis and codes and themes were obtained. As a result of the research, a total of 17 factors were identified in the dimensions of student, instructor and course process. Accordingly, in the context of the student; home environment, digital needs, camera/microphone use, motivation, concern about failing the course, digital competence and learning style factors emerged. In the instructor theme, especially the teaching method, the fact that the image of the instructor is open during the lesson and the asynchronous sharing of the instructor affect the participation and attendance of the students. Regarding the course process, factors such as the lack of attendance requirement, lack of classroom environment, the ability to watch the recording later, technical problems, the length of the course, the number of students in the course and the course hours were found. In line with these results, suggestions for instructors and institutions are presented.

Keywords: Distance education, online learning, course attendance, student participation, higher education

Giriş

Uzaktan eğitim, mevcut teknolojileri en verimli şekilde kullanarak öğreten, öğrenen ve öğrenme kaynakları arasındaki sınırları kaldırmayı hedefleyen disiplinlerarası bir alan olarak ifade edilmektedir (Bozkurt, 2017). Coğrafi konumdan bağımsız olarak eğitime erişimi sağlaması yönüyle yükseköğretim kurumlarında popüler hale gelen uzaktan eğitimin kişiye özel öğrenme deneyimi sunma, öğrenci merkezli olma ve maliyet tasarrufu sağlama gibi avantajları da bulunmaktadır (O'Lawrence, 2005). Bu avantajlar 2015 yılında Birleşmiş Milletler tarafından yayınlanan Sürdürülebilir Kalkınma Amaçları ile ilişkilendirilebilir. Nitekim kalkınma amaçlarının boyutlarından biri olan "Nitelikli Eğitim" ile "kapsayıcı ve hakkaniyete dayanan nitelikli eğitimi sağlamak ve herkes için yaşam boyu öğrenim fırsatlarını teşvik etmek." amaçlanmaktadır. Eğitimle ilgili diğer maddelerde de eşitlik, erişilebilirlik ve kaliteli eğitim vurgusu yapılmaktadır (Birleşmiş Milletler, 2022). Uluslararası çağrılara yanıt vermesinin ötesinde uzaktan eğitim acil durumlarda da üstlendiği kritik rol ile ön plana çıkmaktadır. Covid-19 salgını sebebiyle eğitim kurumlarının kapatılması ile dünyada tüm eğitim düzeylerinden 1.5 milyar öğrencinin (%90) eğitimi kesintiye uğramıştır (UNESCO, 2020). Bu süreçte uzaktan eğitim kurtarıcı rol oynayarak (Can, 2020) tüm eğitim seviyelerinde odak nokta haline gelmiştir (Geçer vd., 2023). Türkiye'de de bu bağlamda ilköğretimden yükseköğretime kadar tüm kademelerde acil uzaktan eğitim sürecine geçilmiştir (Bozkurt, 2020). Bununla birlikte, ülkemizde 6 Şubat 2023 tarihinde Kahramanmaraş merkezli meydana gelen depremler sonrasında YÖK tarafından uzaktan eğitim kararı alınarak yükseköğretim kurumlarında tekrar uzaktan eğitim süreci yaşanmıştır (YÖK, 2023).

Belirtilen katkılarının yanında uzaktan eğitim, daha fazla öz disiplin gerektirmesi, öğrencilerde yalnızlık hissine sebep olması, internet ihtiyacı ve teknik problemlerin yaşanması gibi bazı güçlükleri de beraberinde getirmektedir (O'Lawrence, 2005). Ayrıca, uzaktan eğitimde derse aktif katılımın ders başarısını etkilemesine rağmen (Hawkins vd., 2017) derse devamlılık oranlarının düşük olduğu da belirtilmektedir (Xavier & Meneses, 2020). Çevrim içi öğrenmede öğrenci devamlılığını etkileyen bazı faktörler; kurumsal destek hizmetlerinin yetersizliği (Aversa & MacCall, 2013; Muljana & Luo, 2019), öğretici kaynaklı etkileşim eksikliği (O'Neill & Sai, 2014), yetersiz geri bildirim (Shah & Cheng, 2018; Shaikh & Asif, 2022), memnuniyet (Joo vd., 2011), motivasyon (Nichols, 2010), ev ortamı (Güven vd., 2022), dijital beceriler (Blau vd., 2016) ve öğrencinin dijital ihtiyaçları (Güven vd., 2022; Parkes vd., 2015) şeklinde sıralanmaktadır. Dersin içeriği, uygunluğu, yapılandırılma biçimi ve öğreticinin öğrenmeyi kolaylaştırmak amacıyla sunduğu rehberliğin de öğrencilerin uzaktan eğitimde kalıcılıklarını etkileyebileceği belirtilmektedir (Shaikh & Asif, 2022). Bu çerçevede, ders başladıktan sonraki eğitim sürecinin öğrencilerin dersi bırakma kararları üzerinde önemli bir rol oynadığı ve bu süreçteki en önemli faktörün de öğreticinin niteliği olduğu ifade edilmektedir. Öğreticilerin uzaktan eğitime olan inancı, deneyimi ve dersleri önemseme derecesinin öğrencilerin derse devamlılıklarına yön verebileceği düşünülmektedir (Bağrıaçık Yılmaz & Karataş, 2022). Öte yandan öğrencinin öz düzenleme (Bağrıaçık Yılmaz & Karataş, 2022; Lee vd., 2013) ve zaman yönetimi (Aydın vd., 2019) gibi becerilerin de uzaktan eğitimde aktif kalmalarını etkilediği ifade edilmektedir. Güven ve diğerleri (2022) ise derse ilgi ve merak duyma, kişisel öğrenme kazanımları ve öğreticinin alan bilgisi faktörlerini uzaktan eğitimde öğrencilerin devam etme gerekçeleri olarak ortaya koymaktadır.

Uzaktan eğitimde öğrenci devamlılığını etkileyen faktörlerin zaman içinde ve bağlama göre farklılaşabileceği açıktır. Olası faktörlerin bağlamsal olarak belirlenerek gerekli önlemlerin alınması, uzaktan eğitimin başarıya ulaşması için oldukça kritiktir. Bu sebeple araştırmada hem Covid-19 döneminde hem de Şubat 2023 depremleri sürecinde uzaktan eğitimi deneyimleyen yükseköğretim öğrencilerine odaklanılarak ilgili deneyimler doğrultusunda derslere devamlılıkları araştırılmaktadır. Elde edilen bulgular ışığında öğrencilerin derslere devamlılığının sağlanmasına yönelik kurumlara ve öğreticilere öneriler sunulmaktadır. Bu çerçevede araştırma kapsamında aşağıdaki araştırma sorusuna yanıt aranmaktadır:

Yükseköğretim öğrencilerinin uzaktan eğitimde derse devamlılıklarını etkileyen faktörler nelerdir?

Yöntem

Araştırmada yükseköğretim öğrencilerinin uzaktan eğitime devamlılıklarını etkileyen faktörleri derinlemesine incelemek için durum çalışması (case study) yöntemi kullanılmıştır. Durum çalışması, bireysel deneyimlerden kişiler arası ilişkilere kadar gerçek yaşam durumlarını bütünsel bir bakış açısıyla ele alarak "nasıl" ve "niçin" sorularına cevap aramaktadır (Yin, 2003).

Araştırma Grubu

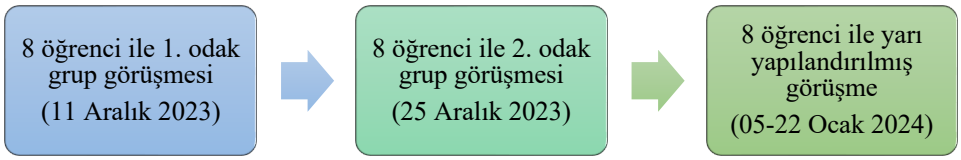
Araştırma kapsamında amaçlı örnekleme yöntemlerinden ölçüt örnekleme yöntemi ile uzaktan eğitim deneyimi olan toplam 24 üniversite (devlet) öğrencisi belirlenmiştir. Amaçlı örnekleme, araştırma sorularına cevap verecek, bilgi bakımından zengin durumları seçmeye odaklanan bir yöntemdir. Ölçüt örnekleme ise belli niteliklere sahip

katılımcılara, olaylara veya durumlara odaklanmaktadır (Büyüköztürk vd., 2014). Bu doğrultuda araştırma grubu, Covid-19 salgını sebebiyle lise döneminde, Kahramanmaraş merkezli Şubat 2023 depremleri sebebiyle de üniversitenin ilk yılında uzaktan eğitim sürecini yaşamış 2. sınıf öğrencilerinden oluşmaktadır.

Veri Toplama Süreci

Araştırma kapsamında öğrencilerin uzaktan eğitim deneyimlerine yönelik derinlemesine veriler elde edebilmek amacıyla iki odak grup görüşmesi ve yarı yapılandırılmış görüşmeler gerçekleştirilmiştir. Odak grup görüşmelerindeki grup içi etkileşim katılımcılardan daha fazla bilgi edinilmesi için oldukça önemli görülmektedir. Farklı bakış açıları ve deneyimler, zengin bir bilgi akışı oluşturarak derin ve kapsamlı bulgular elde edilmesini sağlar (Çokluk vd., 2011). Yarı yapılandırılmış görüşmeler ise, katılımcıların kendilerini daha fazla ifade etmelerine olanak tanır (Büyüköztürk vd., 2018). Bu sebeple araştırmada hem grup etkileşiminden yararlanmak hem de bireysel derinliği sağlayabilmek amacıyla her iki görüşme yöntemi de kullanılmıştır.

Odak grup görüşmeleri sekizer öğrencinin katılımıyla toplam 16 öğrenci ile gerçekleştirilmiştir. Odak grup görüşmeleri sonrasında sekiz öğrenci ile yarı yapılandırılmış bireysel görüşmeler yapılmıştır (Şekil 1).

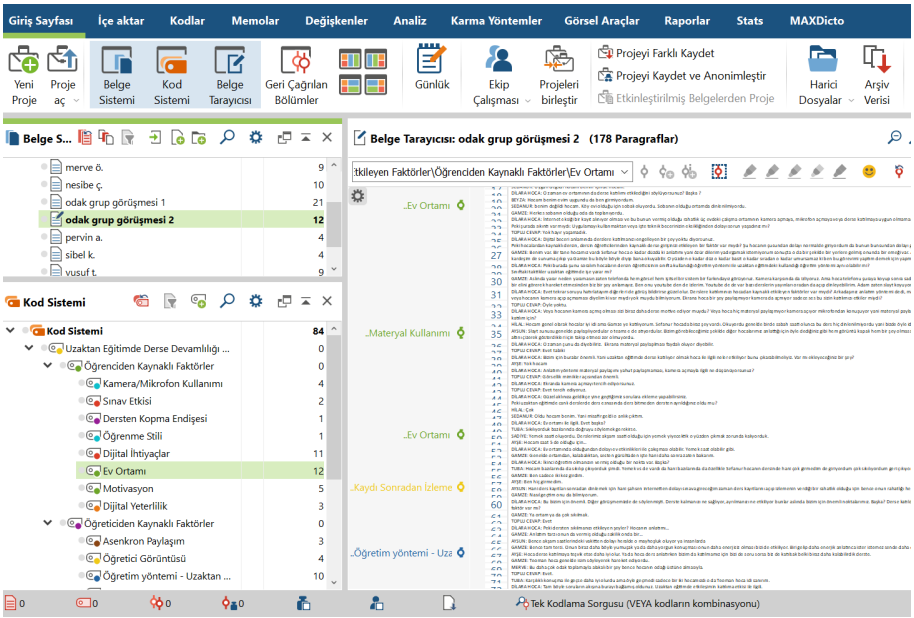


Şekil 1. Veri toplama süreci

Odak grup görüşmeleri ve yarı yapılandırılmış görüşmeler için araştırmacı tarafından görüşme soruları hazırlanmıştır. Görüşme soruları, öğrencilerin uzaktan eğitim deneyimleri bağlamında derslere katılma veya katılmama gerekçelerine odaklanmaktadır. Hazırlanan soruların amaca uygunluğunu, anlaşılırlığını ve uygulanabilirliğini değerlendirmek için bir alan uzmanından görüş alınmıştır. Uzmandan gelen geri bildirimler doğrultusunda görüşme formu düzenlenerek son haline getirilmiştir. Tüm görüşmeler yüz yüze gerçekleştirilmiş olup katılımcıların onayı ile ses kaydı alınmıştır. Ses kayıtları daha sonra transkript edilerek nitel veri analizi uygulamasına aktarılmıştır. Odak grup görüşmeleri 25-30 dakikada, bireysel görüşmeler ise yaklaşık 10 dakikada gerçekleşmiştir.

Verilerin Analizi

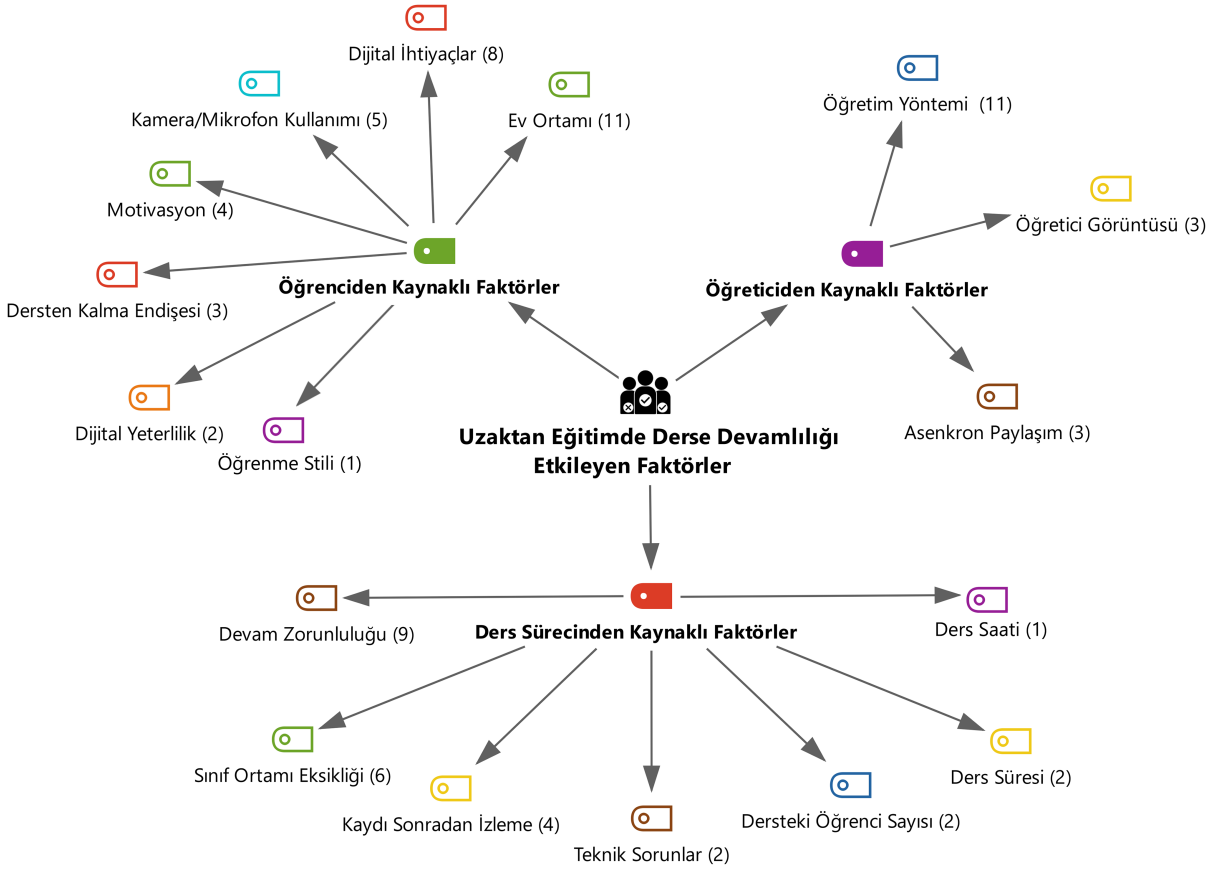
Araştırmada toplanan veriler, analiz süreçlerinin güvenilirliğini artırmak için MAXQDA 2020 uygulamasına aktarılarak içerik analizi tekniği ile çözümlenmiştir. Bu süreçte birbiri ile ilişkili ve tekrarlanan veriler gruplandırılarak kodlar, kodlar gruplandırılarak ise temalar oluşturulmuştur.



Şekil 2. Veri analiz sürecine ait ekran görüntüsü

Bulgular

Araştırmanın veri analizi sonucunda öğrencilerin uzaktan eğitimde derse devamlılıkları ile ilgili "öğrenciden kaynaklı faktörler, öğreticiden kaynaklı faktörler ve ders sürecinden kaynaklı faktörler" olmak üzere üç tema ve toplam 17 kod ortaya çıkmıştır (Şekil 3).



Şekil 3.Uzaktan eğitimde derse devamlılığı etkileyen faktörler

Araştırma bulguları ulaşılan temalar altında başlıklar halinde açıklanmaktadır. Bulguların sunumunda katılımcı görüşleri, gizlilik esası doğrultusunda isimleri "K1, K2, K3" şeklinde kodlanarak verilmektedir.

Öğrenciden Kaynaklı Faktörler

Araştırma verilerine göre, öğrencilerin ev ortamı, dijital ihtiyaçları, kamera/mikrofon kullanım durumları, motivasyonları, dersten kalma endişeleri, dijital yeterlilik seviyeleri ve öğrenme stillerinin uzaktan eğitime devamlılıklarını etkilemektedir. "Ev ortamı" faktörü 11 katılımcı tarafından ifade edilerek öğrenci kaynaklı faktörler içinde öne çıkmıştır. Ev ortamı ile ilgili eksiklikleri öğrencilerin dijital ihtiyaçları takip etmektedir (f=11).

Ev Ortamı

Öğrenciler, evde kendilerine ait odaları olmamaları ve aile bireylerinin sayısının fazla olması sebebiyle ev ortamlarının uzaktan eğitime katılmak için uygun olmadığını belirtmişlerdir (K1, K2, K3, K4, K5, K7, K8, K10, K12, K17, K23). Ayrıca ev ortamı faktörünün öğrencilerin katıldıkları derslerde de kamera ve mikrofon kullanımlarını kısıtladığı ifade edilmiştir. Ev ortamı faktörü ile ilgili aşağıda bazı öğrenci görüşleri sunulmaktadır:

«Yemek saati oluyordu. Derslerimiz akşam saati olduğu için yemek yiyecektik o yüzden çıkmak zorunda kalıyorduk.» (K17)

«Biz kalabalık bir aileyiz yani benim kardeş sayısı çok fazla var yani onun için uygun olmuyordu odaya falan gidiyordum. Bazen misafir geldiği zaman anneme derdim sessizlik olsun, ses çıkmasın falan. Ortamım çok çok müsait olmuyordu. Zaten çok müsait olmadığım için çok fazla derslere de katılamadım.» (K4).

Dijital İhtiyaçlar

Dijital ihtiyaçlar faktörü, öğrencilerin uzaktan eğitime katılmaları için gerekli olan internet bağlantısı, bilgisayar veya mobil cihazlara yönelik ihtiyaçları temsil etmektedir (K1, K2, K3, K4, K5, K8, K12, K18). İnternet ile ilgili olarak bazı öğrenciler sınırsız internet bağlantısı olmadığı, bazıları ise yaşadıkları yerleşim yerinde (köy, yayla gibi) internet alt yapısının bulunmadığı gerekçesiyle derslere devam etmediklerini belirtmişlerdir. Öte yandan birkaç öğrenci bilgisayar gerektiren uygulama derslerine bilgisayara erişemediklerinden dolayı katılamadıkları ve ödevleri yapamadıklarını ifade etmişlerdir. Örnek görüşler şöyledir:

«Ben köyde yaşadığım için pek derslere katılamıyordum keza internet paketim de o kadar yetmiyordu derse katılmam için bende sadece belli başlı derslere giriyordum bazen ise giremiyordum o yüzden öyle.» (K3)

«Trabzon da yaşıyorum ve yüksek bir yerde olduğum için internet genellikle ya çekiyor ya çok az çektiği için derslere katılamadım.» (K1).

Kamera/Mikrofon Kullanımı

Senkron derslerde öğretici ve öğrencilerin kamera açmaları ile ilgili öğrencilerin farklı yönlerden görüşleri bulunmaktadır (K3, K6, K15, K20, K24). Bazı öğrencilerin kamera açma zorunluluğu olmadığı için derse katılmalarına rağmen bulunduğu ortamda farklı işlerle meşgul oldukları ifade edilmiştir. Bazı öğrenciler ise derse katılan herkesin kamera açmasının sınıf atmosferi oluşturacağı için daha fazla derse katılmak isteyeceklerini belirtmiştir. Bu görüşlerin dışında K15, kamera açılmadığı için derslere sözlü olarak daha rahat bir şekilde katıldığını dile getirmiştir.

«Hocalar arkadaşların isimlerini söylüyordular. Birkaç kez tekrarlamasına rağmen kimse gelmiyordu. Demek ki bırakıp gitmiş sadece derse girmiş o şekilde.» (K6)

«Sınıftaki arkadaşlarımın hepsini ekranda hoca ile birlikte görseydim derse daha fazla katılırdım.» (K21).

Motivasyon

Öğrenciler isteksizlik, öğreticiye yakınlık ve deprem endişesi sebepleriyle derse katılım motivasyonlarının etkilendiğini ifade etmişlerdir (K5, K7, K8, K16). Bazı görüşler aşağıda sunulmaktadır:

«Dersi derste dinlediğim için, çoğu hocayı sevdiğim için sürekli katılmaya çalıştım.» (K5)

«Asıl etkileyen faktör kendi isteksizliğim.» (K8).

Dersten Kalma Endişesi

K3, K8 ve K16 dersten kalma endişesi ile uzaktan eğitimde derslere katıldıklarını belirtmiştir. Bu çerçevede K16 özellikle öğreticinin derste sınava yönelik bilgilendirme veya vurgulama yapma ihtimalinden dolayı derse katıldığını ifade etmiştir. İlgili görüşler şöyledir:

«Bazen hocalar önemli yerlerin altına çizdirip sınavda şu şekilde çıkacak dediği zaman en azından oraları not almasını biliyordum yani.» (K16)

«Derslerde kopukluk yaşarsam dersleri geçmemde zorlanacağımı düşünüyordum o yüzden katılıyordum.» (K3).

Dijital Yeterlilik

Öğrenci görüşmelerinde yalnızca iki öğrenci dijital yeterliliklerinin zayıflığından dolayı uzaktan eğitimde ders sürecinde problem yaşadıklarını belirtmiştir. Görüşler şu şekildedir:

«Teams uygulamasını kullanırken yanımda internetten anlayan veya bilgisayardan anlayan birisi olması gerekiyordu. Gerçekten çok karışıktı.» (K6)

«Uygulamayı kullanamadığım için yanlışlıkla toplantıya girmiştim. Bu şekilde çok sıkıntılar yaşadım, o dersten kaldım mesela geçemedim.» (K5).

Öğrenme Stili

Öğrenciden kaynaklı uzaktan eğitimde derse devamlılığı etkileyen son faktör öğrencinin öğrenme stili olarak belirlenmiştir. İki öğrenci (K5, K6) derslere katılım gerekçesini "dersi derste öğrendiğim/anladığım için" şeklinde gerekçelendirmiştir. Örnek görüş aşağıda sunulmaktadır:

«Ben dersi derste dinlediğim için derslere katılmaya çalışıyordum. Ders çalıştığımda ben pek anlayamıyorum o yüzden dersi derste dinliyorum o yüzden katılıyordum.» (K6).

Öğreticiden Kaynaklı Faktörler

Öğrencilerin uzaktan eğitimde derse devamlılıklarını etkileyen öğretici kaynaklı faktörler; öğretim yöntemi (f=11), öğretici görüntüsü (f=3), ve asenkron paylaşım (f=3) şeklinde ortaya çıkmıştır.

Öğretim Yöntemi

Görüşme verilerine göre katılımcı öğrencilerin yarıya yakını, öğreticinin ders sürecinde kullanmış olduğu öğretim yönteminin derslere katılımlarını etkilediğini ifade etmiştir (K1, K4, K5, K6, K7, K8, K10, K13, K15, K18, K22). Bu çerçevede görüşmelerde katılımcılar özellikle "monoton, sıkıcı, pasif" gibi kelimeler kullanmışlardır. Ayrıca öğreticilerin ders esnasında materyal kullanmasının dersi aktifleştirdiği ve anlamayı kolaylaştırdığı (K13) şeklinde görüşlerin yanında ders sürecinde sadece sunu kullanımı "slayttan okuma veya tek düze ilerleme" olarak değerlendirilmiştir (K4, K5, K8). Öğreticilerin öğretim yöntemi ile ilgili bazı katılımcı görüşleri şöyledir:

"Bazı hocaların dersi pasif ve monoton işlediği için devamlılık durumunda nerdeyse az denecek kadar katıldım." (K1)

"Başka bir hocamız vardı sunu yapıyordu. Sunum üzerinden gidiyordu ve biz bunu daha çok anlıyorduk. Çünkü biz bunu elimizde bir materyal oluyordu. Yani o materyaller her zaman derse katılmamızı hem de daha iyi anlamamızı kolaylaştırıyordu." (K13)

Öğretici Görüntüsü

Üç öğrenci öğreticinin ders esnasında kamera açmamasından dolayı derste kopukluk yaşadığını ve o derse katılmak istemediklerini belirtmiştir (K1, K3, K8). Örnek görüş şu şekildedir:

"Yani yüz yüze olmadığı için birebir onun hocanın mimikleriyle falanda yüz ifadesi ile dersi anlatması benim için daha uygun olurdu. Çoğu hoca açtı ama birkaç hoca açmadığı için biraz zorluk yaşadım." (K1)

Asenkron Paylaşım

Öğretici temasındaki son faktör öğreticinin uzaktan eğitim sürecinde senkron derslerin yanında asenkron paylaşım da yapması ile ilgilidir. Asenkron duyuru ve paylaşımların dersin takibini ve derse gösterilen önemi artırdığı yönünde görüşler bulunmaktadır (K5, K21, K22).

"Mesela hocanın paylaşımları artıyordu derse girme olasılığını artıyordu. Paylaşım yapmayan hocalar için zaten o önemsemiyor biz de önemsemeyelim yapıyorduk, girmiyorduk." (K21).

Ders Sürecinden Kaynaklı Faktörler

Görüşmelerden elde edilen verilerin analizi sonucunda ders sürecinden kaynaklı olarak; devam zorunluluğu, sınıf ortamı eksikliği, kaydı sonradan izleyebilme seçeneği, ders süresi, dersteki öğrenci sayısı, teknik sorunlar ve ders saati faktörlerine ulaşılmıştır. En fazla ifade edilerek öne çıkan faktör ise uzaktan eğitim sürecinde devam zorunluluğunun olmamasıdır.

Devam Zorunluluğu

Sekiz öğrenci (K1, K4, K5, K7, K8, K10, K13, K22) derslere devam zorunluluğuna bağlı olarak derslere katıldıklarını veya katılmadıklarını ifade etmiştir. Belirtilen faktör ile ilgili bazı görüşler şu şekildedir:

"Bazı derslere zorunluluk var diye zaten genelde giriyorduk. Yani girme sebebimiz dersi anlamak için değil, anlamıyorduk çünkü. Hani devamlı görünelim diye giriyorduk." (K10)

"Sınıfta iken yoklama alınıyor ya arkadaşın dediği gibi uzaktan eğitimde de bir yoklama tarzında bir şey olsa aslında herkesin devam şartı olacaktı o yüzden herkesin bir katılma zorunluluğu olabilirdi." (K22)

Sınıf Ortamı Eksikliği

Öğrenciler etkileşim, iletişim ve göz teması eksiliğine vurgu yaparak sınıf ortamı eksikliğinin derslere katılımlarını etkilediğini ifade etmişlerdir. Bu doğrultuda altı katılımcı (K3, K4, K5, K8, K10, K12) görüş bildirmiştir. Ayrıca katılımcılar geleneksel sınıf ortamındaki derslerin daha eğlenceli olduğu ve daha fazla soru cevap yönteminin kullanıldığını belirtmişlerdir. Bazı görüşler şu şekildedir:

"Uzaktan olduğu için, o sınıf ortamında olmadığımız için ister istemez kopukluk oluyordu, derse katılımımız zorlaşıyordu." (K3)

"Sınıf ortamı daha iyi olduğundan daha iyi katılım sağlıyoruz ama uzaktan eğitimi pek ciddiye alamadık." (K10).

Kaydı Sonradan İzleme

Öğrencilerin uzaktan eğitimde dersle katılımlarını etkileyen diğer bir faktör ders kaydının sonradan izlenebilmesidir. Öğrenciler senkron derse katılmak yerine kaydı sonradan izlediklerini ifade etmişlerdir (K3, K15, K18, K19). Bazı görüşler şöyledir:

"Hocayı dinlerken artık ben sıkılıyordum, benim dinleme şeyim yok. En son şey dedim hızlandırıp videosunu izlerim o şekilde alırım notlarımı diye dersten o şekilde ayrılıyordum." (K15)

"Sınava gireceğim zaman ders kayıtlarını açıp izleyebilmenin verdiği bir rahatlık vardı. Bence onun rahatlığı herkeste vardı." (K18).

Ders Süresi

Görüşmelerde iki öğrenci ders sürelerinin uzunluğundan dolayı katıldıkları dersten ayrıldıklarını ve uzun süren derslere tekrar katılmak istemediklerini belirtmişlerdir (K10, K11). Örnek görüş şu şekildedir:

"Birde hocam mesela bir saat bir ders ful işlediği için konsantre olamıyordum. Nasıl anlatayım ben iki saati tam kullanıyor hoca artık belli bir süre sonra kopuyorduk oradan çıkmak zorunda kalıyorduk. Artık uykumuz geliyordu o dersten." (K11).

Dersteki Öğrenci Sayısı

Ders süreci ile ilgili ortaya çıkan kodlardan biri de dersteki öğrenci sayısıdır. İki öğrenci derse katılan öğrenci sayısının öğrencilerin derse katılımlarını etkilediğini ifade etmiştir (K10, K11). Bir öğrenci dersteki katılımcı sayısı fazla olduğunda dersin zenginleştiğini, diğer öğrenci ise katılımcı sayısının fazla olmasının kendilerinin de katılımını teşvik ettiği yönünde görüş bildirmiştir. Görüşler şu şekildedir:

"Yani üç kişi olursa üç örnek verebiliriz ama otuz kişi olduğunda Fatma farklı bir örnek verir hoca daha güzel açıklanır ben farklı bir örnek veririm daha çok detaya inilir. O şekilde daha iyi anlarız. Daha çok katılırız." (K10)

"Arkadaşlar katılıyor, ben de katılayım. Ya da zaten üç kişi girmiş bende çıkayım yani bu düşünce olabilir." (K11)

Teknik Sorunlar

Görüşme verilerine göre yalnızca iki öğrenci teknik sorunların derse katılımlarını etkilediğini ifade etmiştir. Bu sorunların özellikle mikrofon ve sesin iletilmesi ile ilgili olduğu belirlenmiştir.

"Burada da hocalar sesin gelmiyor işte arkadaşlardan gelen mesajlar kesik kesin ses alıyoruz gibi şeyler onu da kullanmanın gereksiz olduğunu düşündürmüştü." (K8)

"Arada bir mikrofon olaylarında internet gidip geldiği için hani mikrofonu açtığın zaman sesin gitmiyordu bu sefer hoca şey diyordu derse katılmıyor musun dersi dinlemiyor musun açıp bıraktın mı." (K4).

Ders Saati

Ders süreciyle ilgili ortaya çıkan son faktör ders saatidir. Bir öğrenci dersin saatinden dolayı derslere katılamadığını ifade etmiştir. İlgili görüş şu şekildedir:

"Bazen çok erken olduğu zamanda girmiyordum derslere." (K4)

Sonuç ve Tartışma

Bu araştırma, yükseköğretim öğrencilerinin uzaktan eğitimde derslere devamlılıklarını etkileyen faktörleri belirlemeyi amaçlamaktadır. Araştırma kapsamında odak grup ve yarı yapılandırılmış görüşmelerle 24 öğrenciden veri toplanmıştır. Verilerin analizi sonucunda öğrenci, öğretici ve ders sürecinden kaynaklı toplam 17 faktörün öğrencilerin derslere devamlılıklarını etkilediği belirlenmiştir. Bu çerçevede öğrenci ile ilgili özellikle ev ortamı ve dijital ihtiyaçların etkisi öne çıkmaktadır. Nitekim bu ihtiyaçların gerekliliği uzaktan eğitimle ilgili benzer çalışmalarda da vurgulanmaktadır (Güven vd., 2022). Öğreticiden kaynaklı olarak öğreticinin uzaktan eğitimde kullandığı öğretim yönteminin öğrencilerin dersten ayrılmalarına ve derse devam etmemelerine sebep olduğu ortaya çıkmıştır. Bu çerçevede, öğrencilerin dersin hedefleriyle ilgili anlamlı görevler ve etkinlikler sunulduğunda (Meşe & Sevilen, 2021) ve ders öğretici tarafından etkili bir şekilde yapılandırıldığında derslere daha yüksek düzeyde katılım gösterdikleri belirtilmektedir (Shaikh & Asif, 2022). Ayrıca öğreticinin uzaktan eğitime olan inancı ve deneyiminin de eğitim sürecine yansıdığı ifade edilmektedir (Bağrıaçık Yılmaz & Karataş, 2022). Öğreticilerin öğrencilerle etkili iletişim kurması, yüksek kaliteli geri bildirim ve rehberlik sunması da gerekli görülmektedir (Muljana & Luo, 2019). Çünkü öğretici iletişimi ve geri bildirimleri uzaktan eğitimde öğrenci motivasyonunu olumlu yönde etkilerken, sınıf arkadaşları ve öğretici ile etkileşimin yetersiz olması motivasyon

düşüklüğüne sebep olmaktadır (Meşe & Sevilen, 2021). Ders süreci bağlamında ise öğrencilerin dersin devam zorunluluğu koşuluna bağlı olarak derse devam ettikleri, devam zorunluluğu olmayan derslere ise katılım sağlamadıkları sonucuna ulaşılmıştır. Bununla ilgili olarak, kurumun devamlılık politikasının (esnek veya katı olması) öğrencilerin derslere devamlılığını etkilediği, öğrencilerin en sıkı devam politikası ile yüksek düzeyde katılım gösterdikleri ifade edilmektedir (Zhu vd., 2019). Ancak her öğrencinin aynı dijital imkanlara sahip olmadığı dikkate alınarak ders kayıtlarının izlenmesinin de devamlılık için yeterli görülebileceği belirtilmektedir (Durak vd., 2020). Öte yandan bu seçeneğin sunulmasının dijital imkânı olan bazı öğrencilerin senkron derslere katılımlarını olumsuz etkilediği sonucuna ulaşılmıştır. Öğretmen adayları ile yapılan bir araştırma da bu bulguyu desteklemektedir (Aslan Altan & Göçen Kabaran, 2022). Elibol ve Bozkurt'a göre (2023), uzaktan eğitimde öğrenci devamlılığı, karmaşık bir sorundur ve tek bir "çözüm" yoktur. Bu nedenle, devamsızlık sorunu insan odaklı bir yaklaşımla ele alınarak öğrenci motivasyonu, memnuniyeti ve bağımsızlığı geliştirilmeye çalışılmalıdır.

Araştırma sonuçları doğrultusunda aşağıda öneriler sunulmaktadır:

- Öğrencilerin dijital ihtiyaçlarına yönelik kurumlar tarafından destek sağlanabilir.
- Öğrencilerin ve öğreticilerin uzaktan eğitim uygulama ve araçlarını etkili bir şekilde kullanabilmeleri için rehber kılavuzlar ve destek hizmetleri sunulabilir.
- Eğitim kurumları tarafından öğreticilerine uzaktan eğitimde kullanılabilecek yöntem ve tekniklerle ilgili eğitimler sunulabilir.
- Kurum tarafından platforma yapay zekâ entegrasyonu sağlanarak 7/24 destek sunulabilir ve öğrencilerin soruları anlık olarak yanıtlanabilir. Bununla birlikte yapay zekâ, öğrenci katılımlarını ve etkileşimlerini analiz ederek kuruma ve öğreticiye riskli öğrenciler hakkında bilgi sağlayabilir.
- Etkileşimi artırmak amacıyla öğreticiler öğrencilerin ders esnasında kamera ve mikrofon kullanımlarını teşvik edebilir.
- Öğreticiler senkron ders esnasında farklı öğrenme türlerine hitap edebilecek metin, video, ses ve görsellerle desteklenmiş materyaller kullanabilir.
- Öğreticiler dersleri ile ilgili asenkron olarak içerik ve duyuru paylaşımı yaparak etkileşimi devam ettirebilir. Ayrıca öğrencilerin soru ve yorumlarına düzenli ve hızlı geri bildirim sağlanmasına da özen gösterilebilir.

Teşekkür

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Öğretmen Adaylarının ve Yapay Zekâ Programlarının "Forrest Gump" Filmine İlişkin Değerlendirmelerinin Karşılaştırılması

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Özet

Bu çalışmanın amacı öğretmen adaylarının "Forrest Gump" filmine ilişkin değerlendirmeleri ile Yapay Zekâ (YZ) programları tarafından yapılan değerlendirmelerin karşılaştırılmasıdır. Öğretmen adayları bu filmi Özel Eğitim dersi kapsamında izlemişlerdir. Öğretmen adayları Matematik ve Fen bilimleri bölümünde öğrenim görmektedir. Çalışmada öğretmen adaylarının özel eğitime gereksinim duyan bireye ilişkin "Forrest Gump" filmi özelinde sahip oldukları farkındalık ortaya çıkarılmaya çalışılmıştır. Ayrıca son dönemlerde pek çok farklı amaçla kullanılan YZ programlarının "Forrest Gump" filmi özelinde verdikleri cevapların ortaya çıkarılması amaçlanmıştır. Son olarak öğretmen adaylarının cevapları ile YZ'nin cevaplarının karşılaştırması yapılmıştır. Böylece YZ'nin verdiği cevapların özel eğitim gibi spesifik konularda ne derece gerçekçi ve insan cevaplarına yakın olduğu anlaşılmaya çalışılmıştır. Öğretmen adaylarının sınıf ortamında karşılaşabilecekleri özel eğitim gereksinimi olan öğrencilerin özellikleriyle ilgili farkındalığa sahip olmaları onları tanıma ve uygun eğitim sağlama noktasında önem taşımaktadır. Diğer yanda yaşamın pek çok alanına giren YZ programlarının özel eğitim gibi spesifik ve hassas bir konuda nasıl bir veri tabanına sahip olduğunun ortaya çıkarılması da gelecekteki olası bir kullanım alanı için YZ programlarının altyapısını ortaya çıkarmak açısından anlamlı olacaktır. Araştırma kapsamında 4. sınıfa devam eden 24 öğretmen adayı ile çalışılmıştır. Öğretmen adaylarının filme ilişkin değerlendirmeleri yazılı olarak alınmıştır. Öğretmen adaylarından filmdeki kahramanın karakteristik özelliklerini filmden sahnelerle örneklendirmeleri istenmiştir. Ayrıca filmin onlarda iz bırakan sahnelerini/sözlerini belirterek bir değerlendirme yapmaları da istenmiştir. Aynı sorular kullanılarak 3 farklı YZ programından (ChatGPT, Gemini ve Copilot) da cevaplar alınmıştır. Yapılan değerlendirmeler içerik analizi yöntemi ile 2 uzman tarafından incelenmiştir. Uzmanlar arası uyum katsayısı 0.87 hesaplanmıştır. Bu değerlendirmeler incelendiğinde öğretmen adaylarının cevaplarında fiziksel ve zihinsel yetersizlik, sosyal ilişkiler ve iletişim, davranışsal özellikler, yetenekler ve başarılar ile duygusal ve kişisel özellikler temaları ortaya çıkmıştır. YZ programlarının verdikleri cevaplarda da benzer şekilde fiziksel ve zihinsel yetersizlik ile duygusal ve kişisel özellikler temaları ortaya çıkmıştır. Chat GPT dışında diğer YZ programlarında sosyal ilişkiler ve iletişim temalarına ulaşılmıştır. Ancak YZ programları davranışsal özellikler ve yetenekler-başarılar temalarını içeren cevaplar vermemiştir. Dikkati çeken bir diğer nokta da öğretmen adaylarının verdikleri cevaplarda daha öznel ifadeler kullanırken YZ programlarının daha nesnel bir dil kullanmasıdır. İz bırakan sahneler/sözler konusunda öğretmen adayları YZ programlarında yer verilmeyen sahneler/sözleri ifade etmişlerdir. Gemini YZ programı iz bırakan sahneleri kullanıcıya görselleştirerek sunmuştur. Öğretmen adaylarının verdikleri cevaplar YZ programlarına göre daha kapsamlı ve ayrıntılı açıklamalara içermiştir. YZ programlarının özel eğitim alanındaki veri tabanları ve film analizi becerileri geliştirilebilir. Farklı filmler ve YZ programları kullanılarak daha kapsamlı araştırmalar yapılabilir.

Anahtar Kavramlar: öğretmen adayları, özel eğitim, yapay zekâ, Forrest Gump

Giriş

Özel gereksinimleri olan çocuklara yönelik eğitim hizmetlerinin önemi gün geçtikçe artmaktadır. Bu hizmetlerin tamamına özel eğitim denilmekte olup özellikle bireyselleştirilmiş eğitim programlarının hazırlanması ve uygulanması bu alandaki en belirgin uygulamaların başında gelmektedir (Eripek, 2000). Öğrencilerin özel gereksinimlerini anlamak ve onlara uygun eğitim hizmetinin sunulması eğitimcilerin öncelikli görevidir. Özel çocuklara öğretmenlik yapacak öğretmen adaylarının bu öğrencilerin ihtiyaçlarına yanıt verebilmesi için gerekli bilgi ve becerilere sahip olması gerekmektedir (Byrd & Alexander, 2020; Leana-Taşçılar, 2014). Bu nedenle öğretmen yetiştirme programlarında öğretmen adaylarının özel gereksinimli öğrencilere yönelik olumlu tutum geliştirmelerine ve özel eğitim yöntemlerini öğrenmelerine odaklanan teorik dersler yer almaktadır (VanWeelden & Whipple, 2007).

Öğretmenlerin ve öğretmen adaylarının özel eğitim gereksinimi olan öğrencilere uygun eğitimi verebilmeleri için teorik bilgiyle birlikte pratik deneyime de sahip olmaları gerekmektedir (Wong vd., 2023). Bu bağlamda farklılaştırma, bireyselleştirilmiş öğretim ve özel eğitimde teknoloji entegrasyonu gibi konularda öğretmenlerin

yetkinliklerini artırmaya yönelik profesyonel gelişim oturumları büyük önem taşımaktadır (Tiwari vd., 2023). Hizmet öncesi süreçte öğretmen adaylarının özel eğitim ihtiyacı olan bireylerle ilgili bilgi ve farkındalıklarının geliştirilmesi, onların bu alanda daha etkili ve duyarlı birer eğitimci olmalarına katkı sunmaktadır (Işıkdoğan Uğurlu, 2023). Öğretmen adayları için özel eğitim dersleri, özel ihtiyaçları olan öğrencilerle etkin bir şekilde çalışmak için gerekli yeterliliklerle donatılmasında çok önemli bir rol oynamaktadır (Sanders, 2011; Blackwell vd., 2017). Bu dersler genellikle öğrencilerin hem kapsayıcı eğitim ortamlarında hem de özel eğitim sınıflarında öğrenme süreçlerini uygulama konusundaki anlayışlarını ve becerilerini geliştirmeye yönelik planlanmaktadır (Rochyadi & Wulandari, 2018).

Filmler ve videoların özel eğitim derslerinde kullanımı, öğretmen adaylarının kavramsal anlayışlarını ve pedagojik becerilerini geliştirmede etkili bir yöntem olarak değerlendirilmektedir (Cretu, 2019; Osmanoğlu, 2016). Filmler, özel eğitim ihtiyaçları olan karakterleri tasvir ederek öğretmen adaylarının bilgi ve becerilerini gerçekten geliştirebilir. Örneğin, "Tara Zameen Par" gibi filmlerdeki semboller analiz edilerek öğretmenlerin problem analizi, öğrenme stillerine uyum sağlama ve ebeveyn koordinasyonu dâhil olmak üzere özel ihtiyaçları olan öğrencilere hitap etme çabaları vurgulanmaktadır (Ghosh, 2016; Şakar vd., 2023). Hollywood sineması, öğretmen eğitimini etkileyerek klişelere meydan okuyan ve eleştirel düşünmeyi teşvik eden temsiller sunmaktadır (Dalle Valle, 2020). Bu tür görsel temsiller, kapsayıcı uygulamaların ve özel gereksinimli öğrencilerin çeşitli ihtiyaçlarının daha derin bir şekilde anlaşılmasını teşvik ederek öğretmen eğitimi için güçlü bir pedagojik araç haline gelmektedir (Burmaizar, 2023). Sonuç olarak, filmlerin öğretmen adaylarının özel eğitim ihtiyacı olan öğrencilere yönelik algılarını ve yaklaşımlarını şekillendirmede değerli bir kaynak görevi göreceği düşünülmektedir.

Yapay zekâ programları, filmleri analiz ederek öğretmen adaylarının özel eğitim gereksinimi olan karakterler hakkında bilgi edinmelerine katkıda bulunabilir. Bu bağlamda, hem filmlerin hem de yapay zekânın sunduğu analiz ve temsil araçları, öğretmen adaylarının pedagojik becerilerini ve kavramsal anlayışlarını derinleştirmede tamamlayıcı roller üstlenebilir. Yapay zekâ, eğitimde bilgiyi daha anlaşılır bir şekilde sunma ve öğrencilerin öğrenme süreçlerini kolaylaştırma potansiyeline sahiptir (Jatileni vd., 2023). Yapay zekâ programları, filmleri analiz ederek özel eğitim gereksinimi olan karakterler hakkında bilgi edinmemize ve farkındalık geliştirmemize yardımcı olabilir. Makine öğrenimi yöntemlerini kullanarak, bu programlar karakter diyaloglarındaki klişeleri (Duan, 2022), film senaryolarındaki sahne açıklamalarındaki eylemleri (Martinez et al., 2022) ve film karakterleri arasındaki tematik benzerlikleri belirleyebilir (Wang et al., 2020). Bu araştırma, öğretmen adaylarının ve yapay zekâ programlarının "Forrest Gump" filmindeki özel eğitim gereksinimi olan karaktere yönelik değerlendirmelerini karşılaştırmayı amaçlamaktadır. Öğretmen adaylarının sınıf ortamında karşılaşabilecekleri özel eğitim gereksinimi olan öğrencilerin özellikleriyle ilgili farkındalığa sahip olmaları onları tanıma ve uygun eğitim sağlama noktasında önem taşımaktadır. Diğer yanda yaşamın pek çok alanına giren YZ programlarının özel eğitim gibi spesifik ve hassas bir konuda nasıl bir veri tabanına sahip olduğunun ortaya çıkarılması da gelecekteki olası bir kullanım alanı için YZ programlarının altyapısını ortaya çıkarmak açısından anlamlı olacaktır.

Yöntem

Bu araştırmada durum çalışması yöntemi kullanılmıştır. Durum çalışmasında bir yada birkaç durum derinlemesine çalışılır (Yıldırım & Şimşek, 2008). Bu çalışmada derinlemesine incelenmek istenen durum da “Forrest Gump” filmindeki özel eğitim gereksinimi olan karaktere ilişkin değerlendirmelerdir.

Çalışma Grubu

Araştırmanın çalışma grubu Matematik ve Fen Bilimleri Eğitimi Bölümü’nde eğitim alan 24 öğretmen adayıdır (7 erkek, 17 kadın). Öğretmen adaylarının belirlenmesinde amaçlı örnekleme yöntemlerinden homojen/benzeşik örnekleme yöntemi kullanılmıştır. Bu örnekleme yönteminde deneyim ve bakış açısı bakımından birbirine çok benzeyen bireyler örnekleme alınır (Gay & Airasian, 2000). Bu çalışma kapsamında özel eğitim dersi almış olan ve 4. Sınıfta okuyan öğretmen adayları benzeşik bir grup oluşturmaktadır.

Çalışmada kullanılan yapay zeka (YZ) programlarının belirlenmesinde de Türkçe dil desteği olan 3 program (ChatGPT, Gemini, Copilot) seçilmiştir.

Veri Toplama Aracı

Öğretmen adaylarından veri toplamak amacıyla açık uçlu soruların yer aldığı “Görüş Formu” kullanılmıştır. Görüşler yazılı olarak alınmıştır. Formda yer alması planlanan sorular araştırmacılar tarafından oluşturulduktan sonra uzman görüşü alınarak sorulara son hali verilmiştir. YZ programlarına da aynı sorular yazılı olarak Türkçe sorulmuş ve verdikleri cevaplar kaydedilmiştir.

Veri Toplama Süreci

Öğretmen adaylarının filme ilişkin değerlendirmeleri yazılı olarak alınmıştır. Öğretmen adaylarından filmdeki özel gereksinimli kahramanın karakteristik özelliklerini filmden sahnelerle örneklendirmeleri istenmiştir. Ayrıca filmin onlarda iz bırakan sahnelerini/sözlerini belirterek bir değerlendirme yapmaları istenmiştir. Aynı sorular kullanılarak 3 farklı YZ programından (ChatGPT, Gemini ve Copilot) da cevaplar alınmıştır.

Veri Analizi

Verilerin analizinde içerik analizi ve betimsel analiz birlikte kullanılmıştır. İçerik analizi verilerin tümevarımsal analizinin yapmasına olanak tanır. Öncelikle metin içindeki kodlar belirlenir, sonra temalara gidilir (Tunison, 2023). Betimsel analizde önceden belirlenen temalara göre veriler özetlenir (Yıldırım & Şimşek, 2008). Filmdeki özel gereksinimli kahramanın karakteristik özellikleri içerik analizi ile incelenirken, filmin iz bırakan sahneleri ve sözlerinin belirlenmesinde betimsel analiz kullanılmıştır. Görüş formu ve YZ programlarından alınan cevaplar 2 uzman tarafından içerik analizi ile incelenmiştir. Öcelikle metinler okunarak kodlar oluşturulmuştur. Sonrasında kodlar kullanılarak temalar belirlenmiştir. Bu süreçte uzmanlar arası uyum katsayısı 0.87 hesaplanmıştır.

Bulgular

Öğretmen adaylarının ve YZ programlarının “Forrest Gump” filmindeki özel eğitim gereksinimi olan karaktere ilişkin değerlendirmelerini karşılaştırmanın amaçlandığı bu çalışmada, içerik analizi sonucunda temalar, alt temalar ve kodlar belirlenmiştir. Öğretmen adaylarının, ChatGPT, Gemini ve CoPilot’un verikleri cevaplar tablolar halinde sunulmuştur. Öğretmen adaylarının verdikleri cevaplara ilişkin örnek alıntılar ve kullanılan yapay zekâ programlarının cevapları karşılaştırmalı olarak verilmiştir.

Öğretmen adaylarının filmdeki özel gereksinimi olan karaktere ilişkin değerlendirmeleri

Tablo 1’de öğretmen adaylarının "Forrest Gump" filmindeki özel eğitim gereksinimi olan karakterin değerlendirmeleri temalar, alt temalar ve kodlar şeklinde sunulmuştur. Bu değerlendirmeler, karakterin fiziksel ve zihinsel yetersizlikleri, sosyal ilişkileri ve iletişimi, yetenekleri ve başarıları ile duygusal ve kişisel özelliklerini kapsamaktadır.

Fiziksel ve Zihinsel Yetersizlikler

Fiziksel yetersizlik alt temasında, karakterin hareket etmede sınırlılıklar yaşadığı ve omurgasından kaynaklı fiziksel yetersizliklerinin bulunduğu belirtilmiştir. Tanı alt temasında ise karakterin Asperger sendromuna sahip olduğu ve belirli bir IQ puanına sahip olduğu ifade edilmiştir. Bilgiyi işleme ve anlamlandırma problemleri alt temasında, karakterin problem çözme ve öğrenmede zorluk çektiği, dikkat eksikliği yaşadığı, ayırt etme güçlüğü çektiği, basit komutları anlamakta zorlandığı ve karmaşık bilgileri anlamada zorluk yaşadığı vurgulanmıştır. Ayrıca, neden-sonuç ilişkisi kuramama, mecazi anlamlama, mizahi anlamlama ve imaları anlama konularında da zorluklar yaşadığı belirtilmiştir.

Sosyal İlişkiler ve İletişim

Davranış alt temasında, karakterin tekrarlayıcı davranışlar sergilediği, yönerge dışına çıkmama eğiliminde olduğu ve komut alarak hareket ettiği ifade edilmiştir. Sosyal ilişki problemleri alt temasında, karakterin sosyal ilişkilerde zorluk çektiği, alay ve sosyal dışlanmaya maruz kaldığı, yalnızlık ve duygusal bağlanmada sorunlar yaşadığı ve toplumsal normlara uyum sağlamakta güçlük çektiği ifade edilmiştir. İletişim alt temasında, karakterin kendini ifade etmede zorluk yaşadığı ve sınırlı iletişim becerilerine sahip olduğu belirtilmiştir. Destek alt temasında ise, karakterin sosyal destek ve aile bağlarının önemi vurgulanmıştır.

Yetenekler ve Başarılar

Fiziksel yetenekler alt temasında, karakterin el becerisi, odaklanma ve fiziksel aktivitelerdeki performansı ele alınmıştır. Spor ve başarı alt temasında ise, karakterin sporda elde ettiği başarılar ve bu başarıları avantaja dönüştürme yeteneği vurgulanmıştır.

Duygusal ve Kişisel Özellikler

Duygusal özellikler alt temasında, karakterin duygularını doğrudan ifade etme, koruma içgüdüsü, duygusal saflık, duygusal ve psikolojik yetersizlikler ve yaşama sevinci gibi özellikleri detaylandırılmıştır. Kişisel özellikler alt temasında ise, karakterin başkalarına bağımlılık, sözünde durma, sakinlik, rutine bağlılık ve yetersizlikle başa çıkma gibi kişisel özellikleri incelenmiştir.

Tablo 1. Öğretmen adaylarının "Forrest Gump" filmindeki özel eğitim gereksinimi olan karaktere ilişkin değerlendirmeleri

Tema	**Alt tema**	Kodlar
Fiziksel ve Zihinsel Yetersizlik	Fiziksel Yetersizlik	Hareket etmede sınırlılık, Omurgasından kaynaklı fiziksel yetersizlik
	Tanı	Asperger sendromu, IQ Puanı
	Bilgiyi İşleme ve Anlamlandırma Problemleri	Problem çözmede güçlük, Öğrenmede güçlük, Dikkat Eksikliği, Ayırt etme güçlüğü, Basit komutları anlama, Karmaşık bilgiyi anlamada zorlanma, Neden-sonuç ilişkisi kuramama, Mecazı anlamama, Mizahı anlamama, İmaları ve ipuçlarını anlamama
Sosyal İlişkiler ve İletişim	Davranış	Tekrarlayıcı davranışlar, Yönerge dışına çıkmama, Komut alarak davranışa geçme.
	Sosyal İlişki Problemleri	Sosyal ilişki güçlüğü, Alay, Sosyal Dışlanma, Yalnızlık, Duygusal Bağlanma/Bağlılık, Toplumsal Normlara Uyum Sorunu
	İletişim	Kendini ifade etme güçlüğü, Sınırlı iletişim becerisi
	Destek	Sosyal destek, Aile bağı
Yetenekler ve Başarılar	Fiziksel Yetenekler	El becerisi, Odaklanma, Yürüme ve Koşma
	Spor ve Başarı	Sporda Başarı, Avantaja dönüşme
Duygusal ve Kişisel Özellikler	Duygusal Özellikler	Duygularını Doğrudan İfade Etme, Koruma İçgüdüsü, Duygusal saflık, Duygusal ve psikolojik yetersizlik, Yaşama Sevinci
	Kişisel Özellikler	Başkalarına Bağımlılık, Sözünde durma, Sakinlik, Rutini sevme, Yetersizlikle başa çıkma

ChatGPT'nin filmdeki özel gereksinimi olan karaktere ilişkin değerlendirmeleri

Tablo 2, ChatGPT'nin filmdeki karaktere ilişkin değerlendirmelerini içermektedir. Verilen cevaplar iki tema altında toplanmaktadır. Bu temalar fiziksel ve zihinsel yertersizlik ve duygusal ve kişisel özellikler olarak belirlenmiştir.

Fiziksel ve Zihinsel Yetersizlik

Fiziksel yetersizlik alt temasında, karakterin uzuv kaybı yaşadığı belirtilmiştir. Bu durum, karakterin fiziksel hareketlerini kısıtlayan bir engel olarak tanımlanmıştır. Tanı alt temasında, karakterin zekâ geriliği bulunduğu ifade edilmiştir. Bu tanı, karakterin bilişsel işlevlerinde yaşadığı sınırlılıkları yansıtmaktadır. Bilgiyi işleme ve anlamlandırma problemleri alt temasında, karakterin zihinsel zorluklar yaşadığı vurgulanmıştır. Bu zorluklar, karakterin bilgi işleme süreçlerinde ve karmaşık bilgileri anlamlandırmada karşılaştığı problemleri kapsamaktadır.

Duygusal ve Kişisel Özellikler

Kişisel özellikler alt temasında, karakterin saf ve dürüst doğası ile zorluklarla başa çıkma yeteneği ele alınmıştır. Karakterin saf ve dürüst doğası, onun içten ve güvenilir bir kişiliğe sahip olduğunu göstermektedir. Ayrıca, zorluklarla başa çıkma yeteneği, karakterin karşılaştığı engellere rağmen yaşamda başarı elde etme ve adaptasyon sağlama kapasitesini ifade etmektedir.

Tablo 2. ChatGPT'nin "Forrest Gump" filmindeki özel eğitim gereksinimi olan karaktere ilişkin değerlendirmeleri

Tema	***Alt tema***	Kodlar
Fiziksel ve Zihinsel Yetersizlik	Fiziksel Yetersizlik	Uzuv kaybı,
	Tanı	Zekâ geriliği,
	Bilgiyi İşleme ve Anlamlandırma Problemleri	Zihinsel zorluk,
Duygusal ve Kişisel Özellikler	Kişisel Özellikler	Saf ve dürüst doğa, zorluklarla başa çıkma,

Gemini'nin filmdeki özel gereksinimi olan karaktere ilişkin değerlendirmeleri

Tablo 3'te, Gemini programının "Forrest Gump" filmindeki özel eğitim gereksinimi olan karaktere ilişkin değerlendirmeler yer almaktadır. Verilen cevaplar, fiziksel ve zihinsel yetenekler, sosyal ilişkiler ve iletişim, duygusal ve kişisel özellikler temaları altında yeralmıştır.

Fiziksel ve Zihinsel Yetenekler

Tema altında yer alan Tanı alt temasında, karakterin DEHB (Dikkat Eksikliği ve Hiperaktivite Bozukluğu) tanısı aldığı belirtilmiştir. Bilgiyi İşleme ve Anlamlandırma Problemleri alt temasında ise, karakterin öğrenme zorluğu yaşadığı ve soyut düşünme konusunda zorluklar çektiği ifade edilmiştir. Bu durum, karakterin eğitim sürecinde karşılaştığı bilişsel engelleri ve bu engellerin günlük yaşantısına olan etkilerini yansıtmaktadır.

Sosyal İlişkiler ve İletişim

İletişim alt temasında, karakterin sosyal becerilerinde eksiklikler olduğu belirtilmiştir. Bu eksiklikler, karakterin sosyal ilişkiler kurmada ve sürdürmede yaşadığı zorlukları ortaya koymaktadır. Sosyal becerilerin yetersizliği, karakterin sosyal uyumunu ve toplumsal etkileşimlerini olumsuz yönde etkilemektedir.

Duygusal ve Kişisel Özellikler

Duygusal Özellikler alt temasında, karakterin duygusallık, saflık ve masumiyet gibi özellikleri vurgulanmıştır. Bu özellikler, karakterin duygusal yapısını ve başkalarıyla olan duygusal etkileşimlerini tanımlamaktadır. Kişisel Özellikler alt temasında ise, karakterin bağımsızlık, sadakat ve sevgi, cesaret ve kararlılık, doğallık gibi kişisel özellikleri ele alınmıştır. Bu nitelikler, karakterin duygusal ve kişisel yapısını ve zorluklarla başa çıkma konusundaki tutumunu yansıtmaktadır.

Tablo 3. Gemini'nin "Forrest Gump" filmindeki özel eğitim gereksinimi olan karaktere ilişkin değerlendirmeleri

Tema	***Alt tema***	Kodlar
Fiziksel ve Zihinsel Yetersizlik	Tanı	DEHB
	Bilgiyi İşleme ve Anlamlandırma Problemleri	Öğrenme zorluğu, soyut düşünme zorluğu,
Sosyal İlişkiler ve İletişim	İletişim	Sosyal beceriler
Duygusal ve Kişisel Özellikler	Duygusal Özellikler	Duygusallık, saflık ve masumiyet
	Kişisel Özellikler	Bağımsızlık, sadakat ve sevgi, cesaret ve kararlılık, doğallık

Copilot'un filmdeki özel gereksinimi olan karaktere ilişkin değerlendirmeleri

Tablo 4, Copilot programının "Forrest Gump" filmindeki özel eğitim gereksinimi olan karakterin çeşitli yönleriyle ilgili değerlendirmeleri içermektedir. Değerlendirmeler, fiziksel ve zihinsel yetenekler, sosyal ilişkiler ve iletişim, duygusal ve kişisel özellikler temaları altında alt temalara ayrılmış ve kodlarla ifade edilmiştir.

Fiziksel ve Zihinsel Yetenekler

Tema altındayer alan Tanı alt temasında, karakterin düşük IQ düzeyine sahip olduğu belirtilmiştir. Bu durum, karakterin bilişsel işlevlerinde sınırlılıklar yaşadığını ve öğrenme süreçlerinde belirgin zorluklarla karşılaştığını göstermektedir. Düşük IQ, karakterin bilgi işleme hızını, problem çözme yeteneğini ve genel öğrenme kapasitesini olumsuz yönde etkilemektedir.

Sosyal İlişkiler ve İletişim

İletişim alt temasında, karakterin iletişim yeteneğinin değerlendirildiği görülmektedir. İletişim yeteneği, karakterin başkalarıyla sözlü ve sözsüz iletişim kurma becerilerini kapsar. Bu yetenek, sosyal ilişkilerin kurulmasında ve sürdürülmesinde kritik bir rol oynar. Karakterin iletişim becerilerinin sınırlılığı, onun sosyal etkileşimlerde yaşadığı zorlukları ifade etmektedir.

Duygusal ve Kişisel Özellikler

Kişisel Özellikler alt temasında, karakterin samimiyet ve saflık gibi özellikleri vurgulanmıştır. Bu özellikler, karakterin içten ve dürüst doğasını, diğer insanlarla olan ilişkilerinde gösterdiği masumiyeti ve doğallığı

tanımlamaktadır. Samimiyet ve saflık, karakterin duygusal yapısını ve başkalarıyla olan ilişkilerinde sergilediği davranışları vurgulamaktadır.

Tablo 4. Copilot'un "Forrest Gump" filmindeki özel eğitim gereksinimi olan karaktere ilişkin değerlendirmeleri

Tema	Alt tema	Kodlar
Fiziksel ve Zihinsel Yetersizlik	Tanı	Düşük IQ
Sosyal İlişkiler ve İletişim	İletişim	İletişim yeteneği
Duygusal ve Kişisel Özellikler	Kişisel Özellikler	Samimiyet ve saflık

Öğretmen adayları ve YZ programlarının filmindeki özel eğitim gereksinimi olan karaktere ilişkin değerlendirmelerinin karşılaştırılması

Tablo 5, "Forrest Gump" filmindeki özel eğitim gereksinimi olan karaktere ilişkin 4 farklı kaynaktan (öğretmen adayları, ChatGPT, Gemini, Copilot) yapılan değerlendirmeleri karşılaştırmalı bir şekilde incelemeyi kolaylaştırmak için hazırlanmıştır. Değerlendirmeler, fiziksel yetersizlikler, tanı, bilgi işleme ve anlamlandırma, sosyal ilişkiler ve iletişim, duygusal ve kişisel özellikler olmak üzere beş özellik kategorisinde ele alınmıştır.

Fiziksel Yetersizlikler

Öğretmen adayları ve ChatGPT, karakterin fiziksel yetersizliğini "hareket emniyetinde sınırlılık" ve "uzuv kaybı" olarak tanımlamışlardır. Gemini ve Copilot ise herhangi bir fiziksel yetersizlik belirtmemiştir. ChatGPT programının fiziksel yetersizliğe ilişkin değerlendirmesi filmin ana karakterine ilişkin bir özellik değildir.

Tanı

Öğretmen adayları, karakterin "Asperger sendromu" ve "IQ puanı" olduğunu belirtmişlerdir. ChatGPT ve Gemini ise sırasıyla "zeka geriliği" ve "DEHB" teşhisleri koymuştur. Copilot ise Düşük IQ'lu olduğunu belirtmiştir.

Bilgi İşleme ve Anlamlandırma

Öğretmen adayları, karakterin bilgi işleme ve anlamlandırma becerilerinde birçok zorluk yaşadığını belirtmişlerdir. Bu zorluklar arasında problem çözmede güçlük, öğrenmede güçlük, dikkat eksikliği, ayırt etme güçlüğü, basit komutları anlama, karmaşık bilgiyi anlamada zorlanma, neden-sonuç ilişkisi kuramama, mecazı anlamama, mizahı anlamama, imaları ve ipuçlarını anlamama yer almaktadır. ChatGPT zihinsel zorlukları olduğu cevabını vermiş, Gemini ve Copilot ise öğrenme zorluğunun yanında soyut düşünme becerilerinin de sınırlı olduğunu vurgulamışlardır.

Sosyal İlişkiler ve İletişim

Öğretmen adayları, karakterin sosyal ilişkilerinde ve iletişim becerilerinde önemli problemler yaşadığını belirtmişlerdir. Bu problemler arasında "sosyal ilişki problemleri", "alay", "sosyal dışlanma", "yalnızlık", "duygusal bağlanma/bağlılık" ve "toplumsal normlara uyum sorunu" yer almaktadır. ChatGPT ve Gemini ise karakterin "sosyal beceriler" ve "iletişim yeteneği"nin yetersiz olduğunu belirtmişlerdir. Copilot ise bu konuda herhangi bir bilgi vermemiştir.

Duygusal ve Kişisel Özellikler

Öğretmen adayları, karakterin duygusal ve kişisel özelliklerini "duygularını doğrudan ifade etme", "koruma içgüdüsü", "suygusal saflık", "duygusal ve psikolojik yetersizlik" ve "yaşama sevinci" olarak tanımlamışlardır. ChatGPT ve Gemini ise karakterin "saf ve dürüst doğa"ya sahip olduğunu ve "zorluklarla başa çıkma" becerisinin yüksek olduğunu belirtmişlerdir. Copilot ise karakterin "samimiyet ve saflık" gibi duygusal ve kişisel özelliklerini vurgulamıştır.

Tablo 5. Öğretmen adayları ve YZ programlarının filmindeki özel eğitim gereksinimi olan karaktere ilişkin değerlendirmelerinin karşılaştırılması

Özellik	Öğretmen Adayları	Chat GPT	Gemini	Copilot
Fiziksel Yetersizlik	Hareket etmede sınırlılık, omurgasından kaynaklı yetersizlik	Uzuv kaybı	Tanı yok	Tanı yok
Tanı	Asperger sendromu, IQ puanı	Zekâ geriliği	DEHB	Düşük IQ
Bilgi İşleme ve Anlamlandırma	Problem çözmede güçlük, öğrenmede güçlük, dikkat eksikliği, ayırt etme güçlüğü, basit komutları anlama, karmaşık bilgiyi anlamada zorlanma, neden-sonuç ilişkisi kuramama, mecazı anlamama, mizahı anlamama, imaları ve ipuçlarını anlamama	Zihinsel zorluk	Öğrenme zorluğu, soyut düşünme zorluğu	Öğrenme zorluğu, soyut düşünme zorluğu
Sosyal İlişkiler ve İletişim	Sosyal ilişki problemleri, alay, sosyal dışlanma, yalnızlık, duygusal bağlanma/bağlılık, toplumsal normlara uyum sorunu	İletişim yeteneği	Sosyal beceriler	İletişim yeteneği
Duygusal ve Kişisel Özellikler	Duygularını doğrudan ifade etme, koruma içgüdüsü, duygusal saflık, duygusal ve psikolojik yetersizlik, yaşama sevinci	Saf ve dürüst doğa, zorluklarla başa çıkma	Duygusallık, saflık ve masumiyet	Samimiyet ve saflık

Öğretmen adayları ve yapay zeka (YZ) programları arasındaki Forest Gump filminin baş karakteriyle ilgili değerlendirmelerde farklılıklar gözlemlenmiştir. Öğretmen adayları, fiziksel ve zihinsel yetersizlikler ile duygusal ve kişisel özellikler temalarına daha fazla odaklanmıştır. Ayrıca, sosyal ilişkiler ve iletişim ile davranışsal özellikler ve yetenekler-başarılar temalarına da değinmişlerdir. Bununla birlikte, YZ programlarının sadece iki tanesi (ChatGPT hariç) sosyal ilişkiler ve iletişim temalarına yanıt vermiştir. Hiçbir YZ programı ise davranışsal özellikler ve yetenekler-başarılar temalarını ele almamıştır.

Öğretmen adayları ve YZ programları arasında dil kullanımı açısından da farklılıklar gözlemlenmiştir. Öğretmen adayları, filmin kendilerinde uyandırdığı duyguları yansıtan daha öznel ifadeler kullanırken, YZ programları daha nesnel bir üslupla bilgi sunmuşlardır. Öğretmen adaylarının değerlendirmeleri, YZ programlarınınkinden daha kapsamlı ve ayrıntılı olmuştur. Öğretmen adayları karakterin özelliklerini daha fazla örnek ve açıklama ile desteklemişlerdir, ancak YZ programları daha kısa ve öz bilgiler sunmuşlardır. Bu farklılıklar, insan ve yapay zeka tarafından yapılan değerlendirmelerin doğasındaki temel ayrımları yansıtmaktadır.

Öğretmen adaylarının ve YZ programlarının filmindeki iz bırakan sahneler/sözler konusundaki değerlendirmeleri

Tablo 6 öğretmen adaylarının ve YZ programlarının vurguladığı sahne ve sözleri göstemektedir. Öğretmen adayları ve YZ programları, filmin farklı yönlerine dikkat çekerek farklı sahne ve sözleri öne çıkarmaktadır. Öğretmen adayları, filmin duygusal ve mesaj veren yönlerine daha fazla odaklanmışlardır. En çok vurguladıkları sahneler ve sözler arasında “Hayat bir kutu çikolataya benzer. İçinden ne çıkacağı hiç belli olmaz.”, Akıllımı yoksa Benim gibi birimi”, “Koş Forest! Koş!” ve “3 yıl, 2 ay, 14 gün ve 16 saat koştum.” yeralmaktadır. YZ programlarının her üçününde vurgu yaptığı söz öğretmen adayları ile benzer şekilde “Hayat bir kutu çikolataya benzer. İçinden ne çıkacağı hiç belli olmaz.” ifadesi/sahnesidir. Gemini beş farklı ifade/sahneye vurgu yaparken, ChatGPT dört, Copilot ise bir ifade/sahneye vurgu yapmıştır. Filmdeki birçok sahne ve sözün öğretmen adaylarında etki bıraktığı görülmektedir. Öğretmen adayları YZ programlarının belirtmediği sahnelerden ve repliklerden söz etmiştir. Öğretmen adayları ve YZ programları, filmin farklı yönlerine dikkat çekerek farklı sahne ve sözleri öne çıkarmaktadır.

Tablo 6. Öğretmen adaylarının ve YZ programlarının "Forrest Gump" filmindeki İz bırakan sahneler/sözler konusundaki değerlendirmelerinin karşılaştırılması

Sahneler /Sözler	Öğretmen adayları	YZ
Benim adım Forrest, Forrest Gump!	0	ChatGPT
Seni seviyorum	0	Gemini
Bazen hayat seni aşağıya indirir. Seni yere çarpar ve seni sert vurur. Ama sen kalkmazsan, seni yener.	0	Gemini
Koş Forrest! Koş!	8	Gemini
Hayatta devam edebilmek için geçmişi arkada bırakmak gerekir.	4	
İnsan kendi kaderini kendi hazırlar. Tanrının verdikleriyle elinden gelenin en iyisini yapmalısın.	3	
Hayat bir kutu çikolataya benzer. İçinden ne çıkacağı hiç belli olmaz.	12	ChatGPT, Gemini, Copilot
Kimsenin sana 'ben senden daha iyiyim' demesine izin verme. Tanrı herkesin aynı olmasını isteseydi, hepimizin bacaklarına bir tel çekerdi	4	
Akıllı bir adam değilim ama sevginin ne olduğunu biliyorum.	2	ChatGPT, Gemini
Annem yabancıların arabasına binmememi tembihledi.	1	
Annem her şeyi anlayacağım gibi anlatmanın bir yolunu bulurdu	1	
Teğmen Dan ona sakat denmesini bana da salak denmesini hiç istemiyordu	2	
3 yıl, 2 ay, 14 gün ve 16 saat koştum.	5	ChatGPT
Pinpon oynamaktan sıkıldığım zamanlarda bile pinpon oynuyordum.	2	
Akıllı mı yoksa benim gibi mi?	9	
İhtiyaçtan fazla para gösterişe girer	1	
beş puan dediğimiz nedir ki benim çocuğumda diğerleri gibi normal ahmak, ahmak davranandır	2	
ben çok yoruldum	3	
Ayakkabılarına bakarak insanlar hakkında çok şey anlayabilirsin, derdi. Nereye gittiklerini, nereden geldiklerini."	2	
Ben asla canını yakmazdım, Jenny."	1	
Herkesin ikinci bir şansı vardır.	1	
Benim kaderimde senin annen olmak varmış, Forrest. Elimden geleni yaptım.	1	
Annem mi haklıydı yoksa Teğmen Dan mı, bilemiyorum. Herkesin bir kaderi var mı bilemiyorum, yoksa rüzgâra kapılmış gibi tesadüfen oraya, buraya mı sürükleniyoruz? Bence her ikisi de doğru. Belki ikisi de aynı anda oluyor.	1	
Deli olmakta sadece delilerin bildiği bir zevk vardır.	1	
Normal olmak zorunda değilsin. Dışarı çık ve hayallerini gerçekleştir.	1	
Sana daha önce hayatımı kurtardığın için hiç teşekkür etmemiştim''	2	

Öğretmen adaylarının sözler ve sahneler ile ilgili ifadelerinden örnek alıntılara yer verilmiştir. Alıntılarda duygusal ifadelere sıkça raslanmıştır.

- "Daha sonra Forrest çok iyi koşabildiği için ve çevresindeki insanlar başına bir iş geldiğinde bu durumdan sadece koşarak kendisini kurtarabileceğini düşündükleri için ona hep 'run Forrest run' (koş forrest koş) diye sesleniyorlardı. Bu da beni çok etkilemişti. Daha sonra Teymen Dan kendisine yetersizliğinin söylenmesinden hiç hoşnut olmadığını söylemişti. O sırada Forrest'da kendisine ahmak denilmesinden hiç hoşnut olmadığını söylemişti. Bu sahnede aslında insanların kendisi hakkında düşündüğü çoğu şeyin farkında olduğunu ve bunu her duyduğunda çok üzüldüğünü gördüm. O yüzden çok etkilendim." (Öğrenci 12)
- "Özellikle Jenny defalarca kez onu bırakıp gitmesine rağmen ona hiç kızmadı, öfkelenmedi, hesap sormadı. Bir çocuğu olduğunu çok sonra öğrenmesine rağmen ona hesap sormadı. Teğmen Dan'i depresyon döneminde yalnız bırakmaması, onu ve diğer sağ görebildiği arkadaşlarını savaş alanından canı pahasına çıkarmak için çabalaması vb. örnekler de bana Forrest'in hep çok verici olduğunu düşündürttü. Özel olan,

yetersizliği bulunan bireyleri tanımamız açısından güzel bir film olduğunu düşünüyorum. Filmdeki normal diye nitelendirdiğimiz insanların davranışları ise bize nasıl davranmamamız gerektiğini gösterir nitelikteydi. Aslında özel yetersizliği bulunan bireylerin destekle normal olarak nitelendirdiğimiz duruma gelebileceklerini, bizlerin bilgisizliğimizin ve düşüncesiz davranışlarımızın engel olabileceğini düşürttü." (Öğrenci 9)

- "Forrest Gump'ın en belirgin özelliklerinden biri duygusal saflığıdır. Diğer insanların sosyal normlarına ve beklentilerine uygun davranmak yerine, içtenlikle ve samimiyetle hareket eder. Bu durum onun saflığına ve içtenliğine örnek oluşturur. Örneğin, Jenny'ye karşı olan saf ve içten sevgisi bu özelliğini yansıtır" (Öğrenci, 14)
- "Annem hep şöyle derdi: "Hayata devam edebilmek için geçmişi arkada bırakmak gerekir. Benim koşmam da bununla ilgiliydi sanırım. 3 yıl, 2 ay, 14 gün ve 16 saat koştum" (Öğrenci, 5).

Gemini diğer YZ programlarından farklı olarak filmindeki İz bırakan sahneler/sözler ile ilgili olarak verdiği cevaplarda sahne/film ile ilgili resimleri internetten bularak sunmuştur. Cevaplara ait örneklere Figür 1'de yer verilmiştir.

Figür 1. Gemini'nin verdiği cevaplarda yer alan resimler.

Sonuç ve Öneriler

Bu çalışma, öğretmen adayları ile yapay zeka programlarının "Forrest Gump" filmi hakkında yaptıkları karakter incelemeleri ve önemli sahneleri değerlendiren bir araştırmanın sonuçlarını sunmaktadır. Bulgular, öğretmen adaylarının ve yapay zeka programlarının verdikleri cevaplarda farklılıklar olduğunu göstermektedir. Öncelikle, öğretmen adaylarının cevaplarında fiziksel ve zihinsel yetersizlik ile duygusal ve kişisel özellikler temalarının öne çıktığı gözlemlenmiştir. Bu adaylar, film karakterlerini değerlendirirken daha öznel ifadeler kullanma eğilimindedirler. Buna karşılık, yapay zeka programları ise daha nesnel bir dil kullanarak analizlerini gerçekleştirmişlerdir. Öğretmen adayları, ayrıca, yapay zeka programlarının analizlerinde yer verilmeyen belirli sahnelerden veya repliklerden bahsetmişlerdir. Bu durum, adayların filmdeki belirli anlara ve diyaloglara dair farklı bir bakış açısına sahip olduklarını göstermektedir. Özellikle Gemini yapay zeka programının, iz bırakan sahneleri kullanıcıya görselleştirerek sunması dikkat çekicidir. Bu yaklaşım, görselleştirme tekniklerinin yapay zeka tarafından nasıl kullanılabileceğini ve bu sayede kullanıcıya nasıl zengin bir deneyim sunulabileceğini göstermektedir. Öğretmen adaylarının verdikleri cevapların, yapay zeka programlarının analizlerine göre daha kapsamlı ve ayrıntılı açıklamalara yer verdiği tespit edilmiştir. Bu kapsamlılık, adayların film karakterlerine ve önemli sahnelere dair daha derinlemesine bir anlayış geliştirdiklerini ve bu anlayışı daha ayrıntılı bir şekilde ifade edebildiklerini göstermektedir.

Sonuç olarak, öğretmen adayları ile yapay zeka programları arasında, "Forrest Gump" filmi üzerine yapılan karakter ve önemli sahne incelemelerinde belirgin farklılıklar olduğu görülmektedir. Bu farklılıklar, öğretmen adaylarının daha öznel ve detaylı, yapay zeka programlarının ise daha nesnel ve görselleştirilmiş yaklaşımlar benimsediğini ortaya koymaktadır. Yapay zekâ tabanlı dil öğrenme modellerinin, film analizinde hem sınırlamalara hem de heyecan verici potansiyellere sahip olduğu düşünülmektedir. Bu modellerin sunduğu imkanlar, senaryo yazımı, karakter geliştirme, pazarlama, kitle analizi ve daha fazlasını kapsamaktadır (Roxana vd., 2023). Ancak, bu modellerin bazı sınırlamaları da mevcut olduğu unutulmamalıdır. Daha fazla insan etkileşimi ihtiyacı, dilin bağlamsal nüanslarını anlamada zorluk çekme ve eğitim için büyük veri kümelerine bağımlılık gibi sınırlamalar, bu modellerin etkinliğini sınırlayabilmektedir (Som & Biswas, 2023).

Bununla birlikte, multimodal analiz teorileri gibi gelişmeler, filmlerde anlam inşasını daha kapsamlı bir şekilde anlamamızı sağlayabilir (Yair vd., 2022). Büyük Dil Modelleri (LLM'ler) de önceden eğitilmiş modellerin gizli kavramlarını ortaya çıkarmada ve doğru açıklamalar sağlamada yardımcı olabilir (Basel, 2023; Mouisi, 2023). Fakat LLM'lerin alt sembolik doğası, gerçek dil anlayışında sınırlamalar yaratabilir ve karmaşık anlamları yorumlamayı zorlaştırabilir (Abir, 2023; Saad, 2023). Bu da, bu modellerin film altyazıları hakkında sağladığı bilgilerin derinliğine ve karmaşıklığına bağlı olarak değişebileceği anlamına gelmektedir (Asher, 2023). Modeller, film analizinde değerli araçlar olma potansiyeline sahiptir. Fakat bu modellerin sınırlarının farkında olmak ve onları insan etkileşimi ve diğer analitik yöntemlerle birlikte kullanmak önemlidir (Som & Biswas, 2023).

Öğretmen adaylarının ve yapay zeka programlarının farklı bakış açıları sunması, özel eğitim gereksinimi olan öğrencilerin daha iyi anlaşılmasına katkı sağlayabilir. Bu çalışmanın bulgularına dayanarak, yapay zeka programlarının özel eğitim alanındaki veri tabanları ve film analizi becerilerinin geliştirilmesi önerilmektedir. Böylece, yapay zeka teknolojileri, öğretmenlerin ve eğitimcilerin özel eğitim gereksinimlerine sahip öğrencileri daha etkili bir şekilde desteklemelerine yardımcı olabilir. Ayrıca, farklı filmler ve yapay zeka programları kullanılarak daha kapsamlı araştırmalar yapılması gerektiği unutulmamalıdır. Bu tür araştırmalar, hem öğretmen adaylarının hem de yapay zeka sistemlerinin eğitim süreçlerindeki etkinliğini artırabilir ve özel eğitim alanında yenilikçi yaklaşımların geliştirilmesine olanak tanıyabilir. Bu bağlamda, çok yönlü ve disiplinler arası çalışmaların teşvik edilmesi, özel eğitimde bilgi ve yöntemlerin zenginleştirilmesi açısından büyük önem taşımaktadır.

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Pandemi ve Deprem Nedeniyle Zorunlu Olarak Uzaktan Eğitime Geçen Akademisyenlerin Görüşlerinin Değerlendirilmesi

Esra FIRATLI TÜRKER[1]

Özet

Bu araştırmada, Covid-19 pandemisi ve 6 Şubat depremleri nedeniyle geçilen zorunlu uzaktan eğitimi deneyimleyen akademisyenlerin, karşılaşılan yeni durumlar ve yaşadıkları deneyimler ile ilgili görüşleri incelenmiştir. Araştırmanın gerçekleştirilmesinde nitel yöntemler ve olgu bilim modeli kullanılmıştır. Veriler, 2024 yılı Nisan ayı içerisinde yarı yapılandırılmış görüşme formu aracılığıyla toplanmıştır. Araştırmanın çalışma grubunu Eskişehir ilindeki Anadolu Üniversitesi, Osmangazi Üniversitesi ve Eskişehir Teknik Üniversitesi'nde görev yapmakta olan farklı unvanlardaki 15 akademisyen oluşturmuştur. Bulgular, akademisyenlerin dahil oldukları iki zorunlu uzaktan eğitim süreci için; eğitim kalitesinin düşük olması, etkileşimin sınırlı olması ve uzaktan eğitimin mesleki eğitime yönelik üniversite eğitimi için uygun olmaması gibi olumsuzların varlığını işaret etmektedir. Akademisyenlerin karşılaştıkları eğitici kaynaklı güçlüklerin en belirgininin uzaktan eğitim teknolojileri konusundaki bilgi ve deneyim eksikliği olduğudur. Öğrenci kaynaklı güçlüklerin en belirgininin öğrencilerin derslere katılımlarının düşük olması olduğu ve dış kaynaklı güçlüklerin en belirginleri ise uzaktan eğitim için altyapının yeterli olmaması ve uzaktan eğitimin etkileşimi kısıtlıyor olduğu vurgulanmıştır. Bu süreçte kaçınılmaz olarak akademisyenlerin kendilerini uzaktan eğitim konusunda geliştirdikleri, çaba göstererek yeni bilgiler ve deneyimler kazandıkları, deneyimli akademisyenlerin daha kolay adapte oldukları ancak deneyimsiz olanların zorlandıkları görülmüştür. Bununla birlikte, deneyimsiz olanlar da daha iyi bilenlere danışarak ve kendi başlarına çözüm arayarak istedikleri sonuca ulaşabilmişlerdir. Yüksek motivasyonla ve verimli bir biçimde uzaktan eğitimi sürdürebilmek için akademisyenlerin uzaktan eğitimin detaylarını öğrenmek için özveri gösterdikleri, yeni araçları kullanmaya başladıkları, dersin içeriğini ilgi çekici biçimde zenginleştirdikleri, öğrencilerle yakın bir etkileşime girerek onlarla iletişim halinde oldukları ve sürekli onları cesaretlendirdikleri sonucuna ulaşılmıştır. Bu amaçla canlı derslerde akademisyenler çoğunlukla kamera, mikrofon, videolar, slaytlar ve diğer görseller gibi araçlardan yararlanmışlardır.

Anahtar Kelimeler: Uzaktan Eğitim, Pandemi, Deprem, Akademisyen, Üniversite.

Evaluation of the Opinions of Academicians Who Switched to Compulsory Distance Education Due to the Pandemic and Earthquake

Abstract

In this research, the opinions of academics who experienced compulsory distance education due to the Covid-19 pandemic and the February 6 earthquakes were examined regarding the new situations encountered and their experiences. Qualitative methods and phenomenology model were used in carrying out the research. The data was collected through a semi-structured interview form in April 2024. The study group of the research consisted of 15 academicians with different titles working at Anadolu University, Osmangazi University and Eskişehir Technical University in Eskişehir. The findings for two compulsory distance education processes, in which academics are involved, points out the existence of negative aspects such as low quality of education, limited interaction and the unsuitability of distance education for university education for vocational education. The most obvious educator-related difficulties faced by academics is the lack of knowledge and experience in distance education technologies. It was emphasized that the most obvious student-related difficulties are the students' low participation in the

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courses, and the most obvious external difficulties are that the infrastructure for distance education is not sufficient and distance education limits interaction. In this process, it has been seen that academics inevitably improve themselves in distance education, gain new knowledge and experience by making efforts, experienced academics adapt more easily, but inexperienced ones have difficulty. However, those who were inexperienced were also able to achieve the results they desired by consulting those who knew better and searching for solutions on their own. It was concluded that in order to continue distance education with high motivation and efficiency, academicians devoted themselves to learning the details of distance education, started to use new tools, enriched the content of the course in an interesting way, interacted closely with the students and communicated with them, and constantly encouraged them. For this purpose, academics mostly used tools such as cameras, microphones, videos, slides and other visuals in live lessons.

Keywords: Distance Education, Pandemic, Earthquake, Academician, University.

Giriş

Uzaktan eğitim teknolojik araçlarda desteklenmiş, eğiticiyle öğrenenin aynı ortamda bulunmasının gerekmediği, senkron veya asenkron olarak gerçekleştirilebilen modern bir eğitim yaklaşımıdır. Uzaktan eğitim iletişim ve teknoloji alanında yaşanan gelişmelere bağlı olarak giderek daha fazla yaygınlaşmaktadır (Akkaş Baysal ve Ocak, 2020). Dünyada eğitime verilen önem ve talep arttığı için fiziksel mesafe ve zaman sınırlaması bulunmayan uzaktan eğitim, talepleri karşılamak için önemli bir alternatif olarak kabul edilmektedir (Bakioğlu ve Çevik, 2020; Genç ve Gümrükçüoğlu, 2020).

Uzaktan eğitimin popülerlik kazanmasının nedenleri arasında geniş kitlelere eğitimi zaman ve mekan sınırı olmadan ulaştırmanın yanında eğitimde sürdürebilirliği sağlaması, eğitimde fırsat eşitliğini desteklemesi, eğitim masraflarını azaltması, eğitimde standartlaşamaya katkı sağlaması gibi etkenleri de saymak mümkündür (İşman, 2011; Yurtbakan ve Akyıldız, 2020; Çokyaman ve Ünal, 2021). Bununla birlikte uzaktan eğitim için aşılması gereken bazı bariyer de bulunmaktadır. Bunlar arasında uzaktan eğitim için bir teknoloji satın almak gerekliliği, uzaktan eğitim için gerekli teknoloji öğrenmek gerekliliği, teknoloji kaynaklı arıza ve aksaklıklar, uzaktan eğitimde etkileşim ve iletişim kısıtları sayılabilir (Akkaş Baysal ve Ocak, 2020; Afşar ve Büyükdoğan, 2020; Başaran vd., 2020; Avcı ve Akdeniz, 2021).

Uzaktan eğitime olan talep arttıkça uzaktan eğitim konusunda yapılan araştırmalar da artmıştır. Bu araştırmalarda sıklıkla uzaktan eğitim olgusu incelenmiş ve farklı açılardan klasik yüz yüze eğitimle karşılaştırılmıştır (Genç ve Gümrükçüoğlu, 2020; Afşar ve Büyükdoğan, 2020; Keskin ve Özer Kaya, 2020; Arık vd., 2021; Uzun ve Uzunöz; 2022). Bu araştırmalarda genellikle klasik yüz yüze eğitimin uzaktan eğitime tercih edildiğine ilişkin bulgular elde edilmiştir.

Türkiye'de de uzaktan eğitim giderek yaygınlaşmaktadır. Özellikle üniversiteler ve özel eğitim kurumları uzaktan eğitime daha fazla ilgi göstermektedirler. Uzaktan eğitim uygulamaları önceden planlanmış ve hem eğiticinin hem de öğrencinin uzaktan eğitime gönüllü olduğu ortamlarda gerçekleşmektedir. Ancak, Covid-19 pandemisi ve 6 Şubat depremleri nedeniyle özellikle üniversitelerde zorunlu uzaktan eğitime geçilmiştir. Bu iki zorunlu uzaktan eğitim uygulamasında da hem üniversiteler hem akademisyenler hem de öğrenciler gerekli hazırlığı yapamadan bu eğitimlere zorunlu olarak dahil olmuşlardır. Normal uzaktan eğitim uygulamaları dahi sıklıkla tartışmaların konusu olurken zorunlu uzaktan eğitimin daha fazla zorluklarla ve sorunlarla yüz yüze geleceği öngörülebilir. Yapılan araştırmalar Covid-19 pandemisi ve 6 Şubat depremleri nedeniyle zorunlu olarak geçilen uzaktan eğitimle ilgili pek sorunla karşılaşıldığını, öğrencilerin ve eğiticilerin genel olarak bu zorunlu uzaktan eğitimlerden memnun olmadıklarını ve bu eğitimleri yeterli ve verimli görmediklerini göstermiştir (Afşar ve Büyükdoğan, 2020; Keskin ve Özer Kaya, 2020; Buluk ve Eşitti, 2020; Demir ve Özdaş, 2020; Bakioğlu ve Çevik, 2020; Karaca ve Kelam, 2020; Yurtbakan ve Akyıldız, 2020; Aktaş vd., 2020; Arslan vd., 2021; Kurt, Kandemir ve Çelik, 2021; Urhanoğlu, Bayırlı ve Aslan, 2021; Avcı ve Akdeniz, 2021; Metin, Gürbey ve Çevik, 2021, Arık vd., 2021; Karadağ-Yılmaz, Savaş ve Kalkan, 2022; Fıratlı Türker, 2023; Erdoğdu ve Atabay, 2023; Çakır vd., 2023; Yağız, 2023; Koçer ve Koçak, 2024).

Alanyazında Türkiye'de Covid-19 pandemisi ve 6 Şubat depremleri nedeniyle geçilen zorunlu uzaktan eğitimlerle ilişkili çok sayıda araştırmanın yapıldığı görülmektedir. Ancak, akademisyenlerin bu zorunlu uzaktan eğitim uygulamalarıyla ilişkili tecrübeleri üzerine az sayıda araştırmanın yapıldığı ve bu alanda bir boşluğun olduğu anlaşılmaktadır. Akademisyenlerin zorunlu uzaktan eğitim tecrübelerinin incelenmesi bu uygulamaların daha iyi anlaşılması ve uzaktan eğitimlerin verimli ve sorunsuz bir biçimde geliştirilebilmeleri için katkılar sağlayabilir. Bu araştırmada Türkiye'de Covid-19 pandemisi ve 6 Şubat depremleri nedeniyle üniversitelerde geçilen zorunlu uzaktan eğitimlerle ilgili akademisyenlerin görüşlerinin incelenmesi amaçlanmıştır.

Yöntem

Araştırmanın gerçekleştirilmesinde nitel yöntemler ve olgu bilim modeli kullanılmıştır. Veriler, içerisinde 10 sorunun yer aldığı yarı yapılandırılmış görüşme formu aracılığıyla toplanmıştır. Görüşme formu araştırmanın amacına uygun olarak ilgili alan yazın dikkatli bir biçimde tarandıktan sonra oluşturulmuştur.

Araştırmanın çalışma grubunu Eskişehir ilimizdeki Anadolu Üniversitesi, Osmangazi Üniversitesi ve Eskişehir Teknik Üniversitesinde görev yapmakta olan farklı unvanlardaki 15 akademisyen oluşturmuştur (Tablo 1). Üç ayrı üniversiteden 5'er katılımcı araştırmaya dahil olmuştur. Katılımcıların yedisi kadın ve sekizi ise erkektir. Yaşları 38 ila 58 arasında ve mesleki tecrübeleri de 5 ila 35 arasında değişmektedir. Katılımcılar Öğr. Gör., Yrd. Doç. Dr., Doç. Dr. ve Prof. Dr. gibi farklı unvanlara sahiptirler.

Bu araştırmanın verileri 2024 yılı Nisan ayı içerisinde görüşmeler aracılığıyla toplanmıştır. Görüşmelerde ses kaydı kullanılmamıştır. Araştırmanın verileri içerik analizi yöntemiyle analiz edilmiştir. Verilerin çözümlemesi yapıldıktan sonra katılımcılar K1, K2, K3 vb. şeklinde kimliklendirilmiştir. Her bir araştırma sorusu altında birleştirilmiş olan veriler kodlanmış ve yapılan kodlamalar uygun temalar altında gruplandırılmıştır. Analizlerden elde edilen bulgular tablolarla görselleştirilmiştir. Bulguları desteklemek için katılımcıların dikkat çeken görüşleri de sunulmuştur.

Tablo 1. Katılımcılara Ait Demografik Bilgiler

	Kod	Cinsiyet	Yaş	Unvan	Kıdem	Üniversite
1	K1	Erkek	58	Prof. Dr.	35	AÜ
2	K2	Kadın	45	Doç. Dr.	23	AÜ
3	K3	Erkek	55	Doç. Dr.	33	AÜ
4	K4	Kadın	38	Yrd. Doç. Dr.	15	AÜ
5	K5	Kadın	56	Prof. Dr.	34	AÜ
6	K6	Erkek	52	Doç. Dr.	30	OÜ
7	K7	Erkek	50	Doç. Dr.	28	OÜ
8	K8	Kadın	55	Prof. Dr.	32	OÜ
9	K9	Kadın	45	Yrd. Doç. Dr.	20	OÜ
10	K10	Erkek	50	Öğr.Gör.	5	OÜ
11	K11	Erkek	53	Öğr.Gör.	31	ETÜ
12	K12	Kadın	43	Yrd. Doç. Dr.	21	ETÜ
13	K13	Erkek	50	Prof. Dr.	28	ETÜ
14	K14	Erkek	48	Öğr.Gör.	25	ETÜ
15	K15	Kadın	50	Yrd. Doç. Dr.	28	ETÜ

Bulgular

Açık ve Uzaktan Eğitimin Çağrıştırdığı Kavramlar ve Deneyimi

Tablo 2. Açık ve Uzaktan Eğitimin Çağrıştırdığı Kavramlar ve Deneyimi

Tema	Kod	Katılımcı	f	Top.
Açık ve uzaktan eğitimin çağrıştırdığı olumsuz kavramlar	Belirsizlik	K1, K10	2	15
	Çaresizlik	K1	1	
	Öğrenme zorluğu	K9	1	
	Adaptasyon sorunları	K9	1	
	Motivasyon sorunları	K10	1	
	Mesafe	K10	1	
	Düşük katılım	K10	1	
	Verimsizlik	K10	1	

	Evden çalışma	K10	1	
	Pandemi	K10	1	
	Tek yönlü işetişim	K1	1	
	Katılımsızlık	K1	1	
	Zoom	K13	1	
	Dijital yerli ve dijital göçmen	K8	1	
Açık ve uzaktan eğitimin çağrıştırdığı olumlu kavramlar	Esneklik	K4, K6, K12	3	23
	Gereklilik	K6, K7	2	
	Eşitlik	K6, K11	2	
	Yenilik	K7, K11	2	
	Yararlılık	K2, K3	2	
	Kısıtsızlık	K3, K11	2	
	Teknoloji	K10, K13	2	
	Kullanışlılık	K2	1	
	Değerlilik	K7	1	
	Süreklilik	K3	1	
	Rahatlık	K6	1	
	Eğitimin geleceği	K14	1	
	Hoşgörü	K12	1	
	Deniz feneri	K2	1	
	Google Teams	K13	1	
Açık ve uzaktan eğitim deneyimi	Öğretim elemanının hazırlıklı olması önemli	K4, K6, K8, K13, K14	5	15
	Eğitimini almış olmak önemli	K5, K6, K8	3	
	Kalite önemli	K3	1	
	Öğrenci motivasyonu önemli	K3	1	
	Ders materyalinin tam olması önemli	K4	1	
	İyi planlama önemli	K4	1	
	Kontrol mekanizmalarının kullanılması önemli	K12	1	
	Teknolojik altyapının yeterliliği önemli	K14	1	
	Kullanım amacı önemli (Pandemi ve deprem)	K2	1	

"*Açık ve uzaktan eğitimin size çağrıştırdığı kavramlar nelerdir? Açık ve uzaktan eğitim konusundaki deneyimlerinizi paylaşabilir misiniz?*" sorusuna karşılık katılımcıların verdikleri yanıtlardan bu sorunun üç alt temada incelenebileceği ve bu temaların da açık ve uzaktan eğitimin çağrıştırdığı olumsuz kavramlar, açık ve uzaktan eğitimin çağrıştırdığı olumlu kavramlar ve açık ve uzaktan eğitim deneyimi temaları olduğu anlaşılmıştır. Olumlu çağrışımların (23) olumsuzlardan (15) daha fazla olduğu görülmüştür.

Açık ve uzaktan eğitimin çağrıştırdığı olumsuz kavramların 14 maddede gruplanabileceği görülmüştür. Bu kavramların birbirine belirgin bir önceliği bulunmamış ve çoğu bir birer kez tekrar edilmiştir. Açık ve uzaktan eğitimin çağrıştırdığı olumsuz kavramların belirsizlik, çaresizlik, öğrenme zorluğu, adaptasyon sorunları, motivasyon sorunları, mesafe, düşük katılım, verimsizlik, evden çalışma, pandemi, tek yönlü iletişim, katılımsızlık, zoom, dijital yerli ve dijital göçmen kavramları olduğu saptanmıştır. Katılımcıların açık ve uzaktan eğitimin çağrıştırdığı olumsuz kavramlarla ilgili görüşlerinden örnekler şu şekildedir:

> "*Online kaynaklardan öğrenme sürecinin daha efektif olmasına rağmen, öğrencilerin yine de öğrenme zorlukları yaşadığı bir gerçektir. Bu da üniversite eğitimi boyunca öğrencilerin yaşam boyu öğrenme sürecine yeterli adaptasyonu gösteremediği anlamına gelmektedir*". Katılımcı 9

> "*Özellikle uzaktan eğitimle pandemi döneminde ilk kez tanışınca benim zihnimde çağrıştırdığı kavramlar o dönemin koşullarıyla şekilleniyor ve aşağıdaki gibi: Mecburiyet, teknoloji, mesafe, verimsizlik, düşük motivasyon, düşük katılım, düşük interaktif iletişim, ev-işyeri bütünleşmesi, yarın ne olacak bilinmezliği*". Katılımcı 10

"*Pandemi ve deprem dönemi gibi dönemlerde özellikle öğrencilerle iletişimi koparmamaya çalışarak yürüttüğüm bir süreçti. Başta zorlandım. Çünkü hazırlıksızdım. Sistem olarak da hazırlıksızdık.*". Katılımcı 13

Açık ve uzaktan eğitimin çağrıştırdığı olumlu kavramların 15 maddede gruplanabileceği görülmüştür. Esneklik (3), gereklilik (2), eşitlik (2), yenilik, (2), yararlılık (2), kısıtsızlık (2) ve teknoloji (2) kavramlarının daha sık tekrar edildiği saptanmıştır. Kullanışlılık, değerlilik, süreklilik, rahatlık, eğitimim geleceği, hoşgörü, deniz feneri metaforu ve Google Teams de diğer olumlu kavramlardır. Katılımcıların açık ve uzaktan eğitimin çağrıştırdığı olumlu kavramlarla ilgili görüşlerinden örnekler şu şekildedir:

"*Açık ve uzaktan eğitim; zaman ve mekân kısıtlılıklarını ortadan kaldırarak yaşam boyu sürekliliğinin sağlanması anlamında yararlı bir işlevdir*". Katılımcı 3

"*Yeni ve değerli maden. Nasıl araştırmacılar ve biz akademisyenler için veri madeni, veri akışı önemliyse, uzaktan eğitimde bence yeni keşfedilmeye başlanan bir eğitim türü. Tüm dünya genelinde ölümcül bir virüsle mücadele ederken, bir anda imdadımıza eğitimi kesintiye uğratmamak için uzaktan eğitimin olanakları yetişti*". Katılımcı 7

"*Eğitimin geleceği olduğunu düşünüyorum. Klasik eğitimin, duvarlar arasına sıkışmış eğitimin önümüzdeki çeyrek yüzyılda anlam yitireceğine inanıyorum*". Katılımcı 14

Katılımcılar açık ve uzaktan eğitim deneyimlerinden söz ederlerken bazı noktaların önemli olduğuna dikkat çekmişlerdir. Bu noktalar tekrarlanma sıklığına göre açık ve uzaktan eğitimde öğretim elemanının hazırlıklı olması (5), eğitimini almış olması (3), açık ve uzaktan eğitimin kaliteli kalite olması (1), öğrencinin motive edilmesi (1), ders materyalinin tam olması (1), iyi planlama yapılması (1), kontrol mekanizmalarının kullanılması (1), teknolojik altyapının yeterli olması ve kullanım amacıdır (1). Katılımcıların açık ve uzaktan eğitim deneyimiyle ilgili görüşlerinden örnekler şu şekildedir:

"*Pandemi sırasında dahil olduğumuz uzaktan eğitim, kavramsal olarak bana yararlı, kullanışlı ve geçerli kelimelerini çağrıştırıyor. Bir de insan sağlığını tehdit eden ölümcül bir virüse rağmen, bir anlamda uzaktan eğitim "deniz feneri" metaforunda olduğu gibi, öğrencilerin açıldıkları hayat denizinde yollarını kaybetmemelerini sağladı*". Katılımcı 2

"*Teknolojinin gerekliliğini bir kez daha görmüş oldum. Dijital dünyaya aşina olan akademisyenler sürece adapte olabildi. Dijital dünyaya yabancı olan akademisyenlerse uyum sağlayabilmek için uğraştılar*". Katılımcı 6

"*Kişisel deneyimlerim ise o dönemde teknolojik alt yapının yetersizliğinden sıkıntılar yaşadım. Bir anda ortaya çıkan pandemi nedeniyle toplumun ve eğitim dünyasının hazırlıksız yakalandığını, gerekli alt yapı eksikliği sebebiyle iki yıl eğitimin sekteye uğradığını düşünüyorum*". Katılımcı 14

Pandemi ve Deprem Sonrasındaki Uzaktan Eğitim Sürecinin Değerlendirilmesi

Tablo 3. Pandemi ve Deprem Sonrasındaki Uzaktan Eğitim Sürecinin Değerlendirilmesi

Tema	Kod	Katılımcı	f	Top.
Olumsuz değerlendirmeler	Eğitimin kalitesi düşüktü	K10, K14, K15	3	16
	Etkileşim sınırlıydı	K2, K4, K14	3	
	Eğitim için uygun değildi	K1, K15	2	
	Depremde gereksiz ve verimsizdi	K4, K8	2	
	Sosyalleşme sınırlıydı	K5	1	
	Eğitimin gerekleri karşılanamadı	K9	1	
	Teknik/uygulamalı dersler için uygun değildi	K14	1	
	Teknik sorunlar eğitimi aksattı	K13	1	
	Her eğitici kendi yolunu izledi	K12	1	
	Yüz yüze eğitim öncelikli tercih	K2	1	
Olumlu değerlendirmeler	Pandemi ve deprem gerekli olduğunu gösterdi	K3, K6, K7, K10, K11, K12	6	12
	Pandemide gerekliydi verimliydi	K4, K8	2	

	Mekana bağlı olmadığından daha kolaydı	K2	1	
	Görsel içerik kullanma zenginliği vardı	K5	1	
	Hazırlıklı olma süreci kolaylaştırdı	K6	1	
	Eğiticilerin sürekli eğitilmeleri gerektiği anlasıldı	K11	1	

"*Pandemi ve deprem sonrasında dahil olduğunuz uzaktan eğitim sürecine dair düşünceleriniz nelerdir?*" sorusuna katılımcıların verdikleri yanıtlardan bu sorunun iki alt temada incelenebileceği ve bu temalarında da olumsuz değerlendirmeler ve olumlu değerlendirmeler temaları olduğu anlaşılmıştır. Bazı katılımcıların değerlendirmelerinin hem olumlu hem de olumsuz yönleri ele aldığı görülmüştür. Toplam olarak bakıldığında katılımcıların pandemi ve deprem sonrası dahil oldukları uzaktan eğitim süreciyle ilgili olumlu değerlendirmelerinin (12) olumsuzlardan (16) daha az olduğu görülmüştür.

Katılımcıların pandemi ve deprem sonrası dahil oldukları uzaktan eğitim süreciyle ilgili olumsuz değerlendirmelerinin 10 başlık altında gruplanabileceği ve bunların önde gelenlerinin eğitimin kalitesinin düşük olması (3), eğitimlerde etkileşimin sınırlı olması (3), uzaktan eğitimin üniversite eğitimi için uygun olmaması (2) ve özellikle depremden sonra geçilen uzaktan eğitimin gereksiz ve verimsiz olması (2) olduğu saptanmıştır. Bunlar dışında birer katılımcı tarafından ifade edilmiş olan eğitimin gereklerinin karşılanamaması, teknik/uygulamalı dersler için uygun olmaması, teknik sorunların eğitimi aksatması, her eğitimcinin kendi bildiği yolu izlemesiyle standart bir eğimin verilememesi ve yüz yüze eğitimin her zaman öncelikli tercih olması gibi olumsuzluklar da sıralanmıştır. Katılımcıların pandemi ve deprem sonrası dahil oldukları uzaktan eğitim süreciyle ilgili olumsuz değerlendirmelerinden örnekler şu şekildedir:

> "*Yüz yüze eğitimi her zaman tercih ederim. Mekân kısıtı olmadığından daha kolaydı. Ancak etkileşim daha sınırlı olduğundan aynı zevki alamadım*". Katılımcı 2

> "*Eğitimi sürdürmek yolunda başka çare olmadığı için başvurulan bu çözüm pek çok sakıncaları da yanında getirmiştir. Bunlar içinde en önemlisi eğitim kalitesindeki düşüştür. Bunun ileride telefi edilip edilemeyeceği de benim açımdan bir bilinmezliktir*". Katılımcı 10

> "*Akademisyenler olarak bu süreçlere mecburen dahil olmak zorunda kaldık. Yani başka hiçbir türlü eğitim ve öğretim yapılamayacaktı. O yüzden bence hepimiz aynı oranda rahat bir şekilde bu sürece uyumlanamadık. Bireysel farklılıklarımız, kişisel gelişimlerimiz doğrultusunda edindiğimiz beceriler aynı olmadığı için, uzaktan eğitim sürecine katılımlarımız değerlendirildiğinde farklı katkılarımızın olması kaçınılmazdı*". Katılımcı 12

Katılımcıların pandemi ve deprem sonrası dahil oldukları uzaktan eğitim süreciyle ilgili olumsuz değerlendirmelerinin 6 başlık altında gruplanabileceği ve bunların önde gelenlerinin pandemi ve deprem olaylarının uzaktan eğitimin gerekli olduğunu göstermesi (6) ve özellikle pandemi sonra geçilen uzaktan eğitimin gerekli ve verimli olması (2) olduğu saptanmıştır. Bunlar dışında birer katılımcı tarafından ifade edilmiş olan eğitimin mekana bağlı olmaması nedeniyle kolay olması, görsel içerik kullanma imkanının zengin olması, bazı üniversitelerin uzaktan eğitim hazırlığı ve tecrübesi olması nedeniyle bu üniversitelerde uzaktan eğitim süreçlerinin rahat geçmesi ve bu iki beklenmedik olay nedeniyle uzaktan eğitim konusunda eğiticilerin her zaman güncel bilgilerle hazır olması gerekliliği de vurgulanmıştır. Katılımcıların pandemi ve deprem sonrası dahil oldukları uzaktan eğitim süreciyle ilgili olumlu değerlendirmelerinden örnekler şu şekildedir:

> "*Pandemi ve deprem sürecinde uzaktan eğitimin gerekliliği öne çıktı. Bu konuda oluşan tereddütleri ortadan kaldırdı. Zorunluluk nedeni ile eğitim sisteminin evrilmesi sonucunda açık ve uzaktan eğitimin elverişli bir ortam sağlaması bu konudaki tereddütleri ortadan kaldırdı*". Katılımcı 3

> "*Şehrimizdeki bir üniversitemiz bu alanın öncü uygulayıcısıdır. O açıdan şanslıydık. Geçmişten gelen birikimlerle o Üniversite hazır sistemini kullanabildi. Diğer üniversite sistemini zamana yayarak aktive edebilmeyi başardı. Biz de teknik üniversite olmamız sayesinde sistemi çabucak kullanmaya başlayabildik. Deprem zamanında uzaktan eğitime yeniden geçildiğinde duruma uyumlanmada zorlanmadık*". Katılımcı 6

> "*Pandemi sırasında uzaktan eğitim sürecine dahil oluşumuz eğitimi sürdürebilmek için tartışmasız bir gereklilikti. Deprem sonrası için aynı şeyi söyleyemem. Çünkü bence sadece depremin yaşandığı illerde aileleriyle bu durumdan mağdur olan öğrencilerimizle uzaktan eğitim yapabilirdik. Bir anlamda bütün öğrencilerimizi aynı kefeye koyarak tartmış olduk*". Katılımcı 8

Uzaktan Eğitimin Eğitim ve Öğretim Faaliyetlerine Katkıları

Tablo 4. Uzaktan Eğitimin Eğitim ve Öğretim Faaliyetlerine Katkıları

Tema	Kod	Katılımcı	f	Top.
Katkılar	Mesafe ve zaman nedeniyle eğitime ulaşamayanlar için faydalı	K2, K3, K14	3	19
	Dezavantajlı bireyler için faydalı	K2, K3	2	
	Eğitimin sürdürülebilir olmasını sağlar	K11, K15	2	
	Öğrenci ve eğitici açısından masrafı az	K12, K12	2	
	Eğitime yön vermektedir	K7, K9	2	
	Günümüzde bir zorunluluk	K9, K14	2	
	Derslerin kayıt edilmesi yeniden ulaşmayı mümkün kılıyor	K8	1	
	Kolay ulaşılabilir	K12	1	
	Konforlu	K13	1	
	Eğitimde yeni olanakları görmek için faydalı	K6	1	
	Alternatif bir eğitim modeli olarak faydalı	K6	1	
	Tamamlayıcı bir eğitim olarak kullanılabilir	K5	1	
Dezavantajlar	Zayıf	K1	1	4
	Yetersiz	K1	1	
	Derinlemesine eğitim için uygun değil	K5	1	
	Yüz yüze eğitimle rekabet edemez	K11	1	
Kullanımda dikkat edilmesi gerekenler	Yeterli hazırlık gerekli	K4, K5	2	5
	Doğru yaklaşım gerekli	K4	1	
	Doğru ve yeterli materyal gerekli	K4	1	
	Zorunlu durumlarda kullanılmalı	K1	1	

"*Uzaktan eğitim sürecinin eğitim ve öğretim faaliyetlerine katkıları nelerdir?*" sorusuna karşılık katılımcıların verdikleri yanıtlardan bu sorunun üç alt temada incelenebileceği ve bu temaların da katkılar, dezavantajlar ve kullanımda dikkat edilmesi gerekenler temaları olduğu anlaşılmıştır. uzaktan eğitimin katkılarının (19) dezavantajlarına (4) kıyasla çok daha fazla sıklıkla dile getirildiği görülmüştür.

Katılımcılar uzaktan eğitimin eğitim ve öğretim faaliyetlerine katkılarıyla ilgili 12 farklı katkı dile getirmişlerdir. Bu katkıların önde gelenleri mesafe ve zaman nedeniyle eğitime ulaşamayanlar için faydalı olması (3), dezavantajlı bireyler için faydalı olması (2), eğitimin sürdürülebilir olmasını sağlaması (2), öğrenci ve eğitici açısından masrafının az olması (2), eğitime yön vermesi (2) ve günümüzde bir zorunluluk olması (2) olduğu tespit edilmiştir. Bunlara ilave olarak birer katılımcı tarafından derslerin kayıt edilmesiyle yeniden ulaşmanın mümkün olması, kolay ulaşılabilir olması, konforlu olması, eğitimde yeni olanakları görmek için fırsat vermesi, alternatif bir eğitim modeli olarak faydalı olması ve tamamlayıcı bir eğitim olarak kullanılabilmesi gibi katkılar da dile getirilmiştir. Katılımcıların uzaktan eğitimin eğitim ve öğretim faaliyetlerine katkılarıyla ilgili görüşlerinden örnekler şu şekildedir:

> "*Zaman ve mekân kısıtlamalarını ortadan kaldırması, eğitim alanında göz ardı edilemeyecek katkılar sağlaması, özellikle dezavantajlı bireylere eğitim olanağı sağlaması*". Katılımcı 3

> "*Eğitim-öğretim faaliyetlerinde uzaktan eğitimin zorunlulukla da olsa ezber bozduğunu söyleyebilirim. Metazoriyle başlanan durum, kendini kritik bir değişim gerekliliği olarak kabul ettirmeyi başardı*". Katılımcı 7

> "*Yer ve zaman açısından hem öğrenci hem de hocaya fayda sağlıyor. Büyük bir rahatlık sağlıyor. Öğrenci açısından konaklama ulaşım yeme içme gibi konularda maddi bir kolaylığı ifade ediyor*". Katılımcı 13

Çoğu katılımcı uzaktan eğitimin eğitim ve öğretim faaliyetlerine katkılarıyla ilgili görüş bildirmiş olsa dahi uzaktan eğitimin bir kısım dezavantajlarında söz eden katılımcılar da olmuştur. Bu katılımcıların dile getirdiği az sayıdaki dezavantajların uzaktan eğitimin eğitim açısından zayıf ve yetersiz olması ve derinlemesine eğitim için uygun olmaması olduğu görülmüştür. Bir katılımcı ise uzaktan eğitimin yüz yüze eğitimle rekabet edemeyeceğini

belirtmiştir. Katılımcıların uzaktan eğitimin eğitim ve öğretim faaliyetleri için dezavantajlarıyla ilgili görüşlerinden örnekler şu şekildedir:

"*Nasıl kullanıldığına bağlı olarak değişir. Örgünü tamamlayıcı ama öğretim üyesi yetkin ise ve öğrencilerde de öğrenme motivasyonu varsa çok destekleyici ve katkı sağlayıcı. Bununla birlikte derslikteki eğitim gibi derinliğe ve detaya inebildiğimiz bir eğitim olmadı bana göre*". Katılımcı 5

"*Sürecin eğitim ve öğretim faaliyetlerine katkıları göz ardı edilemez. Yüz yüze eğitimle rekabet etmesi pek çok açıdan kolay olmasa da en önemli katkısı eğitimi acil oluşan durumlara rağmen kesintiye uğratmamasıdır*". Katılımcı 14

Katılımcılardan bazıları uzaktan eğitimin eğitim ve öğretim faaliyetleri için katkılarını olduğunu ve bu katkıların bazı şartlara bağlı olduğunu dile getirmişlerdir. Katılımcıların dikkat edilmesi durumunda uzaktan eğitimi faydalı kılacağını öngördükleri hususlar şunlardır: Uzaktan eğitimden önce yeterli hazırlık yapılmalıdır, uzaktan eğitim için doğru yaklaşım belirlenmelidir, uzaktan eğitim için doğru ve yeterli materyal kullanılmalıdır ve uzaktan eğitim zorunlu olduğu durumlarda kullanılmadır. Katılımcıların uzaktan eğitimin faydalı olabilmesi için dikkat edilmesi gerekenlerle ilgili görüşlerinden örnekler şu şekildedir:

"*Enerji, para, belki de en önemlisi zaman tasarrufu sunarken, hangi alanda, seviyede ve üniversitede olursa olsun eğitimlere erişim özgürlüğü sağlamaktadır. Ancak doğru öğreten yaklaşımı ve özenle hazırlanan eğitim materyalleri ile uygulanabilir*". Katılımcı 4

Zorunlu Geçilen Uzaktan Eğitimin Süreciyle İlgili İzlenimler

Tablo 5. Zorunlu Geçilen Uzaktan Eğitimin Süreciyle İlgili İzlenimler

Tema	Kod	Katılımcı	f	Top.
İzlenimler	Üniversitenin hazırlıklı olması süreci kolaylaştırdı	K11, K12, K13, K14	4	18
	Deneyimsiz hocalar danışarak, deneyip yanılarak adapte oldular	K1, K8, K10, K15	4	
	Deneyimsiz hocalar bocaladı	K1, K5, K8	3	
	Deneyimli hocalar çabuk uyum sağladı	K1, K5, K8	3	
	Rektörlük hocalara yeterli eğitim ve desteği sağlamadı	K5, K15	2	
	Zorunlu bir tercih olması öğrenci motivasyonunu düşürdü	K11	1	
	Etkileşim eksikliği rahatsız ediciydi	K2	1	
Sonuçlar	Zorunlu olarak herkes kendisini geliştirdi	K4, K9, K10	3	7
	Uzaktan eğitimler ilgili önyargılar yıkıldı	K3	1	
	Uzaktan eğitimin önemi anlaşıldı	K6	1	
	Olağandışı durumlara hazır olunduğu görüldü	K3	1	
	Yeniliğe, değişime her an hazır olma gerekliliği anlaşıldı	K7	1	

"*Ülke çapında olduğu gibi, üniversitenizde de beklenmedik anlarda, zorunlu olarak geçilen uzaktan eğitim sürecine ilişkin izlenimlerinizi paylaşır mısınız?*" sorusuna karşılık katılımcıların verdikleri yanıtlardan bu sorunun iki alt temada incelenebileceği ve bu temaların da izlenimler ve sonuçlar olduğu görülmüştür. Katılımcıların uzaktan eğitim süreciyle ilgili izlenimlerine daha fazla (18), sürecin sonuçlarıyla ilgili görüşlerine (7) ise daha az yer verdikleri anlaşılmıştır.

Katılımcıların zorunlu olarak geçilen uzaktan eğitim süreciyle ilgili en sık dile getirdikleri izlenimlerin sırasıyla; üniversitenin hazırlıklı olmasının süreci kolaylaştırması (4), deneyimsiz hocaların danışarak, deneyip yanılarak adapte olması (4), deneyimsiz hocaların bocalarken deneyimli hocaların çabuk uyum sağlamaları (3), rektörlüğün hocalara yeterli eğitim ve desteği sağlamaması (2), zorunlu bir tercih olması nedeniyle öğrenci motivasyonunun düşmesi (1) ve etkileşim eksikliği rahatsız edici olması (1) olduğu saptanmıştır. Katılımcıların zorunlu olarak geçilen uzaktan eğitim süreciyle ilgili izlenimlerinden örnekler şu şekildedir:

"*Acil koşullarda, aniden uzaktan eğitime geçildiği için öğretim görevlileri ve üyeleri de başlangıçta deneyimsizlik kaynaklı bocaladı. Teknolojiye yakın hocalar çabuk uyum sağladı. Teknolojiye mesafeli olan hocalar ise deneye, yanıla ve bilenlere sora sora sisteme, uzaktan eğitimin koşullara adapte oldular*". Katılımcı 1

"*Bu süreçte üniversite yönetimi öğretim elemanlarını çok yalnız bıraktı. Pek çok hoca Mergen öğrenme portalını hiç kullanmamıştır ve ne yapacağını bilmiyordu; Zoom gibi diğer uygulamaları farklı mecralardan öğrenerek eğitim yapmaya çalıştık. Açık Öğretim Fakültesi'nde önemli bir deneyim mevcuttu ancak bu deneyim diğer fakülteler ile paylaşılmadı. Rektörlük inisiyatif alarak hocalarına uzaktan öğretimi nasıl yapacakları konusunda eğitimlerle destek vermedi*". Katılımcı 5

"*Üniversitemiz bu sürece birikimleri ve deneyimleri doğrultusunda çok pratik bir şekilde dahil oldu bence. Yani alt yapı zaten vardı, süreç aksamadan devam etti. Kolay kullanılabilir bir ara yüz vardı. Ya da bununla ilgili verilen eğitimler sayesinde süreç iyi yönetilebildiğin, öğretim kadrosu böyle kritik bir paradigma değişimine ayak uydurabildi. Sürece dair izlenimlerim kolaylıkla uyum sağlanabildiği yönünde oldu*". Katılımcı 13

Katılımcıların zorunlu geçilen uzaktan eğitimle ilgili izlenimleri kadar uzaktan eğitimin sonuçlarına ilişkin görüşlerini de paylaştıkları görülmüştür. Katılımcıların uzaktan eğitimin sonuçlarına ilişkin yaptıkları değerlendirmede; zorunlu geçilen uzaktan eğitim nedeniyle zorunlu olarak herkesin kendisini geliştirdiğine (3), zorunlu geçilen uzaktan eğitim sonrasında uzaktan eğitimlerle ilgili önyargıların yıkıldığına (1), uzaktan eğitimin öneminin anlaşıldığına (1), olağandışı durumlara hazır olunduğunun görüldüğüne (1) ve yeniliğe, değişime her an hazır olma gerekliliğinin anlaşıldığına (1) vurgu yapmışlardır. Katılımcıların zorunlu olarak geçilen uzaktan eğitim sürecinin sonuçlarına ilişkin izlenimlerinden örnekler şu şekildedir:

"*Pandemi ve deprem gibi olağanüstü koşullar uzaktan eğitimi gerekli hale getirdi. Zorunluluk nedeni ile hızlı bir şekilde hayata geçirilen uygulamalar bu konuya ilişkin önyargıları yıkarken aslında altyapının uzaktan eğitim için küçük aksaklıklar yaşansa da bu olağanüstü durumlara hazırlıklı olduğunu gösterdi*". Katılımcı 3

"*Bence öğretenin kendisi, dersi ve ders materyallerine bağlı olarak değişken sonuçlar elde edilir. Uzaktan eğitim sistemlerini kullananların, yönetenlerin ve kontrol edenlerin sistem hakkındaki uygulama becerilerinin geliştiğini düşünüyorum*". Katılımcı 7

"*Hem pek çok akademisyen ferdî olarak, hem de birimlerin ve üniversitenin yönetimi daha kapsayıcı olarak, yeni duruma hızla ve etkin bir biçimde adapte olabilmiştir. Bu da, tekil bir bünye olarak kurumun ve kuruma katkı veren akademisyenlerin çözüme yönelik nasıl bir refleks gösterebildiğine somut bir örnek vermiştir*". Katılımcı 10

Uzaktan Eğitimin Farklı Koşullarına Adapte Olma ve Motivasyon Sağlama Yöntemleri

Tablo 6. Uzaktan Eğitimin Farklı Koşullarına Adapte Olma ve Motivasyon Sağlama Yöntemleri

Tema	Kod	Katılımcı	f	Top.
Zorluklar	Motive olamama	K1, K4, K6, K10, K11, K12, K13, K15	8	13
	Karşılıklı iletişim kuramama	K1, K13	2	
	Öğrenci katılımının az olması	K4	1	
	Üniversitelerin hazırlıksız olması	K5	1	
	Üniversitelerin eğitim ve materyal desteği sağlamaması	K5	1	
Zorlukları aşma yöntemleri	Hocaların eğitime adanmışlığı	K6, K7, K8, K9, 10, K12	6	23
	Araçları ve kullanımı öğrenme	K5, K7, K8, K10, K13	5	
	Dersin niteliğini artırma	K9, K10, K13, K15	4	
	Öğrencileri cesaretlendirme	K6, K7, K12, K14	4	
	Yakınlarından materyal temin etme	K5, K8	2	
	Kendi parasıyla materyal satın alma	K9, K10	2	
	Evden çalışmaya adapte olma	K2, K11	2	

	Ofisten çalışma	K2, K3	2	
	Önceki tecrübeleri kullanma	K3	1	

"*Uzaktan eğitimi mecburi kılan farklı ve alışılmışın dışındaki koşullara nasıl adapte olduğunuzu ve motivasyonlarınızı örnekler vererek açıklayabilir misiniz?*" sorusuna karşılık katılımcıların verdikleri yanıtlardan bu sorunun iki alt temada incelenebileceği ve bu temaların da zorluklar ve zorlukları aşma yöntemleri temaları olduğu anlaşılmıştır. Katılımcıların zorlukları aşma yöntemleriyle ilgili görüşlerinin (23) zorluklarla ilgili görüşlerinden (13) daha fazla sayıda olduğu görülmüştür.

Katılımcıların zorunlu uzaktan eğitim döneminde yaşadıkları zorlukların en önde geleninin motive olamama olduğu tespit edilmiştir. Katılımcıların aşina olmadıkları ve farklı fonksiyonlara sahip olan uzaktan eğitime motive olmada zorlandıkları anlaşılmıştır. Yaşanılan diğer zorlukların ise karşılıklı iletişim kuramama, öğrenci katılımının az olması, üniversitelerin hazırlıksız olması ve üniversitelerin eğitim ve materyal açısından hocaları desteklememesi olduğu tespit edilmiştir. Katılımcıların zorunlu uzaktan eğitim döneminde yaşadıkları zorluklarla ilgili görüşlerinden örnekler şu şekildedir:

> "*Motive olmakta zorluk yaşadım. Çünkü öğrencilerle karşılıklı iletişim kuramadım. Yakın çevremden tanıdığım meslektaşlarım için de durum benzer yaşandı diyebilirim*". Katılımcı 1

> "*Vakıf üniversitesinde kardeşim çalışıyor; fakültesi gençlere eğitim videoları hazırlatmış. Onların videoları ve onun yönlendirmeleri ile Zoom'u nasıl kullanacağımı öğrendim ve böylelikle sürecin üstesinden geldim. Kendi üniversitemin bu süreçlerde hiçbir motivasyon sağlayıcı katkısı olmadı. Kriz yönetimi kurumsal olarak hiçbir şekilde işletilmedi. Oysa kriz yönetiminde hayli başarılı üniversiteler var. En temel motivasyonum ise bir öğretim üyesi olarak öğrencilerimi bu süreçte yalnız bırakmama arzusuydu. Hem eğitimlerine katkı verme hem de hocaları olarak yapabileceklerimi yapmaktı. Bu tamamen öznel bir çabamdır; üniversitemizin özellikle üst düzey yönetimlerin bu süreçte felç olup-kalma durumlarıyla yüzleşmeleri önemli ve gereklidir*". Katılımcı 5

> "*Açıkçası ilk başta herkes gibi motive olamadım. Ancak zamanla süreci normalleştirdim kendi içimde. Öğrencilerle daha etkileşimli olmanın yollarını aradım. Tartışma konuları ödevler. Ders başında sohbet ve ilgi çekici anlatım için sunumlara görseller ekleme gibi. Eğitmenler olarak birbirimizden de çok şey öğrendik. Motive olmanın bir diğer yolu da bence bu*". Katılımcı 13

Katılımcıların zorunlu uzaktan eğitim döneminde yaşadıkları zorlukları aşmak ve adapte olabilmek için bir takım yöntemlere başvurdukları anlaşılmıştır. Bu yöntemlerin önde gelenlerinin hocaların eğitime adanmış olmaları (6), uzaktan eğitimle ilgili araçları ve bunların nasıl kullanılacağını ötürenmiş olmaları (5), dersi ilgi çekici hale getirmek için niteliği artırmaları (4) ve öğrencileri derse bağlamak için onları sürekli cesaretlendirmeleri olduğu tespit edilmiştir. Bunların yanında yakınlarından materyal temin etme, kendi parasıyla materyal satın alma, evden çalışmaya kendini adapte etme, çalışmak için ofisi kullanma ve önceki tecrübelerinden yararlanma yöntemlerinin de kullanıldığı görülmüştür. Katılımcıların zorunlu uzaktan eğitim döneminde yaşadıkları zorlukları aşma yöntemleriyle ilgili görüşlerinden örnekler şu şekildedir:

> "*Adapte olmamı açık bir iletişim yürütmeyi tercih etmemle gerçekleştirebildim. Her şeyi bilen hocayım yaklaşımını tercih etseydim durumum zora girebilirdi. Gerektiğinde destek sisteminden, meslektaşlarımdan, asistanlarımdan, öğrencilerimden yardım almaya çekinmedim. Bu da adapte oluşumu sağladı. Motivasyonum ise sadece öğretmiyorum, ben de yeni şeyler öğreniyorum yaklaşımımdı*". Katılımcı 8

> "*Öncelikle teknolojiye yatırım yaparak, bir ipad ve donanımlı bir kamera, profesyonel bir ses sistemi ile çekimler sırasında kullanılmak üzere arka fon perdesi aldım. Sistemde gerçekleştirdiğim canlı derslerim ve kayıtlarım kaliteli olunca, öğrencilerim tarafından övgüler alarak, takdir edilmem motivasyonumu arttırdı*". Katılımcı 9

> "*Ders verdiğim mekanların dışında kendimi en rahat, güvende ve konforlu hissettiğim ev ortamına kolaylıkla adapte olmam, eğitim verme sırasındaki çalışmalarımın niteliğine katkı sağladı. Bu da kesinlikle motivasyonumu arttırmış oldu*". Katılımcı 11

Uzaktan Eğitim Derslerinde Kullanılan Yöntemler ve Araçlar

Tablo 7. Uzaktan Eğitim Derslerinde Kullanılan Yöntemler ve Araçlar

Tema	Kod	Katılımcı	f	Top.
Kullanılan araçlar	Kamera ve mikrofon	K1, K6, K9, K15	4	5
	Üniversitenin uzaktan eğitim portalları	K3	1	
Paylaşımlar	Videolar	K4, K6, K7, K12, K13, K14	6	16
	Power Point sunumlar	K4, K5, K11, K12	4	
	Dosyalar	K3, K12, K14	3	
	Görseller	K6, K7	2	
	Ekran paylaşımı	K3	1	
Yöntemler	Canlı ders (Zoom ve Mergen)	K5, K9, K10, K11, K14	5	16
	Ders saatin ve içeriğinin önceden duyurulması	K4, K12	2	
	Ödevler verilmesi	K4, K13	2	
	Öğrenci-Eğitici ve öğrenci-öğrenci etkileşimi	K6, K14	2	
	Zamanında ve detaylı dönütler sağlanması	K4	1	
	Tartışma düzenleme	K13	1	
	Sunum yaptırma	K13	1	
	Öğrencilerin bireysel öğrenmelerini teşvik etme	K8	1	
	Ders materyalinin zenginleştirilmesi	K1	1	

"*Uzaktan eğitim kapsamındaki çevrim içi ortamlarda yürütülen derslerinizde kullanılan unsurları açıklayabilir misiniz?*" sorusuna karşılık katılımcıların verdikleri yanıtlardan bu sorunun üç alt temada incelenebileceği ve bu temaların da kullanılan araçlar, paylaşımlar ve yöntemler temaları olduğu anlaşılmıştır. Paylaşımlar (16) ve yöntemlerle (16) ilgili görüşlerin tekrarlanma sıklığının kullanılan araçlarla (4) ilgili görüşlerin sıklığından daha fazla olduğu görülmüştür.

Katılımcılar uzaktan eğitimde en sık kullandıkları araçların kamera ve mikrofon (4) olduğu görülmüştür. Üniversitenin uzaktan eğitim portalı da kullanılan bir araç olarak dile getirilmiştir. Katılımcıların uzaktan eğitimlerde sıklıkla paylaşımlarda bulundukları ve en sık yaptıkları paylaşımların sırasıyla; videolar (6), Power Point sunumlar (4), dosyalar (3), görseller (2) ve ekran paylaşımı (1) olduğu saptanmıştır. Katılımcıların uzaktan eğitimde derse ilgiyi artırmak ve öğrencileri canlı tutabilmek için farklı yöntemler kullandıkları ve en sık kullandıkları yöntemlerin sırasıyla; canlı ders yapma (5), ders saatini ve içeriğini önceden duyurma (2), ödevler verme (2), öğrenci-eğitici ve öğrenci-öğrenci etkileşimini sağlama (2), öğrencilere zamanında ve detaylı dönütler sağlama (1), tartışmalar düzenleme (1), sunum yaptırma (1), öğrencilerin bireysel öğrenmelerini teşvik etme ve ders materyalini zenginleştirme olduğu tespit edilmiştir. Katılımcıların uzaktan eğitim derslerinde kullandıkları unsurlarla ilgili görüşlerinden örnekler şu şekildedir:

> "*Görev yaptığım kurumun uzaktan eğitim altyapısına yönelik, örgün ve uzaktan eğitim öğrencileri için oluşturduğu iki ayrı portal, ses cihazları, görüntü aktarım cihazları, ekran paylaşımı ve dosya paylaşımı unsurlarından yararlandım*". Katılımcı 3

> "*Hazırladığım sunum, dersi anlattığım video kaydı, duyurularla ders öncesi (1 gün önce) derste işlenecek konu ve ders saati ve linki hakkında ilan veriyor olmam, öğrencilere verdiğim ödevleri kelime kelime okuyup review formatında dönüşler yapıp, ödevlerini iyileştirmeleri için fırsat tanıyıp, en son versiyonlarını puanlıyor olmak deneyimlediğim çok iyi bir öğretim yöntemi oldu*". Katılımcı 4

> "*Ben bilinçli bir yaklaşımla çevrim içi ortamda yürüttüğüm derslerimde ders içeriklerine ilişkin sadece hazırladığım metinleri değil, görselleri, videoları, grafikleri de sıklıkla bir arada kullanmaya çalıştım*". Katılımcı 7

> "*Her dersim için öğrencilerimin okuyabileceği kaynakları belirleyerek, onlarla paylaştım. Dersin işleyişle ilgili sürekli duyurular yaparak, yönlendirmeler yaptım. Ders sunularımı paylaştım. Maalesef öğrencilerin canlı derslere katılımı düşük oranda gerçekleşti. Derslerin kayıtlarını sistemden daha sonra takip edebildiler. Yine de çevrim içi ortamın bütün olanaklarını, ders içeriklerimi aktarabilmek için kullandım.*

Derslerimin teorik yönlerini çevrim içi ortamda daha rahat paylaştım. Uygulamaya dönük bitirme projelerini belki yüz yüze daha verimli kotarabilirdik. Ancak yine de uzaktan eğitimin teknoloji desteğinden yararlandık. Derslerle bağlantılı sunular, slaytlar, makale pdfleri, ilgi çekici videolar yardımcı unsurlar olarak kullanılabilir". Katılımcı 12

"*Not paylaşma, video paylaşma, tartışma konuları ve ödevler oluşturma, sunum yaptırma*". Katılımcı 13

Uzaktan Eğitim Sırasında Karşılaşılan Güçlükler

Tablo 8. Uzaktan Eğitim Sırasında Karşılaşılan Güçlükler

Tema	Kod	Katılımcı	f	Top.
Eğitici kaynaklı	Sistem konusunda bilgi/tecrübe eksikliği	K4, K5, K6, K9, K15	5	10
	Kısıtlanmış olma duygusu	K4, K13	2	
	Ders öncesi psikolojik hazırlık zorunluluğu	K4, K13	2	
	Öz motivasyon, öz disiplin gerekliliği	K6	1	
Öğrenci kaynaklı	Öğrenci katılımının düşük olması	K2, K8, K10, K12, K13	5	6
	Öğrencinin dikkati çekmek zorluğu	K10	1	
Dış kaynaklı	Etkileşimim sınırlı olması	K2, K6, K7, K8, K9, [illegible]	6	19
	Altyapı yetersizliği	K1, K3, K11, K12, K13, K14	6	
	Donanım yetersizliği	K1, K3	2	
	Üniversitelerin destek yetersizliği	K8, K9	2	
	Sistemlerin kullanıcı dostu olmaması	K1, K9	2	
	Adaletli değerlendirme güçlüğü		1	

"*Çevrim içi öğrenme ortamlarının, zorunlu uzaktan eğitime geçişe uyarlanması sırasında sizin karşılaştığınız güçlüklerden bahseder misiniz?*" sorusuna karşılık katılımcıların verdikleri yanıtlardan bu sorunun üç alt temada incelenebileceği ve bu temaların da eğitici kaynaklı güçlükler, öğrenci kaynaklı güçlükler ve dış kaynaklı güçlükler temaları olduğu anlaşılmıştır. Katılımcıların sırasıyla en fazla dış kaynaklı (19), eğitici kaynaklı (10) ve öğrenci kaynaklı (6) güçlükleri dile getirdikleri saptanmıştır.

Katılımcıların zorunlu uzaktan eğitim süresince karşılaştıkları eğitici kaynaklı zorlukların sırasıyla; sistem konusunda bilgi/tecrübe eksikliği (5), kısıtlanmış olma duygusu (2), ders öncesi psikolojik hazırlık zorunluluğu (2) ve öz motivasyon ve öz disiplin gerekliliği (1) olduğu tespit edilmiştir. Katılımcıların uzaktan eğitim süresince karşılaştıkları eğitici kaynaklı zorluklarla ilgili görüşlerinden örnekler şu şekildedir:

"*Teams, Mergen ve Zoom gibi mecraların nasıl kullanılacağını bilmiyordum*". Katılımcı 5

"*Çevrim içi öğrenme ortamlarına yabancı olduğum için, teknolojilerini kullanabilsem de işleyiş yapısını bilmediğimden zorlandım. Örneğin, ders materyali yüklediğimi zannediyorum. Öğrencilerimin uyarılarıyla, öğrenci paylaşımına açmadığımdan haberdar olarak, yaptığım işlemi tamamlayabiliyordum*". Katılımcı 7

"*Psikolojik olarak kayıt altına alınma biraz tedirgin edici olabiliyordu başlarda. Çünkü yüz yüze eğitimde bu alışkın olmadığımız bir durumdu. Sınıfta yüz yüze daha samimi ve rahat iletişim kurabiliyorduk. Kamera açmıyorlardı ve gerçekten bazen boşluğa ders anlatıyormuş gibi olmak kötüydü. Bazen tasdik edilmek ve dinlenildiğimi görmek isteyebiliyordum. Teknik olarak ise bağlantı sorunları bizi etkileyebiliyordu. Öğrenciler de zaman zaman bunu bahane ederek derse katılmıyordu*". Katılımcı 13

Katılımcıların zorunlu uzaktan eğitim süresince karşılaştıkları öğrenci kaynaklı zorlukların sırasıyla; öğrenci katılımının düşük olması (5) ve öğrencilerin dikkatini çekmenin zor olması (1) olduğu tespit edilmiştir. Katılımcıların uzaktan eğitim süresince karşılaştıkları öğrenci kaynaklı zorluklarla ilgili görüşlerinden örnekler şu şekildedir:

"*Yaşanan kurumsal problemler kaynaklı güçlüklerden bahsedebilirim. Uzaktan eğitim kurumum tarafından desteklenerek, yaşanabilecek sorunlar aşılmaya çalışılsa da ülke geneli için aynı durumun geçerli olmadığı*

kanaatindeyim. Çevrim içi öğrenme ortamlarının etkililiği ve bu öğrenme ortamlarına katılma oranlarının yetersizliği de akademisyen olarak karşılaştığımız genel sorunlardı". Katılımcı 8

"*En önemli zorluk öğrencinin öncelikle katılımını, katılan öğrencinin de dikkatini derse vermesini sağlamak oldu*". Katılımcı 10

Katılımcıların zorunlu uzaktan eğitim süresince karşılaştıkları dış kaynaklı zorlukların sırasıyla; etkileşimim sınırlı olması (6), altyapı yetersizliği (6), donanım yetersizliği (2), üniversitelerin destek yetersizliği (2), sistemlerin kullanıcı dostu olmaması (2) ve adaletli değerlendirme güçlüğü (1) olduğu görülmüştür. Katılımcıların uzaktan eğitim süresince karşılaştıkları dış kaynaklı zorluklarla ilgili görüşlerinden örnekler şu şekildedir:

"*İnternet, bilgisayar, cep telefonu gibi araçların aynı kalitede olmaması. Ülke genelindeki üniversitelerde teknolojik alt yapının aynı kalitede olmaması. Zorunlu geçilen uzaktan eğitim uygulamalarının getirisi olan sistemlerin kullanıcı dostu olmamaları*". Katılımcı 1

"*Sisteme uyum sağlamada karşılaşılan problemler ve öğrencilerle etkileşimli iletişim kurmada yaşanan zorluklar enerjimizi tüketti. Ayrıca öğretim elemanlarına herhangi bir ek kaynak sağlanmamıştır*". Katılımcı 9

"*Pandemi ve deprem sonrasında gerçekleştirdiğim uzaktan eğitim sürecinde bazı zamanlarda internet bağlantısı yetersizliği ve elektrik kesilmeleri yüzünden zorluk çektim*". Katılımcı 11

Uzaktan Eğitim Sırasında Karşılaşılan Sorunları Aşılması

Tablo 9. Uzaktan Eğitim Sırasında Karşılaşılan Sorunları Aşılması

Tema	Kod	Katılımcı	f	Top.
Eğitici odaklı çözümler	Kendisiyle mücadele etme, özverili olma	K6, K10, K12, K14	4	8
	Kendisini geliştirme	K7, K13	2	
	Bilgi eksikliğinde yakınlarına danışma	K4, K5	2	
Öğrenci odaklı çözümler	Sık sık canlı birebir etkileşim kurma	K4, K13, K14	3	11
	Öğrencileri tam ve eksiksiz bilgilendirme	K7, K11	2	
	Öğrencilere farklı ödevler/aktiviteler verme	K4, K13	2	
	Öğrenci dikkati toplamak için soru-cevap	K3	1	
	İlgi çekici içerikler kullanma	K15	1	
	Öğrencileri cesaretlendirme, motive etme	K14	1	
	Öğrenci temelli bir yaklaşım benimseme	K8	1	
Dış faktörler odaklı çözümler	Altyapı sorunlarına karşı ofisten çalışma	K3	1	4
	Altyapı sorunlarına alternatifler hazırlama	K4	1	
	Donanım eksiklerini kendi imkanlarıyla giderme	K9	1	
	Üniversite teknik ekip görevlendirmesi	K11	1	
Çözüm	Çözüm bulamama	K5	1	1

"*Günlük deneyimleriniz sırasında sistemsel ya da katılımcı bireyler kaynaklı sorunların üstesinden nasıl geldiğinizi, mesleki deneyimlerinizi göz önünde bulundurarak anlatabilir misiniz?*" sorusuna karşılık katılımcıların verdikleri yanıtlardan bu sorunun 4 alt temada incelenebileceği ve bu temaların da eğitici odaklı çözümler, öğrenci odaklı çözümler, dış faktörler odaklı çözümler ve çözüm bulamama temaları olduğu anlaşılmıştır. Katılımcıların sırasıyla en fazla öğrenci odaklı (11), eğitici odaklı (10) ve dış faktörler odaklı (6) çözümleri kullandıkları saptanmıştır. Bir katılımcının (K5) ise uzaktan eğitim süresince karşılaştığı sorunlara çözüm üretme gayreti göstermesine karşın bir çözüm bulamadığı gözlemlenmiştir.

Katılımcıların zorunlu uzaktan eğitim süresince karşılaştıkları sorunlara karşı ürettikleri eğitici odaklı çözümlerin sırasıyla; sorunlara karşı kendisiyle mücadele etme ve öz verili olma (4), kendisini geliştirerek eksiklerini tamamlama (2) ve bilgi eksiklerini yakınlarına danışarak giderme (1) olduğu tespit edilmiştir. Katılımcıların uzaktan eğitim süresince karşılaştıkları sorunlara karşı ürettikleri eğitici odaklı çözümlerle ilgili görüşlerinden örnekler şu şekildedir:

"*Sistemsel sorunları da sisteme dair sorun yaşamadığım zamanlarda destek alabileceğim kişilere sordum. Örneğin, dersi vaktinde açmama engel bir sistemsel sorun yaşadıysam, farklı bir zamanda ders kaydını çekerek, sistem yükleyerek ve her daim öğrenciye bu kayıtları MUTLAK sunarak aştım. Benim öğreten olarak sorun yaşayabileceğim gibi öğrencinin de ders sırasında sorun yaşayabileceğini her zaman gözetmek gerek. Bence uzaktan eğitimin iyi yanı engellerin aşılması için seçenekler yaratması*". Katılımcı 4

"*Uzaktan eğitim sürecinde katılımcı bireyler kaynaklı sorunların en belirgini sorumluluk alınmamasıydı. Harcadığım emeğin göz ardı edildiğine inanıyorum. Daha doğrusu akademisyenler olarak pandemi sırasında ve deprem sonrasında çevrim içi öğrenme ortamlarının koşullarına derslerimizin içeriğini uyarlarken daha fazla emek harcadık. Fazladan zaman ayırdık*". Katılımcı 12

"*Öğrenciyle etkileşimi arttırarak katılımı arttırmaya çalıştım. Sistemsel sorunlarla baş etmeyi öğrendim ve daha hızlı çözümler buldum. Teknolojiyi daha aktif kullanmaya çalıştım. Etkileşimi arttıracak aktivitelere yer verdim. Tartışma konuları, ödevler. Bazı zorunluluklara başvurdum (sunum yaptırma ve derse katılım)*". Katılımcı 13

Katılımcıların zorunlu uzaktan eğitim süresince karşılaştıkları sorunlara karşı ürettikleri öğrenci odaklı çözümlerin sırasıyla; öğrencilerle sık sık canlı birebir etkileşim kurma (3), öğrencileri tam ve eksiksiz bilgilendirme (2), öğrencilere farklı ödevler/aktiviteler verme (2), öğrencinin dikkati toplamak için soru-cevap tekniğini kullanma (1), ilgi çekici içerikler kullanma (1), öğrencileri cesaretlendirme ve onları motive etme (1) ve öğrenci temelli bir yaklaşım benimseme olduğu tespit edilmiştir. Katılımcıların uzaktan eğitim süresince karşılaştıkları sorunlara karşı ürettikleri öğrenci odaklı çözümlerle ilgili görüşlerinden örnekler şu şekildedir:

"*Dijital becerilerimi geliştirdiğim için öğrencilerime dijital kılavuzluk yapabildim. Sistemdeki teknolojiyi daha temkinli kullanan öğrencilerim için aşama, aşama neler yapmaları gerektiğini, yüklediğim ders içeriklerine nasıl ulaşabileceklerine ve istediğim ödevleri nasıl yükleyebileceklerine dair yönlendirmeler yaptığım yardım modülleri yükledim*". Katılımcı 7

"*İnteraktif görüşmeler sağladım. Zoom üzerinden öğrenci toplantıları yaparak sorunlarını belirledim ve çözüm üretme gayreti gösterdim. Öğrenci motivasyonunu sağlamaya çalışarak pandeminin biteceğini güzel günler göreceğimizi kendileriyle sıklıkla paylaştım*". Katılımcı 14

"*Derslere öğrenciler keyiflerince giriyorlardı çünkü bir yaptırım yoktu. Derslere devam zorunluluğu ve devamsızlıktan kalma kriterleri kaldırıldı. Doğal olarak da öğrenciler derslere katılmadılar. Seksen kişilik sınıfta, on, on beş kişi ancak derse katıldı. Öğrencilerin derse ilgisini çekmek için, Youtube'da ilgi çekici videolar bularak linkini paylaştım*". Katılımcı 15

Katılımcıların zorunlu uzaktan eğitim süresince karşılaştıkları sorunlara karşı ürettikleri dış faktörler odaklı çözümlerin; altyapı sorunlarına karşı ofisten çalışma (1), altyapı sorunlarına alternatifler hazırlama (1), donanım eksiklerini kendi imkanlarıyla giderme (1) ve üniversitenin teknik ekip görevlendirmesi (1) olduğu görülmüştür. Katılımcıların uzaktan eğitim süresince karşılaştıkları sorunlara karşı ürettikleri dış faktörler odaklı çözümlerle ilgili görüşlerinden örnekler şu şekildedir:

"*Evden yaptığım derslerimde çok nadir olmakla birlikte ses ya da görüntü iletiminde sıkıntı yaşadım. Sistemsel sıkıntı yaşamamak adına derslerimi genellikle ofisimde yapmaya çalıştım*". Katılımcı 3

"*Öncelikle sistemin getirmiş olduğu dayatmaların karşısında duran bir akademisyenim. İhtiyaç duyduğum ekipmanları kendi imkanlarımla karşılayarak, sistemin yaşattığı sorunların üstesinden geldim*". Katılımcı 9

"*Teknolojik unsurları rahatça kullanamayan akademisyenler ve öğrenciler açasından sistemin yapısı öğrenene kadar sorunlar yaşandı. Bunu aşmak için sistem destek ekibi çalışanları tarafından yardım yapıldı.*". Katılımcı 11

Uzaktan Eğitim Avantajları ve Dezavantajları

Tablo 10. Uzaktan Eğitim Avantajları ve Dezavantajları

Tema	Kod	Katılımcı	f	Top.
Avantajlar	Zaman ve mekan sınırının olmaması	K9, K10, K11, K12, K13	5	18
	Eğitiminin sürdürülebilirliğini sağlaması	K1, K5	2	
	Zaman tasarrufu sağlaması	K13, K14	2	
	Konforlu ve rahat olması	K10, K13	2	
	Derslerin kayıt ediliyor olması	K9, K15	2	
	Esnek olması	K12	1	
	Ekonomik olması	K12	1	
	Uygun donanım ve tekniklerle etkili olması	K6	1	
	Gelişime ve yeniliğe açık olması	K7	1	
	Yeni nesil için daha uygun	K8	1	
Dezavantajlar	Birebir etkileşimin sınırlı olması	K1, K3, K4, K9, K10, K12, K15	7	29
	Uygulamalı dersler için uygun olmaması	K1, K13, K14	3	
	Öğrenci motivasyonunun düşük olması	K3, K10, K15	3	
	Öğrenciden geri bildirim almanın sınırlı olması	K4, K5, K12	3	
	Donanım imkanları açısından eşitlik	K2, K4, K11	3	
	Altyapı imkanları açısından eşitlik bulunmaması	K2, K11	2	
	Derse katılımın sınırlı olması	K4, K10	2	
	Ders yönetiminin zor olması	K11, K13	2	
	Derse bağlanılan ortam koşullarının uygun	K2	1	
	Eğiticilerin motive olamaması	K15	1	
	Derinlemesine eğitimin mümkün olmaması	K5	1	
	Teknik sorunlar	K13	1	

"*Yüz yüze eğitime kıyasla, uzaktan eğitimin sahip olduğu avantajları ve dezavantajları değerlendirebilir misiniz?*" sorusuna karşılık katılımcıların verdikleri yanıtlardan bu sorunun 2 alt temada incelenebileceği ve bu temaların da avantajlar ve dezavantajlar temaları olduğu anlaşılmıştır. Katılımcıların soruyu yanıtlarken çoğunlukla uzaktan eğitimin avantajlarını ve dezavantajlarını birlikte sırladıkları görülmüştür. Bununla birlikte uzaktan eğitimin dezavantajlarıyla ilgili görüşlerin (29) avantajlarıyla ilgili görüşlerden (18) daha fazla olduğu görülmüştür.

Katılımcıların görüşlerine göre uzaktan eğitimin öncelikli avantajları; zaman ve mekanla sınırlı olmaması (5), eğitimin sürdürülebilirliğini sağlaması (2), zaman tasarrufu sağlaması (2), konforlu ve rahat olması (2) ve derslerin kayıt edilmesiyle dilendiği zaman derslerin takip veya tekrar edilebilmesidir (2). Bu avantajlara ilave olarak birer katılımcı uzaktan eğitimin esnek, ekonomik, gelişime ve yeniliğe açık ve yeni nesle uygun olmasını da birer avantaj olarak dile getirmişlerdir. Bir katılımcı da uzaktan eğitimin uygun donanım ve teknikler kullanılması durumunda etkili olduğunu ifade etmiştir. Katılımcıların uzaktan eğitimin avantajlarına ilişkin görüşlerinden örnekler şu şekildedir:

> "*Uzaktan eğitimin tek avantajının zorunluluk dahilinde eğitimi hasbelkader sağlamasıdır.*". Katılımcı 1

> "*Uzaktan eğitimin dikiz aynası kuramında olduğu gibi kendisinden önce uygulanan yüz yüze eğitimin daha ileri, gelişkin ve yeniliğe açık biçimi olduğunu düşünüyorum. Bu yönleriyle uzaktan eğitimin avantajlarının daha fazla olduğunu vurgulamak isterim*". Katılımcı 7

> "*Uzaktan eğitimin yeni jenerasyonun bir anlamda teknoloji bağımlılığına daha uygun bir öğrenme ortamı olduğunu düşünüyorum. Uzaktan eğitim uygulamaları, sistemleri, çevrim içi ortamları bu jenerasyonun aynı zamanda aidiyet ortamlarını temsil etmektedir*". Katılımcı 8

Katılımcıların görüşlerine göre uzaktan eğitimin öncelikli dezavantajları; birebir etkileşimin sınırlı olması (2), uygulamalı dersler için uygun olmaması (2), öğrenci motivasyonunun düşük olması (2), öğrenciden geri bildirim

almanın sınırlı olması (2), donanım imkanları açısından eşitlik bulunmaması (2), altyapı imkanları açısından eşitlik bulunmaması (2), derse katılımın sınırlı olması (2) ve ders yönetiminin zor olmasıdır (2). Birer katılımcı da derse bağlanılan ortam koşullarının uygun olmamasını, eğiticilerin motive olamamasını, derinlemesine eğitimin mümkün olmamasını ve teknik sorunlar yaşanmasını uzaktan eğitimin dezavantajları olarak vurgulamışlardır. Katılımcıların uzaktan eğitimin dezavantajlarına ilişkin görüşlerinden örnekler şu şekildedir:

"*Yüz yüze eğitimin neredeyse gelenekselleşen, kanıksanan uygulama biçimleri bulunmakta. Dersin gerçekleştirileceği ortamın kapısından girdiğiniz andan itibaren öğrencilerinizin yüzlerinden, bakışlarından, vücut dillerinden derse olan ilgilerini değerlendirebiliyorsunuz. Bu doğrultuda dersin anlatımı şekillenebilir. Öğreten olarak karşılıklılıklar sayesinde daha rahat ders anlatıp, örneklerinizi çeşitlendirebiliyorsunuz. Öğrencilerin derse katılımı da çok daha kolay sağlanabiliyor. Diğer taraftan uzaktan eğitimde sistem koşulları gelişmiş olsa da aynı etkileşimlere ulaşılamıyor. Örneğin, öğreten olarak itina ile dersimize hazırlanarak sistem başına geçmemize rağmen, öğrencilerimizin kameralarını açmamaları yüzünden karşılıklılık sağlanamamıştır*". Katılımcı 4

"*Teknoloji kullanmakta yaşanılan sorunların ve yetersizliklerin uzaktan eğitimin olanaklarının yeterince kullanılamamasına yol açması. Ayrıca öğrenci kitlesinin kontrol edilememesinden oluşan sorunlar da derslerin yürütülme akışını engellemiştir*". Katılımcı 11

"*Dezavantajları çok fazla. İletişim gerektiği özelliklerde kurulamıyor. İletişim yetersiz olduğu için de öğrencilerden anlayamadıkları yerde soru gelmiyor. Konular çok daha hızlı şekilde işleniyor. Akademisyenlerde kendi kendine dört duvara konuştuğu hissi oluştuğu için de ders işlenişinde de sıkıntı yaşanıyor. Ders anlatma ve dinleme şevki olmuyor*". Katılımcı 15

İletişim Stratejilerine ve Etkileşime Dayalı Öğretim Yöntemlerine Dair Öneriler

Tablo 11. İletişim Stratejilerine ve Etkileşime Dayalı Öğretim Yöntemlerine Dair Öneriler

Tema	Kod	Katılımcı	f	Top.
Eğitici odaklı öneriler	Derslerin içerikleri zenginleştirilmeli	K3, K13	2	11
	Eğiticilerin becerileri artırılmalı	K4, K5	2	
	Eğiticiler mevcut gelişmeleri ve geleceği düşünerek değişen rollerine hazırlıklı olmalı	K7, K11	2	
	Etkileşimi artıracak uygun donanımlar kullanılmalı	K12	1	
	Öğrenciler için empati yapılarak uzaktan eğitim planlanmalı	K2	1	
	Uygun eğitim teknikleri kullanılmalı	K9	1	
	Uygun ölçme değerlendirme teknikleri kullanılmalı	K9	1	
	Uygulamalı dersler için bir çözüm bulunmalı	K13	1	
Öğrenci odaklı öneriler	Öğrenciler uzaktan eğitim konusunda eğitilmeli	K8, K12, K15	3	5
	Kontrolü artırmak için yaptırımlar getirilmeli	K12, K15	2	
Dış faktörler odaklı öneriler	Üniversiteler uzaktan eğitimi ve eğiticileri çok yönlü desteklemeli	K6, K15	2	8
	Öğrenci sayısı az olmalı	K10, K15	2	
	Pandemi ve depremden ders alıp uzaktan eğitim için	K1	1	
	Kullanıcı dostu uzaktan eğitim sistemleri kullanılmalı	K13	1	
	Ülkenin her yanı internet erişim için eşit hale getirilmeli	K3	1	
	Gelecekte uzaktan eğitimin yaygınlaşacağı gerçeği kabullenilmeli	K11	1	

"*Size özgü olduğunu düşündüğünüz iletişim stratejilerine ve etkileşime dayalı öğretim yöntemlerine dair gelecekteki uygulamalara yönelik önerileriniz nelerdir?*" sorusuna karşılık katılımcıların verdikleri yanıtlardan bu sorunun 3 alt temada incelenebileceği ve bu temaların da eğitici odaklı öneriler, öğrenci odaklı öneriler ve dış faktörler odaklı öneriler temaları olduğu anlaşılmıştır. Katılımcıların sırasıyla en fazla eğitici odaklı (11), dış faktörler odaklı (8) ve öğrenci odaklı (5) öneriler geliştirdikleri saptanmıştır.

Katılımcıların geliştirdikleri eğitici odaklı önerilerin tekrarlanma sıklığına göre sırasıyla; derslerin içeriklerinin zenginleştirilmesi (2), eğiticilerin becerilerinin artırılması (2), eğiticilerin mevcut gelişmeleri ve geleceği düşünerek değişen rollerine hazırlıklı olmaları (2), etkileşimi artıracak uygun donanımların kullanılması (1), öğrenciler için empati yapılarak uzaktan eğitimin planlanması (1), uygun eğitim tekniklerinin kullanılması (1), uygun ölçme değerlendirme tekniklerinin kullanılması (1) ve uygulamalı dersler için bir çözüm bulunması (1) olduğu tespit edilmiştir. Katılımcıların eğitici odaklı önerileriyle ilgili görüşlerinden örnekler şu şekildedir:

"*Her öğretim üyesinin teknolojinin süratle geliştiğinin farkında olarak kendini yenilemesi çok önemli. Online dersler almak, Mergen, Zoom vb. uzak kalmayarak deneme-yanılma yöntemini kullanmak gerekli*". Katılımcı 5

"*Uzaktan eğitimde ve çevrim içi öğrenme ortamlarında artık akademisyenlerin üstlendiği görevler ve roller değişmiştir. Hoca artık bilgiyi sunan ve süreci kontrol eden kişi değildir. Aksine bu konumdan sıyrılarak, öğrenme sürecini teşvik eden, izleyen, kolaylaştıran ve öğrenenleri aktif katılan pozisyonuna hazırlayan olabilmelidir. Ben bunu sağlamayı amaçladım*". Katılımcı 7

"*Uzaktan eğitimde öğrencileri derse katılmaya teşvik edebilmek için, yeni ve etkileşimli teknoloji uygulamalarından yararlanılabilir.*". Katılımcı 12

Katılımcıların geliştirdikleri öğrenci odaklı önerilerin tekrarlanma sıklığına göre sırasıyla; öğrencilerin uzaktan eğitim konusunda eğitilmeleri (3) ve kontrolü artırmak için yaptırımlar getirilmesi (2) olduğu tespit edilmiştir. Katılımcıların öğrenci odaklı önerileriyle ilgili görüşlerinden örnekler şu şekildedir:

"*Uzaktan eğitimde öğrencileri derse katılmaya teşvik edebilmek için, yeni ve etkileşimli teknoloji uygulamalarından yararlanılabilir. Uzaktan eğitimde üniversitelerin kullandığı sistemlerin uyarı mekanizmaları olmalı. Öğrenci önceden belirlenen koşullarda derse katılmıyorsa; kamerasını ve mikrofonunu açmıyorsa derse katılımı olmadığı, gereğini yapması gerektiği yönünde uyarılmalı. Aksi taktirde onuncu dakikada sistemden çıkartılmalı. Bu tarz uygulamalar geliştirilerek, ivedilikle uygulamaya konmalı diye vurgulamak isterim. Bu durum öğreten- öğrenen arasındaki iletişimi mütekabiliyet esasına oturttuğu için zaruridir. Uzaktan eğitimin kapsamında gerçekleştirilen çevrim içi derslerin verimliliğini mutlaka artıracaktır*". Katılımcı 7

"*Üniversite öğrencilerinin çevrim-içi ortamlardan ve etkinliklerden gerektiği şekilde yararlanabilmesini sağlamak amacıyla gerekli düzenlemelerin yanı sıra bilinçlendirme çalışmaları da yürütülmelidir. Bu düzenleme ve çalışmalar sayesinde olumlu yönde çevrim-içi deneyimlere yönlendiren nitelikte politikalar ile çocukların ve gençlerin gelişimine katkıda bulunma ve riskleri azaltma söz konusu olabilir*". Katılımcı 8

"*Öğrencilerin kameralarının ve mikrofonlarının mutlaka açık olduğu sohbet odaları benzeri ortamda, az sayıdaki öğrencilerle dersler işlenirse verimlilik sağlanmış, arttırılmış olur. Tabii üniversitelerin de derslerde kullanılacak ekipmanları, öğretim ekibine temin etmesi gerekir*". Katılımcı 15

Katılımcıların geliştirdikleri dış faktörler odaklı önerilerin tekrarlanma sıklığına göre sırasıyla; üniversitelerin uzaktan eğitimi ve eğiticileri çok yönlü olarak desteklemeleri (2), uzaktan eğitim sınıflarında öğrenci sayısının az olması (2), pandemi ve depremden ders alınıp uzaktan eğitim için hazırlıklı olunması (1), kullanıcı dostu uzaktan eğitim sistemlerinin kullanılması (1), ülkenin her yanının internet erişimi için eşit hale getirilmesi (1) ve gelecekte uzaktan eğitimin yaygınlaşacağı gerçeğinin kabullenilmesi (1) olduğu tespit edilmiştir. Katılımcıların dış faktörler odaklı önerileriyle ilgili görüşlerinden örnekler şu şekildedir:

"*Tek önerim zorunlu uzaktan eğitime geçiş durumlarında yaşanılanlardan ders çıkartarak yola devam etmemiz. Diğer yaşanan olaylardaki gibi balık hafızalı olmamalıyız*". Katılımcı 1

"*Internet altyapısının geliştirilmesi gerekmektedir. Bu özellikle kırsalda yaşayan bireyler için büyük önem taşımaktadır*". Katılımcı 3

"*Uzaktan eğitimin ve çevrim içi öğrenme ortamlarının en önemli bileşenlerinde birisi öğretim kadrosudur. Başka bir ifadeyle ortamın başarılı olmasında, akademisyenlerin önemli işlevleri bulunmaktadır. Bu nedenle de kurumsal desteğiyle üniversiteler, uzaktan öğretim ve çevrim içi eğitim vermek isteyen öğretim elemanlarına ihtiyaç duydukları her tür desteği sağlayabilmelidir*". Katılımcı 6

Tartışma ve Sonuç

Araştırmada, Covid-19 pandemisi ve 6 Şubat depremleri nedeniyle zorunlu uzaktan eğitim uygulamasını deneyimleyen akademisyenlerin bu uygulamalar hakkındaki görüşlerine yer verilmiştir. Açık ve uzaktan eğitimin akademisyenlerde meydana getirdiği çağrışımlar incelendiğinde; esneklik, gereklilik, eşitlik, yenilik, yararlılık, kısıtsızlık ve teknoloji gibi kelimelerle ifade edilen olumlu çağrışımların belirsizlik, çaresizlik, mesafe, katılım düşüklüğü, verimsizlik ve öğrenme zorluğu gibi kelimelerle ifade edilen olumsuz çağrışımlardan daha fazla olduğu sonucuna ulaşılmıştır. Benzer olarak, akademisyenler uzaktan eğitimin önde gelen katkılarını; mesafe ve zaman nedeniyle özellikle dezavantajlı bireylerin eğitime ulaşımının sağlanması, eğitimin sürdürülebilirliğinin sağlaması, öğrenci ve eğiticinin eğitim masrafını azaltması ve teknolojinin gelişimine bağlı olarak eğitimde kullanımının kaçınılmaz olması şeklinde belirtmişlerdir. Akademisyenlerin uzaktan eğitimin olumsuz taraflarını ise birebir etkileşimin sınırlı olması, uygulamalı dersler için uygun olmaması, öğrenci motivasyonunun düşük olması, öğrenciden geri bildirim almanın sınırlı olması, donanım ve altyapı imkanları açısından eşitlik bulunmaması, derse katılımın sınırlı olması ve ders yönetiminin zor olması şeklinde sıraladıkları görülmüştür.

Akademisyenlerin Covid-19 pandemisi ve 6 Şubat depremleri nedeniyle deneyimledikleri iki zorunlu uzaktan eğitim uygulaması için de olumsuz ve olumlu değerlendirmelerde bulundukları saptanmıştır. Uzaktan eğitimin çağrışımların aksine akademisyenlerin olumsuz değerlendirmelerinin daha fazla olduğu tespit edilmiştir. Covid-19 pandemisi ve 6 Şubat depremleri nedeniyle zorunlu uzaktan eğitim uygulaması hakkındaki olumsuz değerlendirmelerin çoğunlukla eğitim kalitesinin düşük olması, etkileşimin sınırlı olması ve uzaktan eğitimin eğitim için uygun olmaması görüşleri etrafında kümelendiği anlaşılmıştır. Olumlu değerlendirmelerin en belirgininin ise pandemi ve deprem gibi olağan dışı zamanlarda uzaktan eğitimin bir gereklilik olduğunun anlaşılması olduğu saptanmıştır. Covid-19 pandemisi ve 6 Şubat depremlerinde geçilen uzaktan eğitim tecrübesinin detayları incelendiğinde; üniversitelerin bu zorunlu uzaktan eğitim uygulamalarına hazır bulunuşlukları nedeniyle sorunların daha az ortaya çıktığı ve daha çabuk çözüldüğü anlaşılmıştır. Bu süreçte zorunlu olarak akademisyenlerin kendilerini uzaktan eğitim konusunda geliştirdikleri, çaba göstererek yeni bilgiler ve deneyimler kazandıkları, deneyimli akademisyenlerin daha kolay adapte oldukları ancak deneyimsiz olanların zorlandıkları görülmüştür. Bununla birlikte, deneyimsiz olanlar da daha iyi bilenlere danışarak ve kendi başlarına çözüm arayarak istedikleri sonuca ulaşabilmişlerdir.

Akademisyenlerin Covid-19 pandemisi ve 6 Şubat depremleri nedeniyle geçilen zorunlu uzaktan eğitim uygulaması süresinde pek çok farklı güçlükle karşılaştıkları saptanmıştır. Bu güçlüklerin eğitici, öğrenci ve dış kaynaklar nedeniyle ortaya çıktığı görülmüştür. Eğitici kaynaklı güçlüklerin en belirgininin uzaktan eğitim teknolojileri konusundaki bilgi ve tecrübe eksikliği olduğu tespit edilmiştir. Öğrenci kaynaklı güçlüklerin en belirgininin ise öğrencilerin derse katılımlarının düşük olması olduğu belirlenmiştir. Dış kaynaklı güçlüklerin en belirginleri ise uzaktan eğitim için altyapının yeterli olmaması ve uzaktan eğitimin etkileşimi kısıtlıyor olması olduğu tespit edilmiştir.

Akademisyenlerin, uzaktan eğitimin kendine özgü teknoloji ağırlıklı ve etkileşim imkanlarının kısıtlı olduğu şartları nedeniyle eğitime motive olmakta zorlandıkları ve bu konuda sorunlar yaşadıkları görülmüştür. Akademisyenlerin bu motivasyon sorununu aşabilmek için kendilerinin çözümler ürettikleri ve kurumsal bir destek almadıkları anlaşılmıştır. Yüksek motivasyonla ve verimli bir biçimde uzaktan eğitimi sürdürebilmek için akademisyenlerin uzaktan eğitimin detaylarını öğrenmek için özveri gösterdikleri, yeni araçları kullanmaya başladıkları, dersin içeriğini ilgi çekici biçimde zenginleştirdikleri, öğrencilerle yakın bir etkileşime girerek onlarla iletişim halinde oldukları ve sürekli onları cesaretlendirdikleri sonucuna ulaşılmıştır. Bu amaçla canlı derslerde akademisyenlerin çoğunlukla kamera, mikrofon, videolar, slaytlar ve diğer görseller gibi araçlardan yararlandıkları belirtilmiştir.

Akademisyenlerin uzaktan eğitimlerin etkinliğini artırabilmek için ileri sürdükleri önerilerin en sık tekrar edilenlerinin öğrencilerin uzaktan eğitim konusunda eğitilmeleri, üniversitelerin akademisyenleri uzaktan eğitim konusunda çok yönlü desteklemeleri, uzaktan eğitim için altyapı ve teknik donanımların yeterli ve uygun hale getirilmesi, ders içeriklerinin zenginleştirilmesi, akademisyenlerin uzaktan eğitim becerilerinin geliştirilmesi ve teknolojide yaşanan gelişmelere paralel olarak uzaktan eğitimin geleceğine hazırlık yapılması gerekliliği vurgulanmıştır.

Türkiye Covid-19 pandemisi ve 6 Şubat depremleri nedeniyle geçilen zorunlu uzaktan eğitim uygulaması hakkında alanyazında daha önce yapılmış araştırmaların bulguları incelendiğinde bu araştırmanın bulgularıyla paralel bir biçimde uzaktan eğitimin zorunluluk anında eğitimi sürdürebilmek için uygun ve etkili bir araç olduğuna ve bu yönüyle yaralı olduğuna vurgu yapılmıştır. Ayrıca, öğrenci ve akademisyenlere kolaylık ve rahatlık sağladığı da ifade edilmiştir. Bununla birlikte hazırlıksız oluşu, altyapı sorunları, teknolojik imkanlara ulaşmadaki eşitsizlikler, uygulama eğitimler için uygun olmama, öğrenci ve öğretmenin motive olamaması ve bunun gibi diğer sorunlar

nedeniyle uzaktan eğitimin verimli olmaması gibi sorunlara dikkat çekilmiştir (Afşar ve Büyükdoğan, 2020; Keskin ve Özer Kaya, 2020; Buluk ve Eşitti, 2020; Demir ve Özdaş, 2020; Bakioğlu ve Çevik, 2020; Karaca ve Kelam, 2020; Yurtbakan ve Akyıldız, 2020; Aktaş vd., 2020; Arslan vd., 2021; Kurt, Kandemir ve Çelik, 2021; Urhanoğlu, Bayırlı ve Aslan, 2021; Avcı ve Akdeniz, 2021; Metin, Gürbey ve Çevik, 2021, Arık vd., 2021; Karadağ-Yılmaz, Savaş ve Kalkan, 2022; Fıratlı Türker, 2023; Erdoğdu ve Atabay, 2023; Çakır vd., 2023; Yağız, 2023; Koçer ve Koçak, 2024).

Araştırmanın bulguları Covid-19 pandemisi ve 6 Şubat depremleri nedeniyle geçilen zorunlu uzaktan eğitimin en belirgin sorununun hazırlıksızlık olduğunu göstermektedir. Üniversitelerin altyapı ve imkân olarak, akademisyenlerin bilgi ve tecrübe olarak, öğrencilerin ise bilgi ve motivasyon olarak uzaktan eğitime hazır olmadıkları için güçlükler yaşadıkları görüldüğünden, uzaktan eğitim konusundaki hazır bulunuşluk çok yönlü olarak geliştirilmelidir. Uzaktan eğitimin teknolojik gelişmelere bağlı olarak eğitim faaliyetleri içerisinde çok daha fazla yer alacağı anlaşılmaktadır. Yapay zekâ uygulamalarının da bu süreci ileri bir noktaya taşıyacağı düşünülmektedir. Bu gelişmelere bağlı olarak hem üniversitelerin hem de akademisyenlerin kapsamlı bir biçimde kendilerini uzaktan eğitimin sunduğu teknolojik olanaklar için hazırlamalarının yararlı olacağı söylenebilir.

Bu araştırmada, Covid-19 pandemisi ve 6 Şubat depremleri nedeniyle geçilen zorunlu uzaktan eğitim uygulaması hakkında akademisyenlerin görüşleri incelenmiş ve önemli bulgular elde edilmiştir. Bu araştırma bir ilimizdeki üç farklı üniversitede görev yapan 15 akademisyen ile sınırlıdır. Elde edilen bilgiler ve bulgular araştırmacı tarafından akademisyenlere yöneltilen ölçme ve değerlendirme aracı olarak hazırlanan görüşme formundaki sorular ve gönüllü katılımcılardan alınan cevaplar ve 2024 yılı ile sınırlıdır. Araştırmanın bulguları bu sınırlılıklar dikkate alınarak yorumlanmalıdır. Uzaktan eğitimler hakkında akademisyenlerin görüşlerini inceleyen araştırmalar daha sık yapılmalıdır. Uzaktan eğitim teknolojilere bağlı olarak sürekli değişen ve yenilenen bir olgudur. Bu nedenle bu alandaki araştırmaların da sürekli bir biçimde tekrarlanması yararlı olacaktır.

Yüksek öğretimin uygulayıcısı olan üniversiteler tarafından aynı anda çok daha fazla kullanıcıya ulaşabilecek şekilde internet bağlantı kapasitesinin arttırılması önerilebilir. Öğrenciler açısından olduğu gibi akademisyenler de teknolojik imkanlarla desteklenmelidir. Ayrıca öğrencilere canlı derslerde yoklama zorunluluğu mutlaka getirilmelidir. Akademisyenlerin uzaktan eğitimi sorunsuz bir şekilde gerçekleştirebilmeleri ve eğitim öğretim faaliyetlerinin kesintiye uğramaması adına teknolojik sistemlerin geliştirilmesi desteklenmelidir. Böylece iletişim sorunları ortadan kaldırılabilecektir. Uzaktan eğitim sürecinde deneyimlenen uzaktan eğitim uygulamaları konusunda karşılaşılan sorunların çözümü için ülke genelinde uzaktan eğitim ile ilgili derslerin verilebileceği düşünülmektedir. Akademisyenler için ise hizmet içi eğitim programları gerçekleştirilebilir. Pandemi sonrasında uzaktan eğitim uygulamalarından yararlanan üniversitelerin sayısında artış belirlenmiştir. Bu kurumlarda yer alan uzaktan eğitim merkezleri, kısa adıyla UZEM'ler bulunmaktadır. Bütün üniversitelerde eğitimin yürütüldüğü UZEM'lerin çalışmaları kapsamlı olarak incelenmelidir. Açık öğretim modelini geliştirerek uygulayan Eskişehir Anadolu Üniversitesi, Türkiye'de bu hususta öncü konumdadır. Uzun yıllardır örgün eğitim sistemine alternatif olarak sunduğu açık öğretim sistemi sadece ülke sınırlarında değil, yurt dışındaki bürolarıyla da özellikle Türk vatandaşları için eğitim olanaklarını geliştirmiştir. Açık ve uzaktan eğitim konusunda deneyim sahibi üniversitelerin kendi bünyelerinden seçtikleri akademisyenlerin bir araya gelmesiyle tesis edeceği birliktelikler, diğer üniversitelerdeki akademisyenler için önemli ve değerli bir deneyim kaynağı oluşturabilir.

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Sanatın Dijital Hali NFT'ler ve NFT Sitelerine Genel Bakış

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Özet

Teknolojinin hızla gelişmesi ile hayatımıza her geçen gün yeni kavramlar eklenmektedir. Bu çalışmada, Blok Zinciri (Blockchain) teknolojisinin bir ürünü olan "Non-Fungible Token (NFT)" kavramı detaylandırılmaktadır. NFT, sıradan dijital dosyaların aksine, benzersiz, eşsiz ve tekrarı olmayan dijital öğelerdir. Görsel sanat eserleri, resimler, videolar, fotoğraflar, müzik eserleri, konser biletleri, üyelik kartları, sanal kreasyonlar, dijital oyun karakterleri, dijital oyunlarda kazanılan ödüller, dijital oyunlarda kazanılan eşyalar, Metaverse'deki sanal araziler, metinler gibi eserlerin, dijital ortamlarda temsil edilmesi ve bu eserler üzerindeki hakların sahipliğinin tescil edilmesidir. NFT'ler, Blok Zinciri teknolojisi kullanılarak, dijital ortamda üretilen benzersiz, değiştirilemeyen eserlerin orijinaline bir kimlik kazandırarak, güvence altına alınır. Bu tokenler dijital dünyada üretilen herhangi bir içeriğe (fotoğraf, video, hikâye, resim, tweet, oyun karakteri vb) özel bir kod vererek onu eşsizleştirmekte ve ona sahiplik imkânı sunmaktadır. Blok Zinciri tabanlı ağlar, Web 3.0 olarak adlandırılan üçüncü nesil Web'e ait olan ve daha yüksek derecede yapay zeka ve makine öğrenimi kullanımı, daha etkin veri toplama ve paylaşma, daha güçlü ve özelleştirilebilir arama özellikleri, daha fazla ölçeklenebilirlik ve güvenlik gibi özelliklere sahiptirler. NFT'lerin oluşturulması, alınması-satılması için Blok Zinciri teknolojisi, akıllı sözleşmeler (smart contracts) gibi teknolojiler kullanılmaktadır. NFT'ler, Blok Zincirinde harf ve sayılarla şifrelenmiş benzersiz ve yeri doldurulamaz bir şekilde yer almaktadır. Bu çalışmada, NFT'ler yani değiştirilemeyen tokenler ya da Türk Dil Kurumu (TDK) tarafından belirlenen yeni karşılığı ile "Nitelikli Fikri Tapu" üzerine yapılan araştırma içerikleri yer almaktadır. Çalışmada; NFT kavramının açıklaması, geçmişten bugüne gösterdiği gelişmeler, benzersiz ve değiştirilemez olmasının altyapısını oluşturan Blok Zinciri teknolojisi, akıllı sözleşmeler, kullanılan standartlar ve son olarak da sekiz farklı NFT platformunun web içerik analiziyle karşılaştırmalı özelliklerini barındıran bulguları içermektedir.

Anahtar Sözcükler: NFT, blok zinciri, akıllı sözleşme.

The Digital State of Art NFTs and Overview of NFT Sites

Abstract

With the rapid development of technology, new concepts are being added to our lives every day. In this study, the concept of "Non-Fungible Token (NFT)", a product of Blockchain technology, is detailed. Unlike ordinary digital files, NFTs are unique, one-of-a-kind and non-repeatable digital items. It is the representation of works such as visual artworks, paintings, videos, photographs, musical works, concert tickets, membership cards, virtual creations, digital game characters, prizes won in digital games, items won in digital games, virtual lands in the Metaverse, texts in digital environments and registering the ownership of rights over these works. NFTs are secured using Blockchain technology, giving an identity to the original, unique, unalterable artifacts produced in the digital environment. These tokens give a special code to any content (photo, video, story, picture, tweet, game character, etc.) produced in the digital world, making it unique and allowing ownership. Blockchain-based networks belong to the third generation of the Web, so-called Web 3.0, and are characterized by a higher degree of artificial intelligence and machine learning, more efficient data collection and sharing, more powerful and customizable search capabilities, greater scalability and security. Technologies such as Blockchain technology and smart contracts are used to create, buy and sell NFTs. NFTs are unique and irreplaceable in the Blockchain, encrypted with letters and numbers. In this study, the contents of the research on NFTs, i.e. non-fungible tokens or "Qualified Intellectual Property" with its new term determined by the Turkish Language Association (TDK) are included. The study includes an explanation of the concept of NFTs, its developments from past to present, the Blockchain technology that forms the infrastructure of its uniqueness and immutability, smart contracts, the standards used, and finally, the comparative findings of eight different NFT platforms through web content analysis.

Keywords: NFT, blockchain, smart contract.

Giriş

NFT (Non-Fungible Token); Türkçe karşılığı ile Değiştirilemeyen Tokenler; sıradan dijital dosyaların aksine, benzersiz, eşsiz ve tekrarı olmayan dijital öğelerdir. Görsel sanat eserleri, resimler, videolar, fotoğraflar, müzik eserleri, konser biletleri, üyelik kartları, sanal kreasyonlar, dijital oyun karakterleri, dijital oyunlarda kazanılan ödüller, dijital oyunlarda kazanılan eşyalar, metaverse'deki sanal araziler, metinler gibi eserlerin, dijital ortamlarda temsil edilmesi ve bu eserler üzerindeki hakların sahipliğinin tescil edilmesidir. Bir NFT pazarında işlem gören ürünler, ortak özelliklerine göre koleksiyonlarda sınıflandırılmaktadır. Koleksiyonların çoğu sanat (art), oyun (game), sanal öte evren (Metaverse) gibi bölümlerden oluşmaktadır (Nadini vd., 2021, s. 31).

NFT'ler, Blok Zinciri (Blockchain) teknolojisi kullanılarak, dijital ortamda üretilen benzersiz, değiştirilemeyen eserlerin orijinaline bir kimlik kazandırarak, güvence altına alınır. Bu tokenler dijital dünyada üretilen herhangi bir içeriğe (fotoğraf, video, hikâye, gif, resim, tweet, oyun karakteri gibi) özel bir kod vererek onu eşsizleştirmekte ve ona sahiplik imkanı sunmaktadır (Kugler, 2021). Blok Zinciri tabanlı ağlar, Web 3.0 olarak adlandırılan üçüncü nesil web'e ait olan ve daha yüksek derecede yapay zeka ve makine öğrenimi kullanımı, daha etkin veri toplama ve paylaşma, daha güçlü ve özelleştirilebilir arama özellikleri, daha fazla ölçeklenebilirlik ve güvenlik gibi özelliklere sahiptirler. NFT'lerin oluşturulması, alınması-satılması için Blok Zinciri teknolojisi, akıllı sözleşmeler (smart contracts) gibi teknolojiler kullanılmaktadır. Değiştirilemeyen Tokenler olarak tanımlanan NFT'ler, Blok Zincirinde harf ve sayılarla şifrelenmiş benzersiz yapılardır (Şağban, 2021).

Teknolojinin gelişmesi ve kullanımının yaygınlaşması ile birlikte sanat eserlerine erişimin kolaylaşması, eserlerin çoğaltılması, dağıtılması sonucu eser sahipleri açısından hakkaniyetsiz durumlar ortaya çıkmıştır. NFT'ler, dijital öğelerin benzersiz ve tekrarı olmayan özelliklerini ortaya çıkarmaya yardımcı olan bir teknolojidir. Eserin mülkiyetini koruyan NFT'ler, eser sahibine telif hakkını vererek adaletsizliğe son vermektedir. Bu teknolojinin alana getirdiği yenilik, dijital sanatın sonsuz sayıda kopya edilebilirliğinin önüne sertifika yolu ile geçilmesi ve fikri mülkiyetin sağlanabilmesidir (Fairfield, 2021, s. 98).

Ünlü bir ressamın tablosunu bir galeride, bir evde, bir iş yerinde görmek mümkündür. Ancak bu eserler orijinal eser değildir. Eserin orijinali tektir. Diğer eserler kopya ya da başka sanatçılar tarafından resmedilmiş eserin reprodüksiyonudur. Eserin türevlerine sahip olmak o eserin üzerinde hak sahipliği sağlamamaktadır. NFT'lerin tercih edilme nedeni benzersiz dijital ürünün orijinaline sahip olmaktır. Bu sayede, sanatçılar daha fazla para kazanabilir ve tüketiciler de benzersiz dijital öğelere sahip olabilirler. NFT sanat eserlerinin sınırlı olması, kaliteli ve özgün olması, sanat eserinin ünlü kişiler tarafından üretilmiş olması, ünlü kişiler tarafından talep görmesi, sosyal medyada popüler olması sebebiyle tercih edilirler.

NFT'leri değerli yapan önemli unsurlardan birisi de NFT'ye dönüştürülen eserin asla değiştirilemez olmasıdır. NFT'ler kripto para birimiyle işlem görmektedir. Dijital varlıkların sahipliğini belirlemek için en yaygın kullanılan Ethereum Blok Zinciri teknolojisidir. Alım satım işlemlerinin tümü Blok Zincirinde kayıtlı tutulur, böylece eserin orijinalliği ve sahipliği değiştirilemez. NFT'ler, Ethereum bloğu üzerinde işlenen ERC-721 adlı bir akıllı sözleşme standardı kullanılarak oluşturulur ve satın alınırlar. Fiziksel nesnelerin özgünlükleri makbuzlar, mühürler ve orijinallik belgeleriyle onaylanırken, NFT'lerde bunların tümü Blok Zincirinde gerçekleşir. Blok Zincir teknolojisi sayesinde sistemler, bir NFT'nin ne zaman basıldığını, hangi koleksiyonun parçası olduğunu, kimin yaptığını, kimin satın aldığını ve kime ait olduğunu otomatik olarak görebilirler.

NFT'ler, farklı sektörlerde ve faaliyetlerde kolayca yararlanılabilen doğrulanabilir dijital mülkiyet, özgünlük, izlenebilirlik ve güvenlik oluşturmak için kullanılabilir. Bunlara kripto sanatı, dijital koleksiyonlar, çevrimiçi oyunlar, patentler veya diğer fikri mülkiyet hakları, gayrimenkul, değerli nesneler, araçlar, lisanslar ve finansal belgeler dahildir (Herian, 2021).

NFT'lerin bir çeşit dijital imzaya sahip olduğu ve dolayısıyla özgünlük sorununa alternatif bir çözüm getirdiği düşüncesi bu alandaki egemen yaklaşım olarak karşımıza çıkmaktadır (Fairfield, 2021; Franceshet vd., 2019). NFT'ler dijital ortamda birbirinden farklı ve tekil özelliklere sahiptir. Aynı çalışmanın birden fazla kopyası olamaz. Bir kez oluşturulduktan sonra içerikleri değiştirilemez.

NFT'ler, blok zincirinde depolandıklarından, tüm işlemler ve transferler kaydedilir ve güvenilir bir şekilde saklanır. NFT'nin ne zaman ve hangi kullanıcı tarafından satın alındığı veya satıldığı, Blok Zincirler üzerinde kaydedilir ve izlenebilir.

NFT'ler, dijital varlıklar olarak değer taşır ve piyasadaki arz talep koşullarına göre değerleri değişebilir. Bir NFT diğer bir NFT'nin aynısı değildir. Bu, NFT'lerin ticareti sırasında değerlerinin belirlenmesinde önemli bir rol oynar. NFT'ler, içeriği temsil ettikleri sanat eserleri gibi, sahiplik haklarını da temsil eder. NFT sahibinin çalışmayı yayınlamak, satmak veya başka bir şekilde kullanma hakkı vardır.

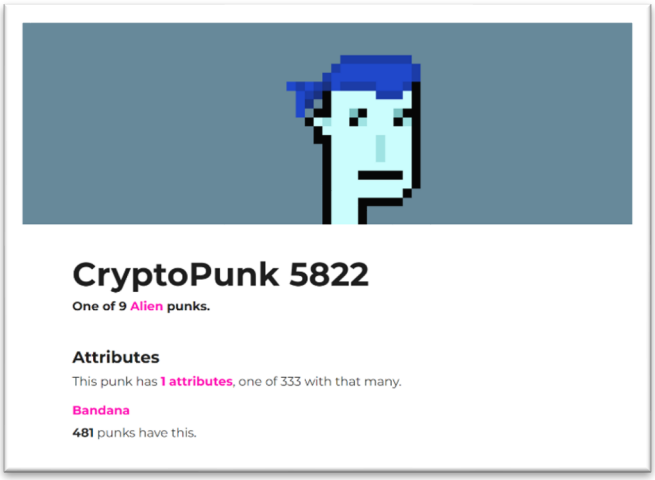
Geçmişten Bugüne NFT

NFT'lerin tarihi, dijital varlıkların piyasaya sürülmesi ve ticaretine ilişkin ilk çalışmalara uzanmaktadır. 1991 yılında, Stuart Haber ve W.Scott Stornetta, Blok Zincirin temelini oluşturan, dijital bir dosyada değişiklik olup olmadığını belirlemek, gerçekleşen değişiklikleri izlemek için bir zaman damgası sistemi oluşturmak için çalışmışlardır. Bu sistem ile dijital dosyanın değişikliklerine ait zaman damgaları bir Blok Zincirinde saklanır ve bu sayede doğrulanabilir olacaktır. Bu çalışmaları, sonradan geliştirilen Bitcoin gibi kripto para birimlerinin temelini atmış ve 2008 yılında Satoshi Nakamoto tarafından icat edilen dijital para birimi Bitcoin'in geliştirilmesinde kullanılmıştır. NFT ise, 2012 yılında oluşturulmuştur (Lyubchenko, 2022).

2014 yılında, New Museum'daki "Seven on Seven" etkinliğinde, Hackathon isimli yazılım yarışmasında, Kevin McCoy ve Anil Dash tarafından, dijital sanatçıların çalışmalarının izinsiz olarak dağıtılmasının önlenmesi ve eserlerinin dijital ortamda satılmasına olanak sağlamak amacıyla bir sanat projesi olarak gündeme gelmiştir. NFT olarak basılan ilk dijital eser olmuştur.

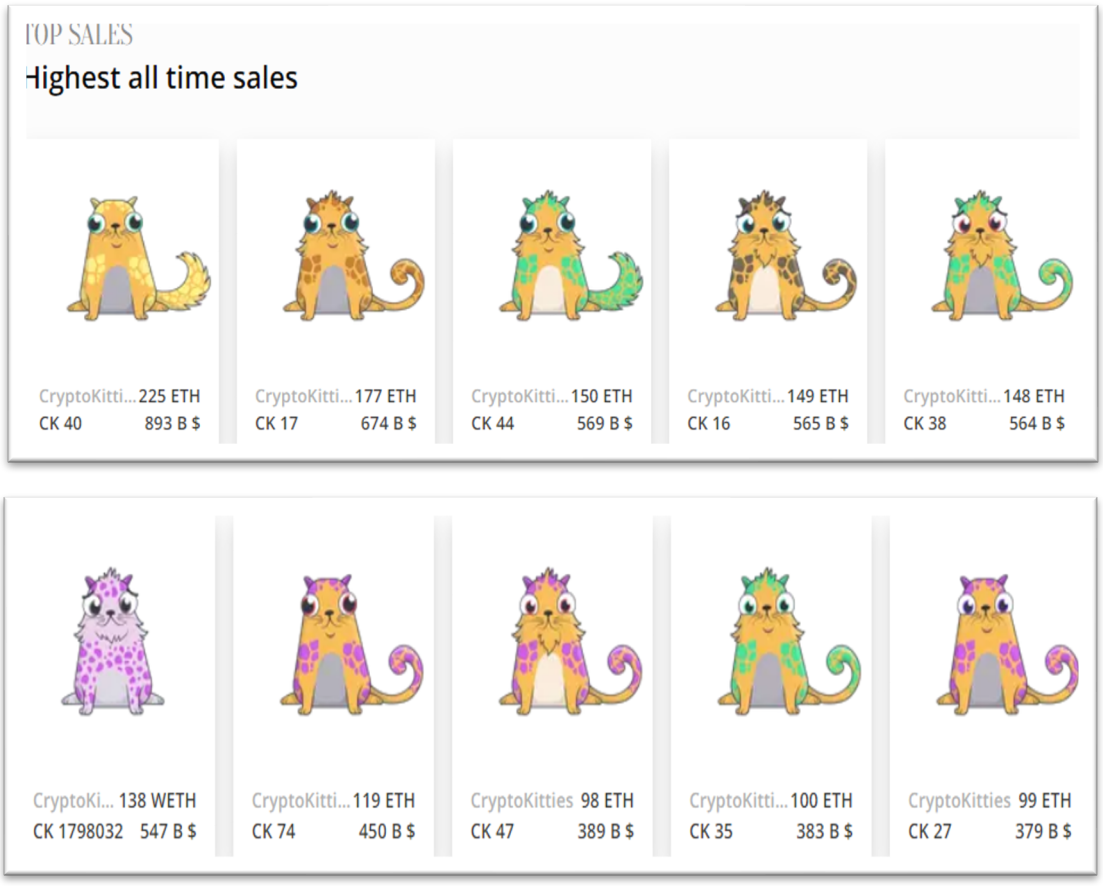
2017 yılında teknoloji şirketi LarvaLabs'ın, "The CryptoPunks"ı piyasaya sürülmesiyle NFT'ler büyük ilgi toplamıştır. Ethereum ağı üzerinde tasarlanan ilk NFT projesi CryptoPunks'tır (De Carlo, 2020) (Şekil 1). CryptoPunks, Ethereum Blok Zincirinde aitlik belgesine sahiptir. 10.000 adet tokenden oluşmakta ve her biri benzersiz pixel art figürlerden oluşan resimleri ifade etmektedir. Çoğu CryptoPunks tokeni erkek ya da kadın yüzünden oluşurken zombi ve uzaylı figürleri olan tokenler de popüler NFT'ler arasında yer almaktadır (Kong & Lin, 2021). CryptoPunks'ın şimdiye kadar en yüksek değerle satılan #5822 kodlu tokeni (Şekil 2) ise 8.000 ETH karşılığı olan 23,8 milyon dolara satılmasıyla NFT'lere olan talebi yükseltmiştir.

Şekil 1. CryptoPunks örnekleri (URL-1, 2022)



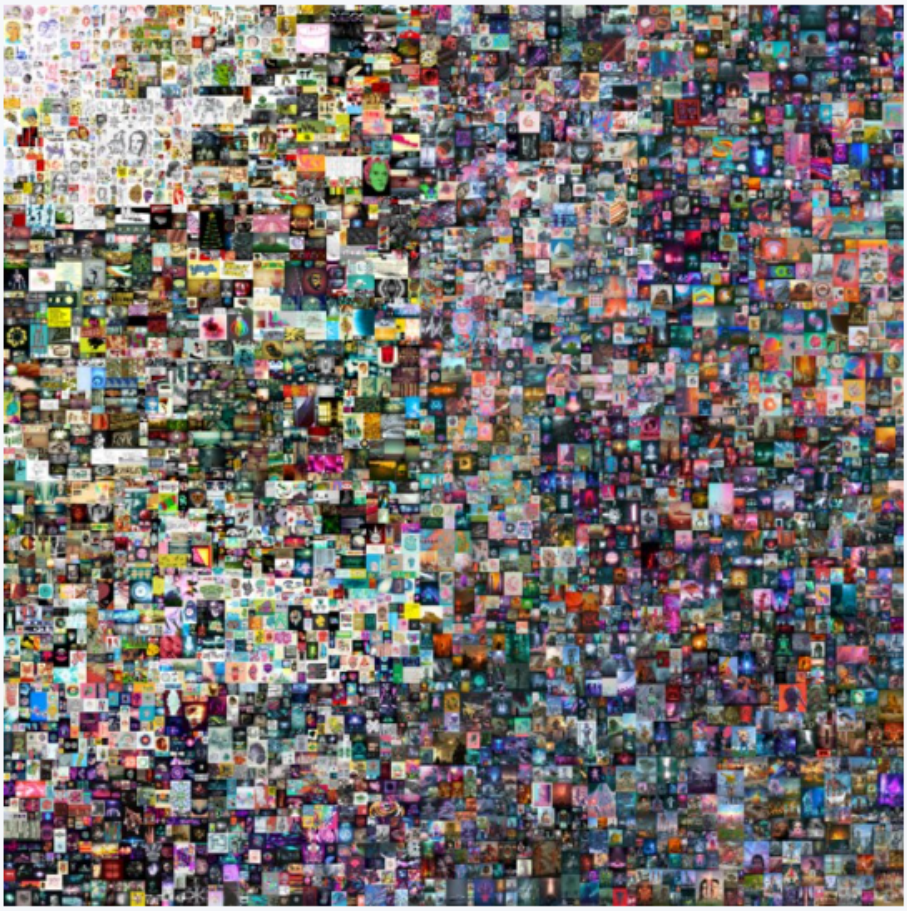
Şekil 2. CryptoPunks #5822 (URL-2, 2022)

CryptoKitties, kullanıcıların dijital kedileri satın almalarını, satmalarını ve üretmelerini sağlayan, Ethereum Blok Zinciri üzerine inşa edilmiş merkezi olmayan bir uygulamadır. Oyun, Kanadalı bir şirket olan Axiom Zen tarafından Blok Zinciri tabanlı bir oyun olarak geliştirilmiş ve Kasım 2017'de piyasaya sürülmüştür. Bu oyunun popülaritesi, Ethereum ağının yükünü arttırmış ve bu sayede NFTlerin farkındalığını arttırmıştır. Çevrimiçi çok oyunculu bir oyun olan CryptoKitties'te oyuncular farklı özellikteki sanal kedileri toplamakta, yavrulatabilmekte, satmakta ve satın alabilmektedir (Serada, vd., 2020, s. 2). Oyunda, her CryptoKitty, oyuncuların kedilere sanki fiziksel varlıklarmış gibi sahip olmalarına ve takas etmelerine izin veren benzersiz bir NFT ile temsil edilmektedir.



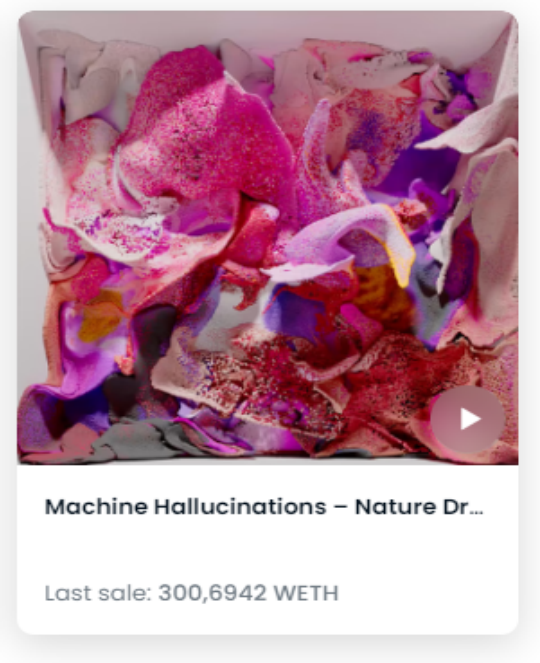
Şekil 3. CryptoKitties Top Sales (URL-3, 2022)

2021 yılında, dijital sanatçı Beeple (Mike Winkelmann)'ın "Everydays: The First 5000 Days" çalışması, Christie's müzayede evi aracılığıyla 69.3 milyon dolar karşılığında satılarak bugüne kadar gerçekleşen en yüksek değerli NFT satışı olmuştur. 5000 dijital çalışmanın ayrı ayrı olan görüntülerinin bir araya getirilmesiyle oluşan bu dijital eser NFT'ye olan ilginin canlanmasına neden olmuştur.



Şekil 4. Beeple'ın "Everydays: The First 5000 Days" çalışması (URL-4, 2022)

Ülkemizde NFT'lere ilgi duyan ve eserlerini NFT'ye dönüştürüp, satışa çıkaran sanatçılarımız vardır. Refik Anadol'un milyonlarca doğa fotoğrafının veritabanı oluşturularak, yapay zeka kullanılarak oluşturduğu "Machine Hallucinations - Nature Dreams : AI Data Sculpture 2021 1/1" eseri OpenSea NFT platformunda 300.69420 ETH ile alıcı bulmuştur. Bir diğer satışı ise 1.38 milyon dolara alıcı bulan "Casa Batllo: Yaşayan Mimari" NFT'sidir.



Şekil 5. Refik ANADOL -"Machine Hallucinations - Nature Dreams : AI Data Sculpture 2021 1/1" (URL-5, 2022)

Şekil 6. Refik ANADOL- "Casa Batllo: Yaşayan Mimari" (URL-6, 2022)

Yine ülkemiz Dijital sanatçısı Tarık Tolunay'ın Fractal İstanbul - Pandemi çalışması 2020 yılında pandemi döneminde, İstanbul'un illüstrasyon olarak resimlenmiş, 10 aylık çalışması sonucu ortaya çıkmıştır. Sanatçının NFT eseri 2021 yılında Foundation NFT platformunda satılmıştır.

Şekil 7. Tarık Tolunay'ın "Fractal istanbul – Pandemi" çalışması (URL-7, 2022)

NFT'nin Türkçe Karşılığı

NFT'nin açılımı olan Non-Fungible Token teriminin Türkçedeki karşılığı ile ilgili farklı adlandırmalar mevcuttur. Non-Fungiable Token terimindeki Non=Olmayan; Fungiable=Değiştirilebilir/Karşılanabilir/Geri Ödenebilir; Token=Simge/Jeton/İşaret anlamına gelmektedir. Türkçe alternatifleri "değiştirilemez belirteçler", "takas edilemez jetonlar" ve "değiştirilemez tokenlar" olarak belirtebilmek mümkündür (Çubukçu, 2022). Ayrıca gayr-i misli jetonlar, eşsiz token, değişimi mümkün olmayan para, takas edilemeyen para gibi terimler sıkça kullanılmaktadır. Türkçe literatüre kazandırılması için "NFT yani Non-Fungible Token teriminin Türkçe karşılığı sizce ne olmalı?" sorusu ile düzenlenen ankete verilen yanıtlar neticesince, anlam bütünlüğüne ve kısaltmanın küresel anlamda yer bulması için arama motorlarında yine NFT'ye karşılık gelmesine dikkat edilerek, Cumhurbaşkanlığı Dijital Dönüşüm Ofisi ve Türk Dil Kurumu'nun ortak çalışması sonucunda 'Nitelikli Fikri Tapu' ifadesinin kullanılması uygun görülmüştür. Fakat yaygın olarak İngilizce terimin kısaltması olan NFT kullanılmaktadır.

NFT'lerin Teknolojik Alt Yapısı

NFT'lerin güvenli bir şekilde üretilmesini, alınmasını, satılmasını ve pazarlanması için teknolojik bileşenlere ihtiyaç vardır. NFT'lerin piyasada yer alması ve işlem görmesinin arkasında Blok Zinciri teknolojisi, akıllı sözleşmeler gibi teknolojiler bulunmaktadır. NFT'ler, çoğunlukla Ethereum Blok Zincirinin akıllı sözleşmeleri kullanılarak oluşturulur ve işlem görür. Bu bağlamda NFT'leri daha iyi anlayabilmek için Blok Zinciri ve Akıllı Sözleşme gibi kavramları açıklamak önem taşımaktadır.

Blok Zinciri (Blockchain)

Blok Zinciri (Blockchain), bir veritabanı sistemidir ve verilerin birbirlerine bağlı bloklar şeklinde sıralandığı bir zincir şeklinde düşünülebilir. Bu zincir, birçok bilgisayar tarafından oluşturulur ve paylaşılır. Blok Zincirleri, blok adı verilen sürekli büyüyen bir kayıt listesini sürdürmek için kullanılan merkezi olmayan, dağıtılmış veritabanlarıdır. Bu bloklar, kriptografik teknikler kullanılarak bağlanır ve güvenlik altına alınır ve verilerin değiştirilmesine karşı dirençli olacak şekilde tasarlanmıştır.

Bir Blok Zinciri, her biri birden çok işlemin kaydını içeren birbirine bağlı bir dizi bloktan oluşur. Yeni bir işlem yapıldığında zincirdeki en son bloğa eklenir. Zincirdeki her blok, onu önceki bloğa bağlayan benzersiz bir kod da içerir. Bu, Blok Zincirindeki tüm işlemlerin güvenli, kronolojik bir kaydını oluşturur. Düğümler, Blok Zinciri ağına bağlı olan ve ağın bütünlüğünü korumada çok önemli bir rol oynayan bilgisayarlardır. İşlemleri doğrularlar ve Blok Zincirine yeni bloklar eklemeye yardımcı olurlar. Her bir blok, bir önceki bloğun hash değerine ve diğer önemli verilere göre oluşturulur. Hash değeri; bir verinin özetini oluşturmak için kullanılan bir matematiksel fonksiyondur. Hash değerleri, verinin özetlemesi olarak kullanılır ve verinin değiştirilmesi durumunda, hash değeri de değişir. Verinin bütünlüğünü doğrulamak için kullanılır. Böylece bloğun değiştirilmesi çok zor hale gelir. Blok Zincirinin en önemli özelliklerinden biri, verilerin değiştirilememesi ve güvenilir olmasıdır.

Blok Zincirinin, Bitcoin'in yaratıcısı Satoshi Nakamoto olarak bilinen fakat gerçekte kim olduğu bilinmeyen bir kişi veya grup tarafından geliştirildiği iddia edilmektedir. Satoshi Nakamoto, 2008 yılında ilk Bitcoin yazılımını oluşturmuş ve bu konuyla ilgili kısa bir makale kaleme almıştır. Nakamoto, Bitcoin ağının ilk sürümünü oluşturmuş ve ilk Bitcoin bloğunu işaretlemiştir. Bu bloğa "Genesis Block" adı verilir. Blok Zinciri teknolojisi, ilk

olarak Bitcoin gibi kripto para birimleri için kullanılmıştır. Ancak zamanla bu teknoloji, finansal işlemlerin yanı sıra birçok farklı alanda da kullanılmaya başlamıştır. Blok Zinciri teknolojisinin birçok avantajı vardır. Öncelikle, verilerin değiştirilmemesi konusunda güvence sağlar. Ayrıca, verilerin depolanması ve paylaşılması sırasında ortaya çıkabilecek güvenlik açıklarını azaltır. Bu sayede, verilere erişim yetkisi olan kişiler dışında başka kişilerin verilere erişimi engellenir.

Blok Zinciri teknolojisinin çalışma prensibinin altında yatan en önemli özellikler;

- Blok Zinciri teknolojisi merkeziyetsiz bir yapıya sahiptir. Herhangi bir merkezi otorite tarafından yönetilemez ve dışarıdan bir müdahalede bulunulamaz. Bu durum kullanıcıların veri güvenliğini sağlamaktadır.
- Verilerin dağıtık yapıda saklanmaktadır. Verilere erişimin bir merkezi yoktur, birden fazla cihaz ve kullanıcı tarafından yapılmasını sağlar. Bu sayede, değiştirilmesi imkansızlaşır ve güvenliği artar. Dağıtılmış defterler işlemleri otomatik olarak ve gerçek zamanlı olarak kaydederek dolandırıcılık olasılığını azaltır (Chang vd., 2020).
- Blok Zinciri teknolojisi açık kaynak kodlu olarak çalıştığından, bloklar üzerinde gerçekleştirilen tüm işlemler halka açıktır, şeffaftır, herkes tarafından görüntülenebilir. Ancak yapılan işlemler dışarıdan bir müdahale ile değiştirilemez.
- Bloklar üzerindeki tüm işlemler herkese açıktır, ancak kullanıcılar anonimdir. İşlemi gerçekleştiren kişilerin kimlik bilgilerine erişim sağlanamaz. Veri aktarmak için kişinin kimliğini bilmek gerekmez sadece o düğüme ait Blok Zinciri adresinin bilinmesi yeterlidir (Ünal & Uluyol, 2020).
- Blok Zincirindeki tüm veriler özel olarak şifrelenir, değiştirilemez. Blokları bozabilmek için milyarlarca kopyası olan bu kayıt defterindeki tüm blokların değiştirilmesi gerekmektedir. Değiştirilmesi, silinmesi ve çalınması neredeyse imkansızdır.

NFT'ler, Blok Zinciri teknolojisi kullanılarak üretilir ve yönetilir. Bu sayede, NFT'lerin değiştirilemez ve özel nitelikleri korunur. Ayrıca, NFT'lerin alım satımı sırasında ortaya çıkabilecek güvenlik açıkları azaltılır ve alıcı ve satıcı arasında doğrudan bir ilişki oluşturulur. NFT'lerin değerleri ve geçerlilikleri Blok Zinciri üzerinde kaydedilir ve doğrulanır.

Akıllı Sözleşme (Smart Contract)

Akıllı sözleşme kavramı ilk olarak, Blok Zinciri teknolojisinin yaratılmasından önce 1994 yılında Nick Szabo tarafından ortaya atılmıştır ve taraflar arasındaki işlemleri güvenli hale getiren ve sözleşmenin şartlarını gerçekleştiren bilgisayara dayalı bir sistem şeklinde tanımlanmıştır (Usta ve Doğantekin, 2019).

Akıllı sözleşmeler, Blok Zinciri ağında işlemlerin gerçekleştirilmesini ve bu işlemlerin koşullara bağlı olarak yürütülmesini sağlayan yazılım programlarıdır. Akıllı sözleşmeler, Solidity gibi özel bir dil kullanılarak yazılır ve Blok Zincirinin bir bloğuna yüklenirler. Bir kez yüklendiklerinde, Blok Zinciri ağının güvenliği sayesinde tamamen otomatik olarak çalışırlar ve Blok Zincirinin diğer kullanıcıları tarafından doğrulanırlar.

Akıllı sözleşme platformlarının teknolojisi sayesinde izinsiz kopyalama ve bu duruma dayalı sahtecilik, orijinalliğinin kanıtlanması süreçleri yine bir miktar zaman ve emek gerektirse de neredeyse imkânsızdır (Franceschet vd., 2019, s. 33). Akıllı sözleşmeler, bir Blok Zincirinin bir parçası olduğundan, onları değiştirmek veya ihlal etmek çok zor veya imkansızdır. Bu, akıllı sözleşmelerin güvenilirliğini ve dayanıklılığını artırır.

Bir şirketin hisse senetlerini temsil eden bir token oluşturmak isteyebilirsiniz ve bu tokenlerin nasıl transfer edileceğini ve depolandığını belirlemek isteyebilirsiniz. Bu durumda, bir akıllı sözleşme oluşturarak bu işlemleri otomatik olarak gerçekleştirebilirsiniz. Akıllı sözleşmeler, birçok farklı alanda kullanılabilirler. Bir e-ticaret mağazasında sipariş verdiğinizde, bir akıllı sözleşme otomatik olarak ödeme işlemini gerçekleştirebilir ve ürünün gönderimini takip edebilir. Bir oyunda bir öğe satın aldığınızda, akıllı sözleşme otomatik olarak öğeyi oyun hesabınıza ekleyebilir. Bir arsa satışında, akıllı sözleşme otomatik olarak satış işlemini gerçekleştirebilir ve evin tapusunu transfer edebilir.

Akıllı sözleşmeler, ayrıca birçok dijital varlık için kullanılabilirler. NFT'ler (Non-Fungible Tokenler), değiştirilemeyen ve sıradan bir tokenden farklı olarak birbirlerine eşit olmayan dijital varlıkları temsil eden, dijital tokenlerdir. NFT'ler, çoğunlukla Ethereum Blok Zincirnin akıllı sözleşmeleri kullanılarak oluşturulur. Bu sayede kopyalamaya veya değiştirmeye karşı güçlü bir şekilde korunurlar. NFT'ler çevrimiçi olarak, kripto para birimiyle işlem görmekte ve akıllı sözleşmelerle korunma altına alınmaktadır (Nadini, vd., 2021). Akıllı sözleşmeler sayesinde, NFT'ler benzersiz ve değiştirilemez olurlar. Akıllı sözleşmeler, tarafların adil takas yapmalarını ve üçüncü bir tarafa ihtiyaç duymadan bir anlaşmanın sözleşme şartlarının otomatik olarak uygulanmasını sağlarlar.

Akıllı sözleşmeler, NFT'lerin oluşumunu, dağıtımını ve transferini yöneten kod bloğudur. NFT'lerin oluşumu ve transferi, tamamen otomatik ve güvenilir bir şekilde gerçekleştirilebilir. Bir sanat eserinin NFT'si

oluşturulduğunda, akıllı sözleşme otomatik olarak NFT'yi oluşturur ve bunu Blok Zincirine yükler. Bir NFT satın alındığında, akıllı sözleşme otomatik olarak NFT'nin transferini gerçekleştirir ve NFT'nin yeni sahibine geçer. NFT'lerin oluşumu ve transferi otomatik ve güvenilir bir şekilde gerçekleştirilebilir.

Adres ve İşlem

Blok Zinciri (Blockchain) adresi, dijital varlıkların sahiplik bilgisini içeren, bir Blok Zinciri ağında kripto para birimi işlemleri göndermek ve almak için kullanılan, gizli bir kod olan özel anahtarlardır. İşlemleri imzalamak ve adresteki fonların sahipliğini kanıtlamak için kullanılan sabit sayıda kriptografik karakterlerden oluşmaktadır. İşlemlerin yapılabilmesi için adresin doğrulanması ve dijital imza ile imzalanması gerekmektedir. Özel anahtarı güvende tutmak önemlidir. Çünkü ona erişimi olan herkes işlemleri imzalayabilir ve adresle ilişkili fonları kullanabilir. Adresleme işlemi MetaMask, TrustWallet, Coinbase Wallet, Trezor, Ledger gibi kripto para cüzdanları kullanılarak kolayca gerçekleştirilir.

ERC-721 Standardı

ERC-721, Ethereum ağı üzerinde çalışan bir akıllı sözleşme standardıdır. Bu standart, bir Blok Zinciri ağında birbirinden benzersiz ve tekil öğelerin (örneğin, koleksiyon öğeleri, oyun parçaları, stok fotoğrafları gibi) özel bir şekilde işlem gördüğü bir sistemi tanımlar. Bu öğeler, Non-Fungible Token (NFT) olarak adlandırılır ve her biri benzersizdir. ERC-721 standardı Ethereum Blok Zincirindeki akıllı kontratları kullanır ve sadece Ethereum Blok Zinciri üzerinde işlem yapılabilmektedir.

ERC-721 standardı, bir NFT'nin ne zaman ve hangi koşullar altında transfer edilebileceğini, hangi bilgilerin içinde tutulabileceğini ve bu bilgilere nasıl erişilebileceğini belirler. Bu sayede, NFT'lerin değerini ve özelliklerini doğru bir şekilde yansıtan bir piyasa oluşur.

ERC-721 standardı, Ethereum ağında NFT'lerin üretimi için kullanılmaktadır. ERC-721 standardı ile kullanıcılar dijital eserlerini, Ethereum Blok Zinciri üzerinde NFT'ye dönüştürerek, dijital eserlerinin hak sahipliğini elde edebilirler.

NFT için bir standart sunan ERC-721, bir eserin Blok Zincirine kaydedilerek NFT haline getirir. Böylece, değiştirilememesi ve iptal edilememesi sebebiyle o eserin tüm haklarının sahibi olmaktadır.

ERC-721 standardı Ocak 2018'de William Entriken, Dieter Shirley, Jacob Evans, Nastassia Sachs tarafından ortaya atılmıştır ve akıllı sözleşme sağlayan tokenlara API sağlayan bir standarttır.

İşlem Ücreti (Gas Fee)

İşlem ücreti, Ethereum Blok Zinciri üzerinde bir işlem gerçekleştirirken ödenen bir ücrettir. İşlem ücreti ödemesi yapılmadığında işlemler onaylanamaz ve gerçekleştirilemez. Ethereum Blok Zinciri işlemleri doğrulayan ve kaydeden madenciler tarafından yönetilir. Bu madenciler, işlemleri doğruladıktan ve bir blokta kaydettikten sonra, işlem ücretini alırlar.

İşlem ücreti ödemesi, işlemin gerçekleştirileceği Blok Zinciri ağının işlem hacmine göre değişebilir. Bu ücret, işlemlerin bir blokta yer alıp almamasına göre değişebilir. Bir blok dolu olduğunda işlemlerin yer alabilmesi için daha yüksek bir işlem ücreti ödemesi gerekebilir. Ethereum ağında işlem hacmi yüksek olduğunda, işlem ücreti ödemesi artar, işlem hacmi düşük olduğunda işlem ücreti ödemesi de düşer. Diğer kullanıcıların ağı kullandığı yoğun bir zamanda bir NFT almak/satmak, genel olarak daha yüksek bir maliyetle sonuçlanır. Yüksek ücretlerinden kaçınmak için, işlemleri ağ kullanımının yoğun olmadığı zamanlarda yapmak gerekir. İnsanların çalışma saatlerinde ya da sabahın erken saatlerinde yapılabilir.

Bir Ethereum cüzdanından bir başka cüzdana Ether gönderimi sırasında, işlem ücreti ödenir ve işlem bir blokta kaydedilir. Aynı şekilde, bir NFT satın alımı veya satışı sırasında da işlem ücreti ödenir ve işlem bir blokta kaydedilir.

NFT satışı yapılan sitelerin işlem ücretlerini kendi belirleme yetkisi vardır ve bu ücretler değişebilir. Platformlar, Ethereum gibi yüksek işlem ücretine sahip kripto paralardaki işlem / transfer ücretlerini kullanıcılara yansıtabilirlerken daha düşük işlem ücretlerini ise platformun gelişmesi ve daha fazla kişi tarafından kullanılması için kendileri üstlenerek kullanıcılarına yansıtmayabilmektedirler (Çubukcu, 2022). NFT sitelerini tercih ederken işlem ücretleri konusunda ayrıntılı bilgi edinmek ve bu ücretleri dikkate almak gerekmektedir.

Dijital Varlıkların NFT'ye Dönüştürülmesi

NFT üretmek, dijital bir ürünün NFT'ye dönüştürülmesi aşamalarını içeren süreçtir. Bu süreç NFT basmak (minting) olarak adlandırılır. NFT'ler minting sürecinde, kriptografik şifreleme algoritmaları ile Blok Zinciri üzerinde şifrelenir. Kullanıcılar NFT'ye dönüştürdükleri dijital ürünlerini seçtikleri Blok Zincirinde üretirler. Blok

Zincirini belirlerken; Blok Zincirindeki işlem ücretlerini ve Blok Zincirinin tercih edilme oranlarını dikkate alınabilir.

NFT'nin sergileneceği platforma kayıt olabilmek için kripto para cüzdanına sahip olmak gerekmektedir. Kripto para cüzdanı oluşturulduktan sonra, ürünlerin satışa sunulacağı bir NFT platformu seçilmelidir. OpenSea, Rarible, Superrare popüler NFT platformlarındır. NFT pazar yerlerinde (marketplace), NFT'nin nasıl satılacağı ile ilgili birden fazla seçenek bulunmaktadır. NFT'ler belirlenen sabit bir fiyat üzerinden satışa sunulabilir. NFT'yi satan kişi, sahip olduğu NFT'ye bir değer belirler ve o değeri teklif eden alıcı NFT'nin yeni sahibi olur.

Başka bir satış yöntemi de açık artırma şeklinde gerçekleşir. NFT üreticisi, dijital varlığını minimum bir fiyat belirleyerek satışa koyar ve açık artırma için süreyi belirler. Belirtilen süre sonunda en yüksek teklifi vererek satın alan kişi, NFT ücretini satışı gerçekleştiren kişinin kripto para cüzdanına göndererek NFT'nin yeni sahibi olur. Satın alan kişi NFT'si satın alınan dijital dosyanın tüm telif haklarına sahip olur. NFT'nin yeni sahibi isterse ürünü satışa çıkarabilir. Ürünün tekrar satıldığında eseri üreten kişi ve işlemlerin yapıldığı platform belirli oranda kazanç sağlar.

NFT Üretim ve Satış Aşamaları

Dijital Bir Cüzdan Oluşturmak

Blok Zinciri Cüzdanları bizim kripto varlıklarımızı tuttuğumuz ve sadece özel şifresi ile erişebildiğimiz yeni nesil dijital varlık saklama metodudur (Çarkacıoğlu, 2016). Blok Zinciri Cüzdanı (Blockchain Wallet), Blok Zinciri teknolojisi ile üretilen NFT'lerin veya kripto para birimlerinin bilgilerinin saklanmasını sağlar. Cüzdan oluşturulduktan sonra, platformlarda belirtilen talimatlar doğrultusunda benzersiz paralara dönüştürülecek çalışmaların (resim, fotoğraf, müzik, video gibi) yüklenmesiyle NFT yapılabilir. Bu işlem için platformlara Ethereum eklenerek işlem gerçekleştirilir. NFT oluşturulduktan sonra bu platformlarda listelenmekte ve koleksiyonerlere sunulmaktadır (Dowling, 2021; Özrili, 2021; Şağban, 2021)

İnternet bağlantısı üzerinde çalışan kripto para cüzdanlarına *sıcak cüzdan* denir. Kripto para birimlerini depolamak için kullanılabilecek birçok mobil ve masaüstü cüzdan uygulaması vardır. İnternet erişimi olmadan çalışan kripto para cüzdanlarına *ise soğuk cüzdan* denir. İnternet erişimsiz kullanıldığı için soğuk cüzdanlar, sıcak cüzdanlardan daha güvenlidir. Soğuk cüzdan oluşturmak için kripto para biriminin cüzdan adresini oluşturmak ve bilgileri internette ücretsiz olan bir cihazda saklamak gerekir.

Dijital bir cüzdan oluşturmak için birçok dijital cüzdan uygulaması mevcuttur. MetaMask, CoinBase Wallet, Ledger, Phantom, BitKeep yaygın olarak kullanılan dijital cüzdan oluşturma uygulama platformlarıdır.

Dijital Cüzdana Kripto Para Yüklemek

NFT'leri basmak, satmak ve almak için Blok Zinciri teknolojisine dayalı güvenli ve merkezi olmayan ödeme formu olan kripto para kullanılmaktadır. İşlemleri gerçekleştirebilmek için dijital cüzdanda kripto para bulunmalıdır. Bu piyasada en yaygın kullanılan kripto para birimi Ethereum (ETH), SOLANA ve MATIC olarak söylenebilir. Kripto para borsalarında hesabınız varsa bu hesap üzerinden para göndererek veya MetaMask üzerinden ETH veya MATIC alınabilir.

NFT Platformu Seçmek

Piyasada birçok NFT platformu mevcuttur. OpenSea, Rarible gibi popüler pazar yerleri bulunmaktadır. NFT platformlarının seçilmesinde, sitelerin işlem hacimlerini, işlemler için yapılan ödemeleri, kullanılan Blok Zinciri teknolojisini, popülaritesini değerlendirerek en uygun platform keşfedilebilir. Çalışmamızda popüler NFT platformlarına ait karşılaştırmalı özellikler Tablo 1'de yer almaktadır.

Dijital Cüzdanı Hesaba Bağlama

Tercih edilen NFT pazar yerinde oturum açmak için dijital cüzdanınızı buraya bağlamanız gerekmektedir. Bu işlemden sonra seçtiğiniz platformda yerinizi alarak koleksiyonlara erişebilir, kendi NFT'lerinizi basabilir, alım, satım yapabilirsiniz.

Dijital Ürünleri Yüklemek

Seçtiğiniz NFT platformunda bulunan Oluştur **(**Creat) tuşuna tıklayarak, NFT'yi basmada (mintlemede) kullanılacak Blok Zinciri para birimi seçilir. Ardından, dijital ürünün tek bir kopya mı, birden fazla kopya olarak mı oluşturmak istenildiği seçilerek, dijital ürün dosyası yüklenilir.

NFT İçin Satış Türünün Seçilmesi

Oluşturulan NFT'nin hangi şekilde satışa sunulacağı belirlenmelidir. Üç şekilde satışa çıkarılabilir. Sabit Fiyat (Fixed Price); ürün için belirlenen fiyatı ödeyen kişi satın alır ve eserin yeni sahibi olur. Zamanlı Müzayede (Timed Auction); satıcının belirlediği süre içinde teklifler sunulur, süre bitiminde en yüksek fiyatı ödeyen NFT'nin yeni sahibi olur. Sınırsız Açık Artırma (Unlimited Auction); ürünün sahibi verilen teklifi kabul edene kadar alıcılar teklif vermeye devam eder. Teklifi kabul edilen kişi NFT'nin yeni sahibi olur.

NFT Satışı İçin Başlık, Açıklama, Telif Ücreti Eklemek

NFT'lerin piyasada görünür olması için, oluşturulan ve satışa sunulacak olan NFT'ler için başlık ve açıklamalar eklenmelidir. Bu pazar yerinde dikkat çekmekte etkili olmayı sağlamaktadır. Ayrıca telif ücreti eklenildiğinde, eser her satıldığında, eserin üreticisi de belirlediği oranda telif ücretine sahip olabilecektir.

İmzalamak ve Paylaşmak

Paylaşmaya hazır olan dijital ürün yüklemesi tamamlandıktan sonra, dijital cüzdanda onaylanmalıdır. Platformun talep ettiği işlem ücreti (gas fee) ödenir ve ürün piyasada satışa çıkarılabilir. İşlem ücreti ödemeleri pazar yerlerine göre, işlem hacminin fazla ya da az olduğu zamanlara göre farklılık göstermektedir. İşlem yoğunluğunun az olduğu zamanlar seçilerek daha düşük ücret ödenebilir.

NFT'lerin Sürdürülebilirliği

NFT'ler (Non-Fungible Token), Blok Zinciri teknolojisi kullanılarak dijital ortamda kaydedilen birbirinden farklı olan ve takas edilemeyen öğelerdir. Özellikle sanat eserleri, oyun içi öğeler ve diğer özel öğelerin dijital ortamda satılmasında kullanılmaktadır. Ancak, NFT'lerin dijital ortamda kaydedilmesi, sürdürülebilirlik açısından bazı sorunları da beraberinde getirir.

- Kripto paraların madenciliği sırasında, elektrik tüketimi çok yüksektir. Bu tüketim, NFT'lerin üretimi ve dağıtımı sırasında da sürdürülebilirliği olumsuz etkilemektedir.
- NFT'lerin saklanması için, özel cüzdanlar ve depolama çözümlerine ihtiyaç duyulur. Bu çözümlerin üretimi ve çalıştırılması da enerji tasarruflu değildir.
- NFT'lerin dijital ortamda kaydedilmesi, onların fiziksel olarak saklanamamasına yol açar. Bu da, NFT'lerin gelecek kuşaklara aktarılamaması anlamına gelir.
- NFT'lerin satın alınması için kullanılan kripto paraların değerleri değişim gösterir. Bu da, NFT sahiplenmenin gelecekte değer kaybına uğrama riskini içerir.

Yöntem

Veri Toplama Süreci

Bu çalışmada sekiz ayrı NFT platformu seçilmiş, seçilen pazar yerlerine ait web siteleri üzerinde ayrıntılı inceleme gerçekleştirilmiştir. Araştırma nitel araştırma yöntemi kullanılarak gerçekleştirilmiştir. Araştırılan platformlarda iş ve işlemlerde zaman zaman değişiklikler yapılmakta olup, araştırmanın yapıldığı döneme ait veriler işlenmiştir. Araştırmada konu ile ilgili veri toplamak için nitel araştırma veri toplama araçlarından döküman incelemesi yapılmıştır. Dökümanlar bu çalışma kapsamında NFT platformlarıdır. Bunun yanı sıra, alan üzerine yapılan çalışmalara ait, makaleler, tezler, bildiriler ve web siteleri içeriklerinden de yararlanılmıştır. Araçlar sürekli güncellenmekte, isimleri ve sürümleri değişmektedir. Ancak, bu araçların temel özelliklerinin tek bir yerde toplandığı özgün bir araştırma olmadığı için bu çalışmanın gerçekleştirilmesi amaçlanmıştır.

Verilerin Analizi

İçerik analizi, metinler ve görüntüler gibi sembolik içeriği bazı yapısal ve anlamsal özellikleri kapsamında temalandırmak ve kodlamak için kullanılan sistematik bir tekniktir (Bauer, 2000). Web içerik analizi ise içerik analizinin bir türü olarak web sayfalarındaki içeriklerin yorumlanması ve temalara ayrılmasıdır (Herring, 2009). Bu çalışmada sekiz NFT web sitesi Web İçerik Analizine tabi tutulmuştur.

Bulgular

Sekiz ayrı NFT platformu üzerinde yapılan araştırma ve incelemeler sonucunda, platformların karşılaştırmalı özelliklerine ait verilerin bulunduğu Tablo 1 oluşturulmuştur. Seçilen NFT platformları OpenSea, Rarible, SuperRare, BinanceNFT, Foundation, Nifty Gateway, Mintable ve Solanart'tır. Bu tablo, NFT işlemleri için

kullanılacak NFT platformu seçiminde yardımcı olabilecek özelliklere sahiptir. Platformlar zaman içerisinde uygulamalarında ve ücretlerde değişiklikler gerçekleştirmektedirler.

Tablo 1. NFT Platformları ve Çeşitli Özelliklerine Göre Sınıflandırılması

	OpenSea	Rarible	SuperRare	BINANCE NFT	Foundation	Nifty Gateway Studio	MINTABLE	Solanart
Geliştiricisi	Devin Finzer Alex Atallah	Alex Salnikov Alexei Falin	John Crain Johnathan Perkins Charles Crain	CZ (Changpeng Zhao) Yi O	Alex Atallah Niv Hadas Justin Blau	Duncan Cock Foster Griffin Horoz Foster	Mark Cuban	Anatoly Yakovenko Greg Fitzgerald Stephen Akridge Raj Gokal
Kuruluş Yılı	2017 (ABD)	2020 (RUSYA)	2018 (ABD)	2017 (Kuruluş: ÇİN Merkez: MALTA)	2017 (San Francisco, California)	2018 (ABD)	2017 (ABD)	2021 (İsviçre)
Dil Seçenekleri	İngilizce İspanyolca Almanca Fransızca Japonca Korece Çince (Basitleştirilmiş) Çince(Geleneksel)	İngilizce (Diğer dil seçenekleri mevcut değil)	İngilizce (Diğer dil seçenekleri mevcut değil)	40 dilde	İngilizce (Diğer dil seçenekleri mevcut değil)	İngilizce (Diğer dil seçenekleri mevcut değil)	İngilizce (Diğer dil seçenekleri mevcut değil)	İngilizce İspanyolca Almanca Fransızca Japonca Korece Çince
Tür	Sanal Dünya	Sanal Dünya	Sanal Dünya	Sanal Dünya	Sanal Dünya	Sanal Dünya	Sanal Dünya	Sanal Dünya
Blok Zinciri / Para Bi	Ethereum (ETH)* Polygon (MATIC)* Avalanche (AVAX)* BNB Chain (BNB)* Klaytn (KLAY)* Solana (SOL)* Arbitrum (ETH)* Weth*	Ethereum (ETH)* İmmutable X* Polygon(MATIC)* Base RariChain Astar zkEvm Kroma zkSync	Ethereum(ETH)* Rare*	BNB Chain(BNB)* Ethereum(ETH)* Polygon	Ethereum(ETH)*	Ethereum(ETH)* Banka kartı, kredi kartı, Gemini Bakiyesi* ImmutableX* Polygon*	Ethereum(ETH)* ImmutableX Ripple (XRPL)*	Solana (SOL)*
Market	Var	Var	Var	Var	Var	Var	Var	Var
Sanal Cüzdan	Gerekli	Gerekli	Gerekli	Gerekli	Gerekli	Gerekli	Gerekli	Gerekli
Cüzdan Türleri	MetaMask(popüler) Coinbase Wallet WalletConnect Phantom Bitkeep Kaikas Core Fortmatic	MetaMask(popüler) Coinbase Wallet Wallet Connect Install Bigget Wallet Torus Portis	MetaMask CoinbaseWallet Rabby Wallet Phantom Trust Wallet Ledger WalletConnect Rainbow Okx Wallet Gnosis Safe	MetaMask WalletConnect	MetaMask WalletConnect Coinbase Wallet	MetaMask	MetaMask XUMM Wallet	MetaMask Solflare Coinbase Wallet WalletConnect Trust Phantom
Teknik Doküman (White Paper)	Web Sitesinde mevcut	Web Sitesinde mevcut	Web Sitesinde mevcut	Web Sitesinde mevcut	Web Sitesinde mevcut değil	Web Sitesinde mevcut değil	Web Sitesinde mevcut değil	Web Sitesinde mevcut
Yol Haritası (Road Map)	Web Sitesinde mevcut	Web Sitesinde mevcut	Web Sitesinde mevcut	Web Sitesinde mevcut	Web Sitesinde mevcut değil	Web Sitesinde mevcut değil	Web Sitesinde mevcut değil	Web Sitesinde mevcut değil
Ana Erişim	Web Sitesi Mobil Uygulama	Web Sitesi Mobil Uygulama	Web Sitesi	Web Sitesi Mobil Uygulama	Web Sitesi	Web Sitesi Mobil Uygulama	Web Sitesi	Web Sitesi
Sosyal Ağ Sohbet Haberleşme	X Instagram Youtube Discord Reddit Linkedln	Instagram X Discord Farcaster Youtube Linkedln	X Instagram Youtube Discord Reddit	Instagram X Telegram Facebook Youtube Reddit	Instagram X Blog	Instagram X Discord	X Discord Reddit	X Discord
Mobil Uygulamalar	Android iOS	Android iOS	-	Android iOS	-	Android iOS	-	-
Gas Fee	Var	Var	Var	Var	Var	Var	Var	Yok
NFT oluşturma Ücreti	Var	Var	Var	Var 0.005 BNB 0,001 ETH	Var	Var	Yok	Satış fiyatına dahil
Satış Sonrası Platformun Kesinti Ücreti	%2.5	%2.5	Birincil satış %15 (+%3-Pazar yeri ücreti)	1%	%15'e kadar	15%	Birincil ve ikincil satıştan %5	3%
Telif Hakkı (İkincil Satışlardan)	Telif hakkı bedeli, ikincil satışlardan alınacak komisyon ücreti eser sahibi tarafından belilenir. Eserin her satışında, yaratıcısı bu bedele sahip olur.							

Sonuçlar

Dijitalleşmenin hızla gerçekleştiği, teknolojinin geliştiği ve gelişmeye devam ettiği günümüzde hayatımıza giren NFT kavramı, sanatın dijitalleşmesinin önünü açmış, sanatçılar ve eserlerinin istenen değere sahip olabilmesi için, güvenli alım satım ortamları varlığını göstermiştir. NFT'lerin teknolojik alt yapısını oluşturan Blok Zinciri teknolojisinin güvenirliğinin yüksek olması, NFT'lerin akıllı sözleşmelerle güvence altına alınması, dijital eserlerin tanınmasında, değer görmesinde ve sanatçıların mülkiyet haklarının koruma altına alınmasında etkili olmuştur. Yeni bir kavram olmasına rağmen çok sayıda eser NFT platformlarında hızla yerini almıştır. Her türlü dijital eserin NFT olabileceği ve bu eserlerin varlığını göstereceği birçok NFT pazar yeri mevcuttur. Yaratıcılar eserlerini hangi platformda sergileyeceklerine, hangi koşullarda işlem yapılacağına karar verme şansına sahiptirler. Dijital eserlerin alım satımı için güvenli ortamlar sunan pazar yerlerinin her birinin kendine has işlem şartları, ödeme koşulları, ne tür eserler sergileneceğine dair koşulları bulunmaktadır. Eser sahipleri bu özellikleri göz önünde bulundurarak, hangi platformun eserleri için uygun olduğuna karar verebilmekte, istediği platforma dahil olma tercihinde bulunabilmektedirler. NFT'ler Türk Dil Kurumu'nun Nitelikli Fikri Tapu adlandırmasıyla tam olarak karşılığını bulmaktadır. Fikri mülkiyet haklarının güvence altına alındığı bu teknoloji önümüzdeki süreçte insanların artan ilgisiyle gelişmeye devam edecektir. Çalışmada NFT kavramıyla ilişkili teknolojiler, NFT platformları ve kullanımları, NFT üretim süreçleri hakkında bilgiler sunulmuştur. Ayrıca doğurabileceği olumsuzluklara da değinilmiş olup her yönüyle değerlendirilmeye çalışılmıştır. Çalışmada OpenSea, Rarible, SuperRare, BinanceNFT, Foundation, Nifty Gateway, Mintable ve Solanart web sitelerine ait, kullanılan Blok Zinciri teknolojisinden, Cüzdan türlerine kadar pek çok detay tablolaştırılmıştır. Böylece, NFT ile ilgilenen araştırmacılara bir bakış açısı sağlanarak bundan sonra yapılacak NFT araştırmalarına ışık tutulması amaçlanmıştır.

Notlar

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Covid-19 Pandemi Döneminde İngilizce Öğretmenlerinin Uzaktan Eğitime Yönelik Görüşleri: Nitel Bir Durum Çalışması

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Özet

Bu araştırmanın amacı, İngilizce öğretmenlerinin Covid-19 pandemi sürecinde deneyimledikleri uzaktan eğitim hakkındaki görüşlerini ve önerilerini belirlemektir. Çalışma grubu, 9 İngilizce öğretmeninden oluşmaktadır. Veriler, 15 Mart 2023 - 13 Mayıs 2023 tarihleri arasında toplanmıştır. Araştırma, nitel araştırma modellerinden durum çalışması kullanılarak desenlenmiştir. İngilizce öğretmenleriyle yarı yapılandırılmış bir form aracılığıyla görüşmeler gerçekleştirilmiştir. Elde edilen bulgulara göre, uzaktan eğitim öğretmenler için ev ortamında daha rahat hissedilebilen, sınıf kontrolünün ve ödev takibinin daha kolay olduğu bir sistem olarak olumlu değerlendirilmiştir. Öğrenciler için ise hem ekran başında olmanın hem de arkadaşlarından ayrı kalmamanın olumlu bir yanı olduğu kabul edilmiştir. Ancak, sessiz bir ortamın olmaması, zaman zaman yaşanan teknolojik aksaklıklar veya evde birden fazla öğrencinin bulunması gibi sebeplerle teknolojik alet yetersizliği öğrenciler açısından sorun teşkil etmektedir. Bu bağlamda, öğretmenler, öğrencilerin internet sorunlarının çözülmesi gerektiğini ve her öğrenciye fırsat eşitliği sağlanması gerektiğini önermektedirler.

Anahtar Sözcükler: İngilizce öğretmenleri, Uzaktan eğitim, Covid-19, Nitel araştırma, Durum çalışması.

English Teachers' Views on Distance Education During the Covid-19 Pandemic: A Qualitative Case Study

Abstract

The aim of this study is to determine the views and suggestions of English teachers about the distance education they experienced during the Covid-19 pandemic. The study group consists of 9 English teachers. The data were collected between March 15, 2023 and May 13, 2023. The study was designed using a case study from qualitative research models. Interviews were conducted with English teachers through a semi-structured form. According to the findings, distance education was evaluated positively for teachers as a system where they could feel more comfortable in a home environment, where classroom control and homework tracking were easier. For students, both being in front of the screen and not being separated from their friends were accepted as positive aspects. However, the lack of technological equipment posed a problem for students due to the lack of a quiet environment, occasional technological glitches or the presence of more than one student at home. In this context, teachers suggest that students' internet problems should be solved and that equal opportunity should be provided for all students.

Keywords: English teachers, Distance education, Covid-19, Qualitative research, Case study.

Giriş

Eğitim, insanların birçok farklı alanda etkilerini yoğun bir şekilde hissettiği bir kavram olduğu için, tek bir tanım veya formülle sınırlamak mümkün değildir (Morse, 1995: 5). Son yıllarda teknolojinin hızlı gelişimiyle birlikte eğitim de değişim geçirmektedir. Uzaktan eğitimle ilgili haberler ve bilgiler dolaşırken, bu yeni sistem beklenmedik bir şekilde hayatımıza girmiş ve süreci yeni bir sisteme adapte olmaya zorlamıştır. Covid-19 pandemisi, bu yeni sistemin hızlı bir şekilde inşa edilip uygulanmasının en önemli etkenlerinden biri olarak görülmektedir. Toplumumuzda, eğitim önemli bir rol oynamaktadır. Ancak, Covid-19 pandemisi sırasında bir süreliğine eğitime ara vermek zorunda kalınmıştır. Bu durumu hızla ele almak ve öğrencilerin eğitimlerinden geri kalmamalarını sağlamak amacıyla, uzaktan eğitim yöntemleri hem televizyon programları aracılığıyla hem de Eğitim Bilişim Ağı (EBA) üzerinden devam ettirilmiştir.

Uzaktan eğitim, teknolojiler aracılığıyla farklı mesafelerdeki bireylere öğrenme ve öğretme sürecinin planlandığı bir eğitim yöntemi olarak ifade edilmektedir (Moore & Kearsley, 2005: 2). Türk eğitim sistemi incelendiğinde, uzaktan eğitimin 1950'li yıllarda başladığı görülmektedir (Kırık, 2014: 83). Ancak, bu dönemdeki uzaktan eğitim anlayışıyla günümüzdeki arasında önemli farklılıklar bulunmaktadır. Özellikle eğitim mekanı, yöntemi ve kullanılan araçlar açısından büyük değişiklikler yaşanmıştır.

Covid-19 pandemi süreci boyunca, uzaktan eğitim tüm eğitim seviyelerinde yaygın bir yöntem haline gelmiştir. Uzaktan eğitimin ani olarak hayatımıza girmesi, sürecin hızlı bir şekilde yönetilmesine rağmen, İngilizce öğretmenlerinin uzaktan eğitim ders ortamıyla ilgili görüşlerini ve öğrencilerin durumunu değerlendirmek, bu konuda önemli bir adım olarak düşünülmektedir.

Yapılan literatür taramasında, Covid-19 sürecinde uzaktan eğitimle ilgili birçok araştırma yapıldığı görülmektedir. Bu çalışmalarda, öğrencilerin görüşlerine yer veren bazı çalışmalar olduğu gibi, eğitimcilerin görüşlerine odaklanan çalışmalar da bulunmaktadır. Bu araştırmalar, ilkokul öğretmenlerinden üniversitede görev yapan öğretim üyelerine kadar tüm eğitimcileri kapsayacak şekilde uzaktan eğitimin sınırlılıkları ve faydaları üzerine görüşmeler yapmışlardır (Altınpulluk, 2021; Bakioğlu ve Çevik, 2020; Canpolat ve Yıldırım, 2021; Özdoğan ve Berkant, 2020; Türker ve Dündar, 2020; Yolcu, 2020; Yurtbakan ve Akyıldız, 2020). Öğretmenlerden oluşan bir grupla yapılan bir görüşmede ise içerik ve materyallerin zenginleştirilmesi ve geliştirilmesi gerektiği vurgulanmış ve çözüm önerileri sunulmuştur (Bayburtlu, 2020).

Bu çalışma kapsamında; Millî Eğitim Bakanlığına bağlı okullarda görev yapan İngilizce öğretmenleriyle uzaktan eğitim konusunda çeşitli görüşmeler yapılmıştır. Bu araştırma, uzaktan eğitimde ders veren öğretmenlerle doğrudan görüşmeler yapıldığı ve pandemi döneminde K-12 okullarında uzaktan eğitimin durumunu yansıttığı için çalışmanın önemli bir değere sahip olduğu düşünülmektedir.

Araştırmanın Amacı

Bu çalışmanın temel amacı, Covid-19 pandemi sürecinde İngilizce öğretmenlerinin uzaktan eğitim sırasında işledikleri dersler ve bu sürece yönelik görüşlerini belirlemektir. Araştırma, İngilizce öğretmenlerinin pandemi sürecinde uzaktan eğitime yönelik bakış açılarını ve derslerinde hangi teknolojileri aktif bir şekilde kullandıklarını incelemektedir. Bu doğrultuda aşağıdaki sorulara yanıt aranmıştır:

1. Covid-19 pandemisinde okullarda görev yapan İngilizce öğretmenlerinin uzaktan eğitime yönelik olumlu görüşleri nelerdir?
2. Covid-19 pandemisinde okullarda görev yapan İngilizce öğretmenlerinin uzaktan eğitim sürecinde karşılaştıkları sorunlar nelerdir?
3. Covid-19 pandemisinde okullarda görev yapan İngilizce öğretmenlerinin uzaktan eğitim süreci için önerileri nelerdir?

Yöntem

Araştırma Modeli

Bu araştırma, İngilizce öğretmenlerinin görüşlerine dayandığı için nitel araştırma yöntemi kullanılarak durum çalışması deseni benimsenmiştir. Durum çalışmalarında, belirli bir zaman diliminde bilgilerin toplandığı ve görüşme, gözlem raporları gibi çeşitli bilgi kaynaklarıyla sınırlı kaldığı nitel bir desen kullanılır (Creswell ve Poth, 2016). Bu desen, bireylerin yaşantılarına ve bu yaşantılara verdikleri anlamlara odaklanır (Creswell, 2007). Bu çalışmada da öğretmenlerin pandemi sürecindeki deneyimlerine ve gözlemlerine verdikleri anlamlara odaklanılmıştır. Uzaktan eğitimi dijital ortamlarda ve EBA üzerinden gerçekleştiren İngilizce öğretmenleri belirlenmiş ve çalışma bu çerçevede gerçekleştirilmiştir.

Çalışma Grubu

Araştırmanın çalışma grubu, İstanbul, Eskişehir, Adana, Malatya ve İzmir gibi farklı şehirlerde 2022-2023 eğitim öğretim yılında uzaktan eğitim yapan İngilizce öğretmenleri arasından ölçüt örnekleme ve kolayda örnekleme yöntemleri kullanılarak belirlenen 9 İngilizce öğretmeninden oluşmaktadır. Bu öğretmenlerin uzaktan eğitim derslerine aktif olarak katıldığı göz önünde bulundurulmuştur. Araştırma grubunun çeşitlilik sağlaması için farklı şehirlerde ve okullarda görev yapan öğretmenler tercih edilmiştir. Grup belirlenirken, öğretmenlerin derslere aktif katılımı, gönüllülük esası ve araştırmanın amacına uygun verilerin elde edilmesi gibi faktörler dikkate alınmıştır. Çalışma grubuyla ilgili detaylar aşağıdaki Tablo 1'de gösterilmektedir.

Tablo 1. Çalışmaya katılan öğretmenlerin demografik özellikleri

Özellik	Kategori	Sayı
Hizmet Yılı	1-10	3
	10-20	3
	20-30	2
	30 ve üzeri	1
Cinsiyet	Kadın	5
	Erkek	4
Uzaktan eğitim ile ders verdi mi?	Evet	9
	Hayır	0
Yaşadığı Şehir	İstanbul	2
	Eskişehir	4
	Malatya	1
	Adana	1
	İzmir	1
Çalıştığı Kurum Türü	İlkokul	2
	Ortaokul	5
	Lise	2

Araştırmaya toplam dokuz öğretmen katılmıştır. Bunların iki tanesi İstanbul ilinde, dört tanesi Eskişehir ilinde, bir tanesi ise Malatya ilinde, bir tanesi Adana ilinde, bir tanesi İzmir ilinde görev yapmaktadır. Yarı- yapılandırılmış görüşme yapılan öğretmenlerden beş tanesi kadın, dört tanesi erkek öğretmendir. Bunlardan 1-10 hizmet yılında olan üç kişi, 10-20 hizmet yılında olanları üç kişi, 20-30 hizmet yılında olan iki kişi ve 30 yıldan fazla hizmet yılına sahip olan bir kişiden oluşmaktadır. Katılımcıların tamamı uzaktan eğitim yöntemiyle aktif bir şekilde ders vermiştir.

Veri Toplama Aracı ve Süreci

Bu araştırmada, yarı yapılandırılmış bir görüşme formu kullanılarak nitel veri toplama teknikleri uygulanmıştır. Katılımcılardan aynı şehirde olanlar ile yüz yüze farklı şehirlerde olanlar ile telekonferans yöntemiyle görüşmeler gerçekleştirilmiştir. Araştırmaya katılan katılımcılara, verdikleri yanıtların sadece bilimsel amaçlarla kullanılacağı ve bilgilerinin gizli tutulacağı konusunda bilgi verilmiştir. Katılımcılara gizlilik gereği E1, E2 gibi kod isimleri verilmiştir. Araştırmada kullanılan veri toplama aracı Google formlar aracılığıyla hazırlanmış ve dileyen öğretmenlerle yüz yüze görüşmeler gerçekleştirilmiştir. Elde edilen veriler Excel formatında depolanmış ve analize hazır hale getirilmiştir.

Verilerin Analizi

Araştırma sorularına öğretmenlerin yanıtları içerik analizi ile incelenmiştir. Bu sayede araştırmanın amacına uygun veriler elde edilmiştir. Elde edilen veriler, anlaşılır bir şekilde tanımlanmış ve sunulmuştur. Böylece okuyucuların kolaylıkla anlamaları sağlanmıştır (Yıldırım ve Şimşek, 2013). Google Formlar kullanılarak alınan notlar, bilgisayar ortamında eksiksiz bir şekilde depolanmış ve 9 öğretmene ait yaklaşık 6 sayfalık bir veri seti oluşturulmuştur. Toplanan yanıtlar, ortak görüşlere göre kategorize edilmiştir.

Nitel araştırmalarda geçerlik ve güvenirlik; tutarlılık ve kararlılıkla ifade edilmektedir. Bu araştırmada, katılımcıların farklı görüşlere sahip olması ve doğrudan görüşlerinin alınması, araştırmanın inandırıcılığını gösterir. Soruların özenle belirlenmesi, yöntemin, veri toplama ve analiz sürecinin açık bir şekilde ifade edilmesi ve bağımsız çözümlemelerin yapılması ise tutarlılığı destekler (Yıldırım ve Şimşek, 2013).

Bulgular

Araştırma bulguları, pandemi sürecindeki uzaktan eğitim deneyimlerine dayalı olarak İngilizce öğretmenlerin eğitimle ilgili olumlu yönleri, karşılaştıkları problemler ve uzaktan eğitim süreci için önerileri şeklinde üç temel başlık altında incelenmektedir.

Pandemi Sürecinde İngilizce Öğretmenlerinin Uzaktan Eğitimle İlgili Olumlu Görüşleri

Covid-19 salgın dönemi ve öncesinde İngilizce öğretmenlerinin uzaktan eğitim sürecinde yaşadıkları ve gözlemledikleri olumlu görüşler doğrultusunda, bu görüşlerin temelini oluşturan temalar Tablo 2'de öğretmenlerin cevaplarıyla birlikte sunulmuştur.

Tablo 2. İngilizce öğretmenlerinin uzaktan eğitim ile ilgili olumlu görüşleri

Temalar	Katılımcılar
1) Öğrencilerin ilgi ve katılımı	E1, E3, E5, E7, E9
2) Uzaktan eğitimin sağladığı açıklık ve esneklik	E1, E2, E3, E4, E5, E6, E8, E9
3) Öğretmenlere konfor alanı sunması/iş yükü azaltma	E1, E2, E3, E4, E6
4) Teknoloji kullanım becerisine katkı sağlaması	E1, E2, E3, E4, E5, E6, E7, E8

Tablo 2'de görüldüğü gibi katılımcıların uzaktan eğitimle ilgili olumlu görüşlerinin 4 tema altında toplandığı görülmektedir. Bu temalar uzaktan eğitimin açıklık ve esneklik sağlaması bağımsız oluşu ve teknoloji kullanımına katkı sağlaması üzerine yoğunlaşmıştır. İlaveten öğrencinin ilgi ve katılımını sağlaması, öğretmenlere konfor alanları sunması olumlu yönler olarak görülebilir. İlgili ve istekli öğrencilere fırsat sağladığını ve öğrencilerin ders başarısına katkı sağladığını belirten üçer öğretmen bulunmaktadır. Ayrıca öğrencilerin ilgi ve katılımının yüksek olduğunu, kişisel sosyalleşmeye fayda sağladığını söyleyen ikişer öğretmen bulunmaktadır.

Pandemi Sürecinde İngilizce Öğretmenlerinin Uzaktan Eğitimde Gözlemledikleri ve Yaşadıkları Problemler

Covid-19 küresel salgın sürecinde okullarda çalışan İngilizce öğretmenlerinin uzaktan eğitim sürecinde deneyimledikleri ve gözlemledikleri problemler temalandırılmıştır. Bu temalar ve ilgili öğretmenlerin cevapları aşağıdaki Tablo 3'de görülmektedir.

Tablo 3. Okullarda uzaktan eğitimin problemli yönleri

Temalar	Katılımcılar
1) Teknik/Teknolojik Problemler	E1,E2,E3,E4,E5,E6,E7,E8
2) Öğrenme Sürecine İlişkin Sorunlar	E3,E5,E4,E8
3) Düşük Motivasyon Sorunu	E3,E4,E5,E6,E7
4) Süreç Değerlendirme Sorunsalı	E1,E2,E5,E9
5) Devam- Devamsızlık Durumu	E1,E2,E4,E9

Tablo 3'de, uzaktan eğitimle ilgili olarak belirlenen problemler 5 tema altında toplanmıştır. Bu temalar teknik aksaklıkların sıklığına odaklanmıştır. Ardından motivasyon eksikliği konusu ortaya çıkmaktadır. Eğitim ortamıyla ilgili sorunlar, güvenilir ölçme ve değerlendirme süreçlerinin olmaması ve devam zorunluluğunun eksikliği gibi temalar, dört öğretmenin ortak görüşleri arasındadır.

Pandemi Sürecinde İngilizce Öğretmenlerinin Uzaktan Eğitim Deneyimleri Bağlamında Önerileri

Covid-19 küresel salgın sürecinde gerçekleştirilen eğitimde İngilizce öğretmenlerinin uzaktan eğitim deneyimleri ve gözlemlerine göre önerileri temalandırılmıştır. Bu temalar ve öğretmenlerin cevapları aşağıdaki Tablo 4'te görülmektedir.

Tablo 4. İngilizce öğretmenlerinin uzaktan eğitim süreci için önerileri

Temalar	Katılımcılar
1) Teknik Altyapı Desteği	E1,E2,E3,E4,E5,E6,E8,E9
2) Öğrenci Eğitimleri	E1,E2,E3,E7
3) Eğitici Eğitimleri	E3,E4,E6,E7,E9
4) Fırsat ve İmkan Eşitliği	E1,E2,E3,E4,E5,E6,E8

Tablo 4'te belirtildiği gibi, katılımcıların uzaktan eğitimle ilgili önerileri 4 tema altında toplanmıştır. Bu temalar teknik altyapının güçlendirilmesi ve eğitimde fırsat eşitliğinin sağlanması konularına odaklanmıştır. Bu konuları takiben, öğrencilerin bilinçlendirilmesi ve öğretmenlere yönelik eğitimlerin yapılması önerileri öne çıkmaktadır. Ayrıca iki öğretmen, ders materyallerinden tam anlamıyla yararlanılması gerektiği görüşünü dile getirmiştir.

Sonuçlar

Bu çalışmanın temel amacı, İngilizce öğretmenlerinin farklı okullardaki uzaktan eğitimle ilgili görüşlerini belirlemektir. Araştırmanın bir alt amacı da, İngilizce öğretmenlerinin uzaktan eğitim uygulamasına yönelik olumlu düşüncelerini tespit etmektir. Elde edilen bulgular, uzaktan eğitimin zaman ve mekândan bağımsız olması ve öğrencilere teknoloji okur-yazarlığı kazandırması açısından olumlu sonuçlar sunmaktadır. Cabı'nın (2016) çalışması, öğrencilerin geleneksel yöntemler yerine dijital yöntemlerle değerlendirilmekten memnun olduklarını ortaya koymuştur. Görgülü-Arı ve Hayır-Kanat'ın (2020) araştırması, Covid-19 sürecinde öğretmenlerin çevrimiçi eğitim sayesinde ilerleme kaydettiklerini göstermiştir. Kaplan'ın (2021) incelemesi ise Covid-19 döneminde uzaktan eğitimin devam etmesinin birçok olumlu yönü olduğunu, katılımcılara zaman ve mekân esnekliği sağladığını vurgulamaktadır. Bu bağlamda, alan yazındaki bulgularla bu çalışmadaki sonuçlar uyumlu bir şekilde birbirini desteklemektedir.

İngilizce öğretmenleri tarafından olumlu bulunan bir diğer nokta, velilerin ilgisi ve desteğinin fazla olmasıdır. Aydemir (2021) yaptığı çalışmada, velilerle iletişimin yaşa bağlı olarak öğrencilere göre daha kolay olduğunu belirtmektedir. Atakan (2010) ise çalışmasında, velilerin sürece dahil olmasının öğretmenin işini kolaylaştırdığını vurgulamaktadır. Velilerin ilgili olması, öğretmenin işini kolaylaştıran bir faktördür. Bu çalışmada da, velilerin ilgili olduğu okullarda görev yapan öğretmenlerin durumdan memnun oldukları belirtilmiştir.

İngilizce öğretmenleri, uzaktan eğitimle ilgili olarak başka bir olumlu yönün, iş yükünü hafifletmesi olduğunu belirtmektedir. Gülbahar (2009) ve Burma (2008) çalışmalarında, uzaktan eğitimin öğrencileri bireysel öğrenmeye teşvik ettiği, öğrencilerin dersleri tekrar dinleyebildiği ve düşük maliyetli bir eğitim imkânı sunduğu belirtilmiştir. Bu çalışma da aynı şekilde, yüz yüze eğitimde kontrolü zor olan öğrencilerin, uzaktan eğitimde öğretmen tarafından daha kolay kontrol edilebildiğini göstermektedir. Bu da öğretmenin işini kolaylaştıran bir faktördür.

Araştırmanın ikinci alt amacı, İngilizce öğretmenlerinin uzaktan eğitim sürecinde karşılaştıkları problemleri belirlemektir. Bu bağlamda elde edilen bulgular, teknik aksaklıkların en yaygın sorun olduğunu göstermektedir. Yapılan araştırmalar, ülkemizde birçok öğrencinin aktif bir şekilde uzaktan eğitim sürecine katılamadığını ortaya koymaktadır. Maalesef, bu durum eğitim kalitesini de olumsuz etkilemektedir (Yılmaz, Güner, Mutlu, Doğanay ve Yılmaz, 2020, s. 25). Alanyazın taramasında, teknolojik altyapı ile ilgili sorunlarla ilgili birçok araştırmacının sıkıntıları dile getirdiği dikkat çekmektedir. Yılmaz ve diğerleri (2020) çalışmalarında öğrencilerin büyük bir çoğunluğunun derse giriş ve ders esnasında internetle ilgili sorunlar yaşadığını belirtmişlerdir. Bu durum, hem öğretmenlerin hem de öğrencilerin motivasyonunu düşürdüğü görülmektedir. Sakarya ve Zahal (2020) ise internet bağlantısının kopması, sesin kesilmesi, bağlantı problemleri veya düşük ses kalitesinin dersin işlenmesini engellediğini ifade etmektedirler.

Araştırmada tespit edilen bir diğer sorun, motivasyon eksikliğidir. İbicioğlu ve Antalyalı (2005) çalışmalarında, bir öğrencinin uzaktan eğitimde başarılı olmasını sağlayan en önemli faktörün motivasyon olduğunu belirtmişlerdir. Sarıtaş ve Barutçu (2020) ise yaptıkları çalışmada, uzaktan eğitime katılan öğrencilerin derslere olumlu bir yaklaşım sergilemelerinin uzaktan eğitimde başarıyı artırdığını ifade etmektedir. Araştırmaya katılan öğretmenlerimiz de öğrencilerdeki motivasyon eksikliğinin kendilerini de olumsuz etkilediğini dile getirmişlerdir.

Araştırmada ortaya çıkan bir diğer sorun, ölçme ve değerlendirme sürecinin güvenilir olmamasıdır. Düzakın ve Yalçınkaya (2008) yaptıkları çalışmada, ülkemizdeki akademisyenlerin uzaktan eğitimde görüntü ve ses yönetimi veya ders sunumlarında teknolojiyi kullanmada iyi olmadıklarını belirtmişlerdir. Bununla birlikte, ölçme ve değerlendirme konusunda tüm öğretmenlerin zorlandığı görülmüştür. Bu noktada, hem adil olmayı gözetmek hem de öğrencilerin sahip oldukları koşulları dikkate almak, öğretmenlerin en büyük zorluklarından biridir. Ayrıca, bu

çalışma eğitim ortamlarının yeterince uygun olmaması ve devam zorunluluğunun olmamasının, öğrenci ve öğretmen motivasyonunu olumsuz yönde etkilediğini ortaya koymaktadır.

Araştırmanın üçüncü alt amacı, İngilizce öğretmenlerinin uzaktan eğitim süreci için önerilerini belirlemektir. Elde edilen sonuçlardan biri, teknik altyapının güçlendirilmesinin gerekliliğidir. Genç ve Gümrükçüoğlu (2020) yaptıkları çalışmada, uzaktan eğitimin öğrenci ve öğretmene birçok fırsat sunduğunu, ancak ortaya çıkan teknik aksaklıkların öğrenciler arasında fırsat eşitsizliğine neden olduğunu belirtmişlerdir.

Bu araştırma, uzaktan eğitimden etkin bir şekilde yararlanabilmek için öğrencilere fırsat eşitliği sağlanması gerektiğini ortaya koymaktadır. Öğrencilerin bilinçlendirilmesi ve öğretmenlere eğitimler verilmesi önemlidir. Telli ve Altun (2020) çalışmalarında, öğretmenlerin öğrencilere ders içeriği hazırlamak için temel ofis uygulamaları bilgisine ve içerik tasarımıyla ilgili temel bilgilere sahip olmalarının gerekliliğine dikkat çekmektedir. Ayrıca çalışmaya katılan öğretmenler, uzaktan eğitim sürecinde yaşanan problemleri ve eksiklikleri fark etmişlerdir. Bu eksikliklere yönelik olarak çeşitli eğitimlerin verilmesinin önemli olduğunu vurgulamışlardır. Ayrıca, ders materyallerinden tam anlamıyla yararlanılması gerektiği de diğer bir bulgudur. Bu çalışmaya katılan öğretmenler de sürece hazırlıksız yakalanmalarının ders materyallerini tam anlamıyla kullanamamalarına sebep olduğunu ifade etmişlerdir.

Genel olarak, bu çalışmanın bulguları, uzaktan eğitimin İngilizce eğitimi vermenin etkili bir yolu olabileceğini, ancak öğretmenlerin ve öğrencilerin karşılaştığı zorlukların ele alınmasının önemli olduğunu göstermektedir. Bu, öğretmenlere teknolojiyi nasıl etkili kullanacakları konusunda eğitim verilmesini ve öğrencilerin başarılı olmak için ihtiyaç duydukları kaynaklara erişimlerinin sağlanmasının önemli olduğu görülmektedir.

Çalışmanın ışığında; İngilizce öğretmenleri ve öğrenciler için uzaktan eğitimin nasıl geliştirilebileceğine dair bazı öneriler sunulmaktadır. Bunlar:

- Öğretmenlere teknolojiyi etkili bir şekilde nasıl kullanacakları konusunda eğitim verilebilir.
- Öğrencilerin başarılı olmak için ihtiyaç duydukları kaynaklara erişebilmeleri sağlanabilir.
- Uzaktan eğitimi planlarken ve sunarken öğrencilerin benzersiz ihtiyaçlarını göz önünde bulundurulabilir.
- Öğrencilere konuşma ve dinleme becerilerini pratik etmeleri için fırsatlar sağlanabilir.
- Öğrencilerin ilgisini canlı tutmak için çeşitli öğretim yöntemleri kullanılabilir.
- Öğrencilere çalışmaları hakkında geri bildirim sağlanabilir.

Notlar

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Küçük Ölçekli Uzaktan Eğitim Uygulamalarında Ders Notlarının Etkileşimli İçeriklere Dönüştürülmesi: Öğretimsel Mesaj Tasarımı Deneyimlerinin İncelenmesi

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Özet

Uzaktan eğitim sürecinde kullanılan eğitim materyallerinin kalitesi giderek önem kazanırken, öğrencilerin etkili, verimli ve eğlenceli bir şekilde öğrenmelerini sağlayabilecek etkileşimli içeriklerin geliştirilmesi büyük önem taşımaktadır. Etkileşimli öğrenme içeriği, uzaktan eğitim sürecinin başarılı bir şekilde yürütülmesinin anahtarı olarak görülebilir. Öğrenme nesnesi olarak da adlandırılabilecek bu materyaller kendi içerisinde giriş, sunuş, etkileşim, çoklu ortam, alıştırma ve özetleme gibi içerik-etkinlik-gezinti yapılarını barındırır. Bu noktada yaygın bir şekilde kullanılan bir uzaktan öğretim standardı olan Paylaşılabilir İçerik Nesnesi Referans Modeli (SCORM) karşımıza çıkmaktadır. SCORM standardına uygun içerik geliştirme sürecinde kullanılabilecek farklı ortamlar, platformlar veya masaüstü programlar bulunmaktadır. Etkileşimli ders içeriklerinin SCORM standardında hazırlanması ve öğretim sürecinde kullanılması profesyonel anlamda analiz, tasarım ve geliştirme süreçlerini zorunlu kılmaktadır. Geleneksel ders notlarının SCORM'a dönüştürülmesine yönelik alanyazına bakıldığında uygulaması güç olan, yüksek bütçe ve geniş ekipler (içerik geliştirici, yayıncı, altyapı sağlayıcı vb.) gerektiren, entegre bir sistem (IMS standardı vb.) sunan veya büyük ölçekli projelerde uygulanabilir modeller bulunmaktadır. Fakat bu modeller küçük ölçekli uygulamalar, içerik geliştiricileri ve uygulayıcıları için oldukça teknik kalmaktadır. Teknolojinin desteğiyle öğretim uygulamalarında basit, hızlı ve uyarlanabilir olan farklı ortamlarda hızlı bir şekilde dönüştürülebilen, kaliteli etkileşimli içeriklerin geliştirilmesi ve uygulanması mümkündür. Bu doğrultuda bu çalışmada içerik geliştirme süreçlerine yönelik zaman ve maliyet kısıtı bulunan küçük ölçekli uzaktan eğitim uygulamalarındaki ders notlarına dayalı hızlı içerik üretim deneyiminin öğretimsel mesaj tasarımı çerçevesinde incelenmesi amaçlanmıştır. Nitel araştırma yöntemlerinden durum çalışmasının izlendiği bu araştırmada içerik geliştirme ekibinde görev almış 10 katılımcı ile yarı yapılandırılmış görüşme yapılmıştır. Elde edilen verilerin analizi sonucunda öğretim tasarımı anlayışının sistematik bir şekilde uygulanmadığı ancak bu konudaki deneyimlerle üretim hızını artıracak şekilde hazır tasarım ve yöntem şablonlarının kullanıldığı ortaya çıkmıştır. Uygulanan yöntemlerin içerik geliştirmede yaratıcılığı sınırlandırdığı ancak hem kurumsal hem de içerik yapı standardının sağlandığı görülmüştür. Bununla birlikte içerik geliştirme alan uzmanlarının katılımının sınırlı olduğu, zaman baskısının bulunduğu ve içerik geliştirme ekibinin sayı ve çeşitliliğinin yetersiz olduğu durumlarda ekipteki deneyimli öğretim tasarımcılarının kurguladığı ilke, şablon, yöntem ve çerçeve üzerinden içerik kalitesinin optimize edilebildiği söylenebilir.

Anahtar Kelimeler: Uzaktan eğitim, Etkileşimli İçerik Geliştirme, Öğretimsel Mesaj Tasarımı, SCORM

Abstract

While the quality of the educational materials used in the distance education process is becoming increasingly important, it is of great importance to develop interactive content that can enable students to learn in an effective, efficient and fun way. Interactive learning content can be seen as the key to the successful execution of the distance education process. These materials, which can also be called learning objects, contain content-activity-navigation structures such as introduction, presentation, interaction, multimedia, multimedia, exercise and summarization. At this point, we come across the Sharable Content Object Reference Model (SCORM), a widely used distance education standard. There are different environments, platforms or desktop programs that can be used in the content development process in accordance with the SCORM standard. Preparing interactive course content in SCORM standard and using it in the teaching process requires professional analysis, design and development processes. When we look at the literature on the conversion of traditional lecture notes to SCORM, there are models that are difficult to implement, require high budgets and large teams (content developers, publishers, infrastructure providers, etc.), offer an integrated system (IMS standard, etc.) or can be applied in large-scale projects. However, these models are too technical for small-scale applications, content developers and practitioners. With the support of technology, it is possible to develop and implement high quality interactive content that is simple, fast and adaptable in teaching applications and can be quickly transformed in different environments. Accordingly, this study aims to examine the rapid content production experience based on lecture notes in small-scale distance education applications with time and cost constraints for content development

processes within the framework of instructional message design. In this study, which is a case study from qualitative research methods, semi-structured interviews were conducted with 10 participants who worked in the content development team. As a result of the analysis of the data obtained, it was revealed that the instructional design approach was not applied in a systematic way, but ready-made design and method templates were used to increase the production speed with the experiences in this subject. It was seen that the applied methods limited creativity in content development, but both organizational and content structure standards were provided. However, it can be said that in cases where the participation of content development field experts is limited, there is time pressure, and the number and diversity of the content development team is insufficient, content quality can be optimized through the principles, templates, methods and frameworks designed by experienced instructional designers in the team.

Keywords: Distance education, Interactive Content Development, Instructional Message Design, SCORM

Giriş

Teknolojinin öğrenme sürecine beklenen katkısının oluşması için teknoloji destekli görevlerin anlamlı zihinsel meşguliyeti tetiklemesi önemlidir. Bu bağlamda etkileşimli çoklu ortam öğeleri kullanıcı ile içerik arasındaki etkileşimi zenginleştiren bir araç olarak kullanılabilir (Satyawan vd., 2023). Bu durum, öğretmenleri öğrencilere verilen bilgi ve becerileri değiştirmek için öğrenme materyallerini kullanmada daha yaratıcı ve yenilikçi olmaya teşvik etmektedir (Chandra vd., 2022).

Uzaktan eğitim sürecinde etkileşimli içeriklerin kullanılması ile öğrenme sürecinde karşılaşılan çeşitli engellerin üstesinden gelinmesi beklenmektedir. Her öğrencide yankı uyandıran dersler oluşturmak gerçekten önemli olup bu süreçte çeşitli faktörlerin göz önünde bulundurulması gerekmektedir (Greve vd., 2022).

Öğretim sürecinde öğrencilerin istenen öğrenme hedeflerine ulaşabilmeleri ve öğrenme çıktılarını iyileştirebilmeleri için öğretim tasarımcılarının/geliştiricilerinin etkileşimli multimedya tasarlama ve öğrenme sürecine entegre etme becerisine sahip olmaları gerekir. Bunu yaparken, geliştiricilerin görsel çekicilik sağlayabilmeleri ve öğrencilere yenilik hissi verebilmeleri için etkileşimli çoklu ortamı yaratıcılıkla düzenleyebilmeleri gerekmektedir (Satyawan vd., 2023).

Etkileşimli öğrenme ortamı ile metin, resim, ses, video ve animasyon gibi unsurları entegre ve yapılandırılmış bir formatta birleştiren, kullanıcının tercihlerine göre akışı değişebilen ve dönütler verebilen, çoğunlukla bire bir öğrenmeyi sağlayacak yapıdaki materyaller kastedilmektedir. Öğrenme nesnesi olarak da adlandırılabilecek bu materyaller kendi içerisinde giriş, sunuş, etkileşim, çoklu ortam, alıştırma ve özetleme gibi içerik-etkinlik-gezinti yapılarını barındırır.

Bu materyallerin oluşturulması, belli tasarım geliştirme modelleri ışığında farklı ölçeklerde tasarım ve geliştirme ekiplerinin çalışmasını gerektirir. Bu anlamda öğretim tasarımı modelleri, etkileşimli içeriklerin geliştirilmesi sürecine rehberlik etmektedir. Bu kapsamda ihtiyacın belirlenmesi, hedeflerin oluşturulması, içerik tasarımlarının planlanması ve senaryolarının hazırlanması, senaryolar ışığında içeriğin geliştirilmesi, test ve değerlendirmelerinin uygulanması gibi adımlar farklı rollerdeki birçok kişinin katılımıyla yürütülür. İçerikte kullanılan her bir çoklu ortam unsurunun tasarlanmasının yanı sıra bunların bir öğrenme içeriğine dönüştürülmesi; yaratıcılık, işbirliği, teknik deneyim ve mesaj tasarımı deneyimlerini gerektirir. Bu konuda hazırlanmış SCORM gibi referans modelleri, içeriği verimli, uygun maliyetli ve kullanılabilir bir şekilde oluşturmanın bir yolunu sağlamak amacıyla etkili bir veri ve içerik yapısı sağlasa da (Rustici, 2009) içerik geliştirme sürecinin kolaylaştırılmasına katkı sunmamaktadır. Benzer şekilde IMS, XAPI uygulamaları daha çok çevik model (Abel, 2010), entegrasyon, yeniden kullanılabilirlik boyutları itibariyle sürdürülebilirliği desteklemektedir (Learning Impact, 2014). Bir başka ifadeyle teknik standartlara rağmen e-öğrenme materyallerinin geliştirilmesi genellikle pahalı, karmaşık ve uzun bir süreç olarak karşımızda durmaktadır (Arman, 2009). Ayrıca bu modeller, küçük ölçekli uygulamalar, içerik geliştiricileri ve uygulayıcıları için oldukça teknik kalmaktadır.

Bu kadar kritik ve zahmetli olan materyal geliştirme süreci için her zaman yeterli bütçe ve zaman kaynağı bulunması olanaksızdır. Özellikle düşük bütçeli uzaktan eğitim programları için içerik geliştirme imkânları oldukça kısıtlıdır. Bu nedenle içerik geliştirici, yayıncı, altyapı sağlayıcı gibi paydaşların bir araya geldiği, entegre bir sistemin kullanıldığı, yüksek bütçeli içerik geliştirme sürecinin yürütülmesi olanaksızdır. Ancak bu uygulamalarda da öğreticilerin hazırlamış olduğu geleneksel ders notlarının hızlı bir şekilde içeriklere dönüştürülmesi gerekmektedir. Nitekim hem öğretme ve öğrenme sürecini daha ilginç hale getirmek, sıkıcılığı önlemek ve monotonluğu önlemek (Dewi vd., 2018), hem de uzaktan eğitim kalite standartlarını sağlamak için ders içerikleri etkileşimli olmalıdır.

Küçük ölçekli uygulamalarda içerik geliştirme konusunda ekip, bütçe, zaman gibi kaynaklar konusunda sınırlılık olsa da teknolojinin desteğiyle bazı içeriklerin kolay ve hızlı bir şekilde geliştirilmesini sağlayan yazılımların

yaygınlaştığı söylenebilir. Örneğin; Adobe captivate, eğitsel videolar, simülasyonlar ve etkileşimli sınavlar için kullanılabilir. Articulate Storyline 360 ise etkileşimli sunumlar veya öğrenme yönetim sisteminde kullanılmak üzere SCORM standardında etkileşimli ders içerikleri üretilmektedir. Teknik olanakların da katkısıyla küçük ölçekli uygulamalarda da etkileşimli içerik geliştirme konusunda bir takım uygulamaların yapıldığı ve etkileşimli içeriklerin üretildiği bilinmektedir.

Buradan hareketle bu çalışmanın amacı, içerik geliştirme süreçlerine yönelik, zaman ve maliyet kısıtı bulunan, küçük ölçekli uzaktan eğitim uygulamalarındaki ders notlarına dayalı hızlı içerik üretim deneyiminin öğretimsel mesaj tasarımı çerçevesinde incelemektir. Bu amaç doğrultusunda araştırmanın soruları aşağıdaki gibidir:

1. Statik ders notlarının etkileşimli içeriklere dönüştürme süreci nasıl işlemektedir? Bu sürecin öğretim tasarımındaki karşılıkları nasıldır?
2. Statik ders notlarının etkileşimli içeriklere dönüştürme sürecini olumlu/olumsuz etkileyen faktörler nelerdir?
3. Statik ders notlarının etkileşimli içeriklere dönüştürülmesi sürecini hızlandırmak için kullanılan yöntemler veya atılan adımlar nelerdir?
4. Statik ders notlarının etkileşimli içeriklere dönüştürülmesi sürecinde alınan destekler (araç, uzmanlık, yazılım vb.) nelerdir?

Yöntem

Bu çalışmada nitel araştırma yöntemlerinden durum çalışması yöntemi kullanılmıştır. Durum çalışması; tek bir durum ya da olayın derinlemesine boylamsal olarak incelendiği, verilerin sistematik bir şekilde toplandığı ve gerçek ortamda neler olduğuna bakıldığı bir yöntemdir (Davey, 2011). Merriam (2013) durum çalışmasını sınırlı bir sistemin derinlemesine betimlenmesi ve incelenmesi olarak tanımlamaktadır. Bu doğrultuda bu çalışmanın zaman ve maliyet kısıtı bulunan bir ortamda hızlı içerik üretimini mesaj tasarımı çerçevesinde incelemesi bakımından bu yöntem tercih edilmiştir.

Araştırma Grubu

Bu çalışmanın araştırma grubunu, bir üniversitenin uzaktan eğitim merkezinde en az 1 yıl içerik geliştirme çalışmasına doğrudan katılmış 10 kişi oluşturmaktadır. Farklı lisans alanlarında eğitim görmüş bu katılımcılar belirlenirken, içerik geliştirme çalışmalarında mesaj tasarımı, görsel tasarım, çoklu ortam birleştirme, alıştırma oluşturma gibi görevleri aktif olarak üstlenmiş olmasına dikkat edilmiştir. Araştırma grubunun özellikleri Tablo 1'de verilmiştir.

Tablo 1. Araştırma Grubunun Demografik Özellikleri

Katılımcılar	Cinsiyet	Bölüm	Öğrenim Düzeyi	Etkileşimli İçerik Geliştirme Deneyimi
K1	E	Yönetim Bilişim Sistemleri	Lisans	4 dönem
K2	E	Yönetim Bilişim Sistemleri	Lisans	5 dönem
K3	K	Hukuk	Lisans	3 dönem
K4	K	Halka İlişkiler ve Tanıtım	Yüksek Lisans	4 dönem
K5	E	Yönetim Bilişim Sistemleri	Lisans	2 dönem
K6	E	Yönetim Bilişim Sistemleri	Lisans	3 dönem
K7	K	Yönetim Bilişim Sistemleri	Lisans	2 dönem
K8	K	Bilgisayar ve Öğretim Teknolojileri Eğitimi	Doktora	15 dönem
K9	K	Halkla İlişkiler ve Tanıtım	Yüksek Lisans	3 dönem
K10	K	Bilgisayar ve Öğretim Teknolojileri Eğitimi	Doktora	8 dönem

Tablo 1 incelendiğinde katılımcıların 6'sının kız, 4'ünün erkek olduğu ve 5 farklı bölümde öğrenim gördüğü görülmektedir. Katılımcıların çoğunlukla lisans düzeyinde olduğu ve etkileşimli içerik geliştirme deneyimlerinin en az 2, en fazla 15 eğitim-öğretim dönemi olduğu görülmektedir.

Verilerin Toplanması

Bu araştırma kapsamında veri toplama sürecinde öğretim tasarımcılarının etkileşimli içerik geliştirme deneyimlerini ortaya çıkarmak için araştırmacı tarafından geliştirilen yarı yapılandırılmış görüşme formu kullanılmıştır. Nitel araştırmalarda en çok kullanılan veri toplama aracı görüşmedir (Yıldırım & Şimşek, 2013). Bu doğrultuda bu çalışmada veriler, görüşmeler yoluyla toplanmıştır.

Verilerin Analizi

Katılımcılardan elde edilen veriler içerik analizi yöntemiyle analiz edilmiştir. İçerik analizi, belirli kurallara bağlı kalınarak kodlamalar yapılması ve bir metnin bazı kelimelerini daha küçük içerik kategorileri ile açıkladığı sistematik, yenilenebilir teknik olarak betimlenmektedir (Büyüköztürk vd., 2008). Yapılan görüşmeler sonucunda elde edilen veriler kategorize edilmiştir.

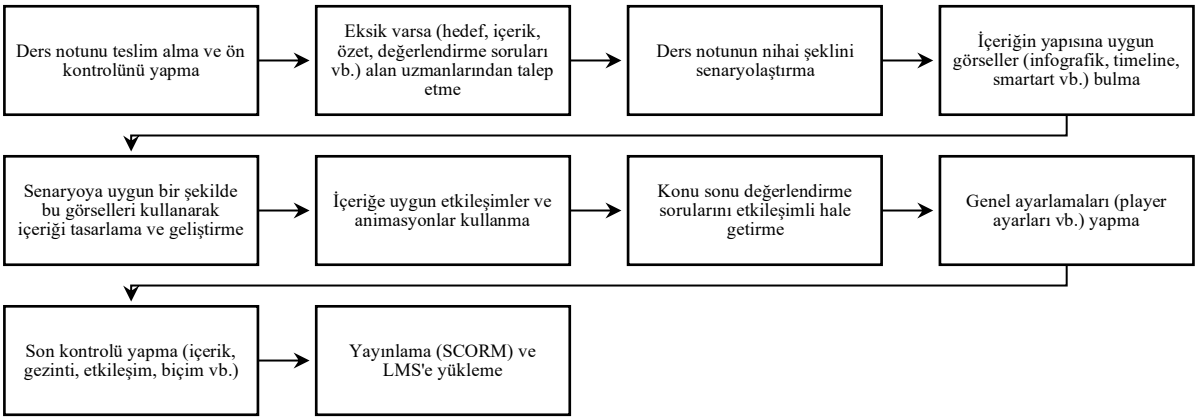
Verilerin analizi sürecinde değerlendiriciler arası farklılıkların olmaması için görüşmeler iki uzman tarafından ayrı ayrı değerlendirilmiş daha sonra bir araya gelinip kodlar ve temalar karşılaştırılıp, analizler yapılarak uyumlandırılmıştır. Böylelikle bireyden kaynaklanan farklılıklar elimine edilmiştir.

Bulgular

Etkileşimli içerik geliştirme süreçlerine yönelik, zaman ve maliyet kısıtı bulunan, küçük ölçekli uzaktan eğitim uygulamalarındaki ders notlarına dayalı hızlı içerik üretim deneyiminin öğretimsel mesaj tasarımı çerçevesinde katılımcıların deneyimleri görüşmeler yoluyla araştırılmış, elde edilen veriler dört araştırma sorusu bağlamında incelenmiş ve sonuç olarak aşağıdaki bulgulara ulaşılmıştır.

Statik ders notlarının etkileşimli içeriklere dönüştürme süreci nasıl işlemektedir? Bu sürecin öğretim tasarımındaki karşılıkları nasıldır?

Küçük ölçekli uzaktan eğitim uygulamalarında ders notlarına dayalı etkileşimli içeriklerin geliştirme süreci Şekil 1'de sunulmuştur.

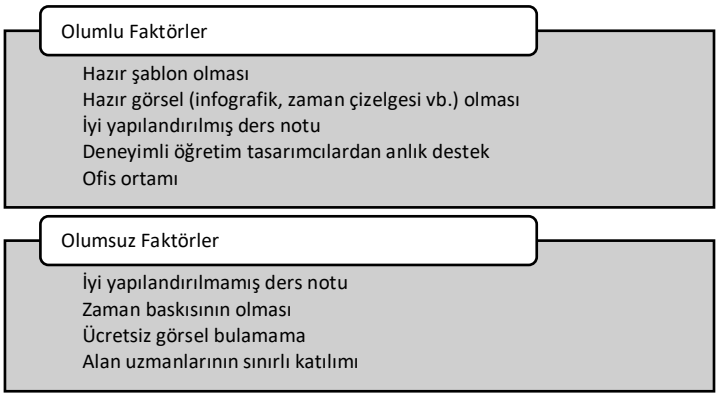


Şekil 1. Statik ders notlarının etkileşimli içeriklere dönüştürme süreci

Şekil 1 incelendiğinde statik ders notlarının etkileşimli içeriklere dönüştürülme sürecinin 10 aşamada gerçekleştiği görülmektedir. Bu süreçte en fazla zaman gerektiren aşamaların, ders notunun nihai halinin senaryolaştırılması ve senaryoya uygun görseller bulunarak içeriğin tasarlanması ve geliştirilmesi olduğu söylenebilir.

Statik ders notlarının etkileşimli içeriklere dönüştürme sürecini olumlu/olumsuz etkileyen faktörler nelerdir?

Ders notunun teslim alınmasından sisteme yükleme aşamasında kadar katılımcıları olumlu veya olumsuz etkileyen faktörler Şekil 2'de verilmiştir.

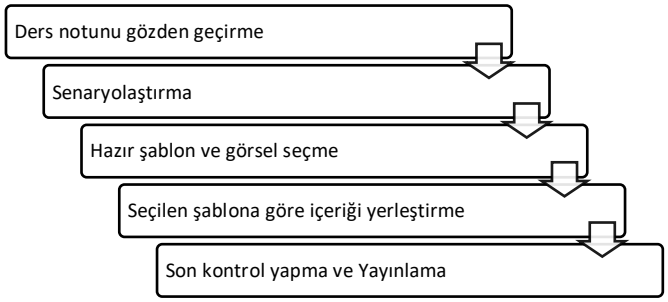


Şekil 2. Statik ders notlarının etkileşimli içeriklere dönüştürme süreci

Şekil 2 incelendiğinde etkileşimli içerik geliştirme sürecini, en fazla alan uzmanlarından gelen yapılandırılmamış ders notlarının olumsuz etkilediği görülmüştür. Diğer yandan deneyimli öğretim tasarımcıları ve ekip arkadaşlarından alınan anlık desteklerin bu süreci olumlu etkilediği görülmüştür.

Statik ders notlarının etkileşimli içeriklere dönüştürülmesi sürecini hızlandırmak için kullanılan yöntemler veya atılan adımlar nelerdir?

Zaman ve maliyet kısıtı bulunan, küçük ölçekli uzaktan eğitim uygulamalarındaki ders notlarına dayalı hızlı içerik üretim deneyiminin incelendiği bu çalışmada içerik geliştirme sürecini hızlandırmak için kullanılan yöntem/adımlar Şekil 3'de gösterilmiştir.



Şekil 3. Statik ders notlarının etkileşimli içeriklere dönüştürme sürecini hızlandırmak için atılan adımlar

Şekil 3 incelendiğinde etkileşimli içerik geliştirme sürecindeki adımların azaldığı, hazır görsel ve tasarımlara yönelim olduğu ve deneyimli öğretim tasarımcılarının kurguladığı yöntem ve şablonların kullanıldığı görülmüştür.

Statik ders notlarının etkileşimli içeriklere dönüştürülmesi sürecinde alınan destekler (araç, uzmanlık, yazılım vb.) nelerdir?

Etkileşimli içerik geliştirme sürecinde farklı faktörlerden olumlu veya olumsuz anlamda etkilenen katılımcıların süreci hızlandırmak veya kolaylaştırmak için destek aldıkları görülmüştür. İçerik geliştirme sürecinde alınan destekler Şekil 4'te sunulmuştur.

Uzmanlık	Araç	Yazılım
Deneyimli öğretim tasarımcıları Ekip arkadaşları	Ücretsiz görsel stok araçları (freepik vb.)	Görsel düzenleme programları (Photoshop, Illustrator) Articulate Storyline

Şekil 4. Statik ders notlarının etkileşimli içeriklere dönüştürülmesi sürecinde alınan destekler

Statik ders notlarının etkileşimli içeriklere dönüştürme sürecinde alınan desteklerin sunulduğu Şekil 4 incelendiğinde katılımcıların sıklıkla deneyimli alan uzmanlarından anlık destek talep ettiği, zaman zaman ekip arkadaşlarından da destek aldığı görülmüştür. Bunun yanı sıra ücretsiz görsel sağlayan ortamların sıklıkla kullanıldığı ve indirilen görselleri düzenlemek için bazı masaüstü programlarından destek alındığı görülmüştür.

Tartışma, Sonuç ve Öneriler

Bu çalışmada, zaman ve bütçe kısıtı olan küçük ölçekli uzaktan eğitim uygulamalarındaki etkileşimli içerik geliştirme sürecinin incelenmesi amaçlanmıştır. Bu doğrultuda etkileşimli içerik geliştirme sürecinde aktif olarak yer alan katılımcılarla yapılan mülakatlar analiz edilerek önemli bulgulara ulaşılmıştır. Bu bağlamda etkileşimli içerik geliştirme süreci, bu süreci etkileyen faktörler, sürecin hızlandırılması için atılan adımlar ve bu süreçte alınan desteklere ilişkin sonuçlar aşağıda tartışılmıştır.

Etkileşimli içerik geliştirilirken izlenen adımların belli başlıklar altında gruplandığı görülmüştür. Ders notunun teslim alınması, kontrol edilmesi, nihai hale getirilmesi, senaryolaştırılması, uygun görsellerin bulunması, sayfaların tasarlanması ve geliştirilmesi, biçimsel düzenlemelerin-genel ayarlamaların-son kontrollerin yapılması ve geliştirilen içeriğin sisteme yüklenmesi adımlarında etkileşimli içerikler üretilmiştir. Doğrudan hedef odaklı pratik uygulamalarda içerik geliştirme aşamaları öğretim tasarımı ve öğretimsel mesaj tasarımı teorileriyle bire bir örtüşmese de mevcut koşullar içerisinde içerik ve biçim olarak uzaktan eğitim standartlarına uygun olduğu görülmüştür. Bu durum teorik yaklaşımların uygulamada koşul ve olanaklar ölçüsünde yansıtılabilmesi anlayışıyla açıklanabilir.

Pratikteki içerik geliştirme sürecinde ders notunun ilgili alan uzmanından teslim alınmasından sisteme yükleme aşamasında kadar süreci olumlu/olumsuz etkileyen faktörlere ilişkin bulgulara bakıldığında sürecin en kırılgan

aşamasının ham içeriğin elde edilmesi olduğu görülmektedir. Bir başka ifadeyle alan uzmanlarının ders notunu yapılandırılmış bir şekilde teslim etmesinin içerik geliştirme sürecindeki etkisi büyüktür. Bu durumun önemli nedenlerinden biri iyi yapılandırılmış içeriğin içerik tasarımcılarına senaryolaştırmayı ve görsel bulmayı kolaylaştırarak zaman kazandırması olabilir. Ayrıca süreçlerde geliştiricilerin sürekli dönüt alabilecekleri deneyimli öğretim tasarımcılarının yer alması ve kullanıma hazır şablon ve görsel havuzlarının bulunması içerik geliştirme sürecini önemli ölçüde etkilemiştir. Bu faktörler hem içeriğin öğrenmeyi destekleme potansiyelinin oluşmasına hem de geliştirme sürecinin hızlı olmasına katkıda bulunmuştur.

Statik ders notlarının etkileşimli içeriklere dönüştürme sürecinde katılımcıların sıklıkla ortam ve uzman desteğine başvurduğu görülmüştür. Buna neden olarak katılımcıların kısıtlı zamanının olması, yeterli bütçenin ve uzman çeşitliliğinin olmaması desteğe olan ihtiyacı artırdığı söylenebilir. Arman (2009)'a göre e-öğrenme materyallerinin geliştirilmesi genellikle pahalı, karmaşık ve uzun bir süreç olarak karşımızda durmaktadır. Bu yönüyle bu çalışma ile benzerlik gösterdiği düşünülebilir.

Elde edilen verilerin analizi sonucunda; öğretim tasarımı anlayışının sistematik bir şekilde uygulanmadığı ancak bu konudaki deneyimlerle üretim hızını artıracak şekilde hazır tasarım, yöntem ve şablonlarının kullanıldığı ortaya çıkmıştır. Bu süreçte uygulanan yöntemlerin etkileşimli içerik geliştirmede yaratıcılığı sınırlandırdığı ancak hem kurumsal hem de içerik yapı standardının sağlandığı görülmüştür. Etkileşimli içerik geliştirmede yaratıcılığın önemine dikkat çeken Satyawan vd., (2023)'e göre içerik geliştiricilerinin etkileşimli çoklu ortamı yaratıcılıkla düzenleyebilmeleri gerekmektedir. Bu bağlamda bu çalışmada kullanılan yöntem ile farklılık gösterdiği söylenebilir.

Bu çalışmanın sonuçlarına göre zaman ve maliyet kısıtı bulunan benzer uygulamalarda hazır içerik, şablon, araç ve yöntemlerin kullanılması önerilir. Ayrıca bu tür durumlarda geliştiricilerin sürekli izlenmesi ve geliştirme sürecinde yeterli dönütlerin verilmesi gerektiği söylenebilir. Uygulamada ortaya çıkan deneyimlerin daha çok incelenmesi yoluyla teoriyle ilişkili yeni geliştirme modellerinin oluşmasına katkıda bulunacak yeni araştırmaların yapılması önerilir.

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Açık ve Uzaktan Öğrenmede Sorgulama Topluluğu Üzerine Bibliyometrik Bir Analiz

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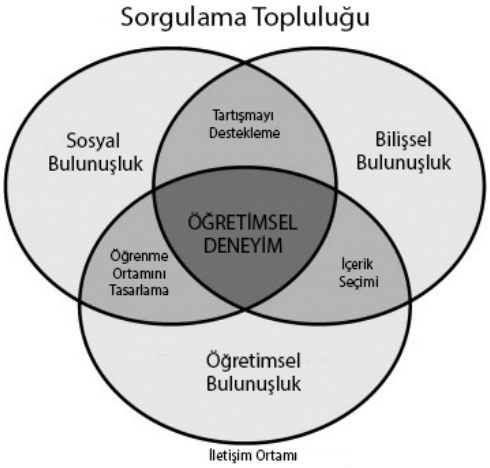
Özet

Bu çalışmanın amacı, açık ve uzaktan öğrenmede sorgulama topluluğu (Community of Inquiry) üzerine yayınlanmış makalelerin bibliyometrik analizinin yapılmasıdır. Bibliyometrik veriler, Web of Science (WOS) veri tabanında SSCI ve SSCI-E indexlerinde taranan tüm makaleleri içerecek şekilde alınmıştır. Çalışmada bibliyometrik analiz yöntemi kullanılmıştır. Yapılan tarama sonucuna göre ulaşılan 526 adet makalenin bibliyometrik verileri VOSviewer yazılımı ile analiz edilmiştir. Açık ve uzaktan öğrenmede sorgulama topluluğu ile ilgili makalelerin yayın yıllarına göre dağılımına bakıldığında, yayınların 1999-2024 yılları arasında yapıldığı, en çok yayın yapılan yılların ise 2022 (81 makale), 2023 (72 makale) ve 2021 (59 makale) yılında olduğu görülmüştür. Yayınların ülkelere göre dağılımı incelendiğinde liderliğin Amerika Birleşik Devletleri'nde (205 makale) olduğu; bu ülkeyi sırasıyla Çin (77 makale), Kanada (43 makale), Güney Kore (35 makale), İngiltere (30 makale) ve Türkiye'nin (30 makale) izlediği tespit edilmiştir. Yayınlanan makaleler sırasıyla en çok International Review of Research in Open and Distributed Learning (47 makale), Computers Education (43 adet) ve Internet and Higher Education (41 adet) isimli dergilerinde basılmış ve 1356 yazardan en çok yayın yapan yazar isimlerinin ise Jennifer C. Richardson (13 makale), Peter Shea (10 makale) ve Temi Bidjerano (8 makale) olduğu görülmüştür. Sorgulama topluluğu ile ilgili yayınlarda social presence (sosyal bulunuşluk), community of inquiry (sorgulama topluluğu), teaching presence (öğretimsel bulunuşluk) ve cognitive presence (bilişsel bulunuşluk) ifadeleri en sık kullanılan anahtar kelimelerdir.

Anahtar Kelimeler: Sorgulama topluluğu, açık ve uzaktan öğrenme, bibliyometrik analiz, VOSviewer

Giriş

Eğitim sürecinin temel katılımcıları olan eğitmenler ve öğrencilerden oluşan bir Sorgulama Topluluğu, etkili bir eğitim deneyimi için zemin oluşturur. Garrison vd. (1999) tarafından geliştirilen Sorgulama Topluluğu kuramı, öğrenmenin topluluk içinde üç temel unsurun etkileşimiyle gerçekleştiğini öngörür. Bu üç temel unsur açık iletişim, grup uyumu ve duyuşsal ifade kategorilerini içeren sosyal bulunuşluk; tetikleyici olay, keşif, bütünleştirme ve çözüm kategorilerini içeren bilişsel bulunuşluk ve tasarım ve organizasyon, söylemi kolaylaştırma ve öğretimi yönlendirme kategorilerinden oluşan öğretimsel bulunuşluğu içermektedir. Sosyal bulunuşluk, öğrencilerin birbirleri ve eğitmenlerle etkili iletişim kurmalarını hedeflerken; öğretimsel bulunuşluk, eğitim sürecinin düzenlenmesi ve yönlendirilmesi görevini üstlenir. Bilişsel bulunuşluk ise öğrenme materyalleri üzerinde eleştirel düşünmeyi ve derinlemesine kavramayı hedefler (Aksoy vd., 2022; Garrison vd.,1999; Garrison ve Arbaugh, 2007). Sorgulama topluluğu kuramı, çevrimiçi öğrenme ortamlarında, öğrencilerin kendilerini izole hissetmelerini engelleyerek, onların eğitim süreçlerine aktif olarak katılmalarını ve öğrenmelerini en üst seviyeye çıkarmalarını sağlar.



Şekil 1. Sorgulama topluluğu kuramı

Sorgulama topluluğu kuramı, temel olarak uzaktan, çevrimiçi veya karma öğrenme ortamlarında sosyal, bilişsel ve öğretimsel bulunuşluğu güçlendirmenin önemine odaklanmaktadır. Modern bilgi toplumu, bireylerin bağımsız düşünmelerinin yanı sıra işbirlikçi bir şekilde öğrenmelerini de teşvik etmektedir. Bu durum, eğitim bağlamında, bireylerin bir araya gelerek yansıtıcı düşünce ve işbirliği yoluyla bilgi üretmelerini sağlamaktadır (Gökmen vd., 2016).

Alanyazın incelendiğinde sorgulama topluluğu kuramı ile ilgili farklı veri tabanlarından farklı tarihlerde makalelerin analizlerinin yapıldığı görüşmüştür. Çakıroğlu vd. (2016) doküman analizi metodunu kullanarak Academic Search Complete, Google Scholar ve YÖK Tez Merkezi veri tabanları kullanılarak belirlediği kriterlere uygun makale ve tez olmak üzere 44 yayını incelemiştir. Analiz sonucunda yürütülen çalışmaların daha çok eşzamansız ortamlarda yoğunlaştığını ortaya çıkarmıştır. Aksoy vd. (2022) kuram ile ilgili Web of Science ve Science Direct veri tabanlarından 71 akademik makalenin sistem analizini yaparak makalelerdeki kullanım amaçlarını incelemiştir. Analiz sonucunda kuram ile; akademik başarı, motivasyon, öğrenci katılımı, öğrenci memnuniyeti ve etkileşim kavramlarının en çok ilişkilendirildiği sonucuna ulaşmışlardır. Olpak (2022) çalışmasında sorgulama topluluğu kuramı ile ilişkili olarak incelediği Web of Science veri tabanında incelediği 102 çalışmada 2000-2020 yıları arasındaki trendleri; özette en çok tercih edilen anahtar kelimeler, yayın yılı, yazarlar, dergiler, coğrafi dağılım, akademik disiplinler, araştırma yöntemleri, ders işleme yöntemleri, katılımcı türü ve referansları açısından analiz etmiştir. Araştırmacılar, makalelerin 20 ülkeden 216 yazar tarafından yapıldığını ve en çok sosyal bilimler alanında olduğunu sonuçlarında ifade etmiştir. Turgut ve Kutay (2023) sorgulama topluluğu kuramı ile ilgili genel eğilimleri ortaya çıkarmak amacıyla yaptıkları çalışmada, içerik analizi yöntemini kullanarak 1999-2022 yıllar arasında yapılmış olan 61 çalışmayı Google Scholar, Scopus, Web of Science, Dergipark, Ulakbim, TR Dizin ve Ulusal Tez Merkezi veri tabanları aracılığıyla incelemişlerdir. Bu çalışmaların çoğunluğunun makale olduğu ve araştırılan konuların ise daha çok sorgulama topluluğu unsurlarından ve aynı zamanda akademik başarı, memnuniyet, motivasyon ve algılanan öğrenme değişkenlerinden oluştuğu görülmüştür.

Yu ve Li (2022) sorgulama topluluğu kuramı üzerine yaptıkları bibloyometrik analiz çalışmasında, Web of Science'da arama yaparak makale, toplantı, inceleme makaleleri, erken erişim, editoryal materyal ve diğer çalışmalar olmak üzere toplamda 885 çalışmayı incelemişlerdir. Yayın yılları, önde gelen yazar, kuruluş ve ülke bazında analizlerde bulunmuşlardır. Khodabandelou vd. (2024) 1999-2023 yılları arasındaki tüm Scopus kayıtlarını (5169) sorgulama topluluğu kuramı ile ilişkilendirerek bibliyometrik analiz yöntemi ile incelemişlerdir. Analizlerini çalışma kategorileri, en üretken yazarlar, dergiler, kurumlar ve ülke bazlı olacak şekilde yapmışlardır. Das ve JV (2024), bibliyometrik analiz ile sorgulama topluluğu çevrimiçi öğrenme modelinde en trend konuların, en etkili yazarların, en ilgili kaynakların, en ilgili ülkelerin ve en çok alıntı yapılan makalelerin belirlenmesine odaklanmaktadır. Web of Science veri tabanından, 2015 ile 2022 yılları arasında yayınlanmış toplam 405 çalışmaya ulaşmışlardır.

Son yıllarda sorgulama topluluğu kuramı ile ilgili artan oranda analiz çalışmalarının yapıldığı söylenebilir. Bu düşünceden hareketle bu çalışmanın amacı, açık ve uzaktan öğrenmede sorgulama topluluğu kuramı üzerine yapılan akademik çalışma sayılarının zaman içerisinde nasıl değiştiğini; bu yayınların ülkelere, dergilere ve araştırmacılara göre dağılımını, ortak yazarlık ve ortak ülke yazarlıklarının nasıl değiştiğini ve yayınlardaki anahtar kelimeleri bibliyometrik yöntemlerle analiz etmektir. Bu sayede, açık ve uzaktan öğrenme alanındaki mevcut eğilimler ve gelecekteki araştırma yönleri daha net bir şekilde ortaya konacaktır.

Yöntem

Araştırmanın Yöntemi

Bu çalışmada bibliyometrik analiz yöntemi kullanılmıştır. Bibliyometrik analiz, büyük hacimli yapılandırılmamış verileri titiz yöntemlerle anlamlandırarak, çeşitli alanların evrimsel gelişimini ve birikmiş bilimsel bilgisini çözümlemek ve haritalamak için kullanılan bir yöntemdir. Bu yöntem akademisyenlerin (1) genel bir bakış kazanmalarını, (2) bilgi boşluklarını belirlemelerini, (3) araştırma için yeni fikirler üretmelerini ve (4) alana yapacakları katkıları konumlandırmalarını sağlar (Donthu vd., 2021). Bibliyometrik analiz, yazar, kuruluş ve anahtar kelimeler dahil olmak üzere çok sayıda verinin istatistik bilgilerini sunmaktadır (Hu vd., 2020; Huang, 2024).

Veri Toplama

Çalışmanın bibliyometrik verileri, dünyanın en eski, en yaygın ve en prestijli veri tabanlarından biri olarak bilinen ve bilimsel dergilerdeki makaleleri içeren Web of Science ile elde edilmiştir (Birkle vd., 2020; Hu vd., 2020).

Web of Science, dergileri, bildirileri, kitapları ve veri derlemelerini içeren bilimsel bir veri tabanıdır. Bu çalışmanın verileri, 4 Mayıs 2024 tarihinde toplanmıştır. Bu tarihten sonra aynı arama kriterleri ile arama yapıldığında çıkan sonuçlar değişkenlik gösterebilecektir. Verilerin elde edilmesi için belirlenmiş olan arama kriterleri Tablo 1'de verilmiştir.

Tablo 1. Arama kriterleri

Arama Kriterleri	Arama Türü	Dizinler	Yayın Türü	Dil	Yayın Sayısı
("community of inquiry" OR "cognitive presence" OR "social presence" OR "teaching presence") AND ("open learning" OR "e-learning" OR "e learning" Or "online learning" OR "online education" OR "distance learning" OR "distance education")	Topic: Titles, abstract, keyword plus, author keywords.	SSCI, SSCI-E	Makale	İngilizce	526

Verilerin Analizi

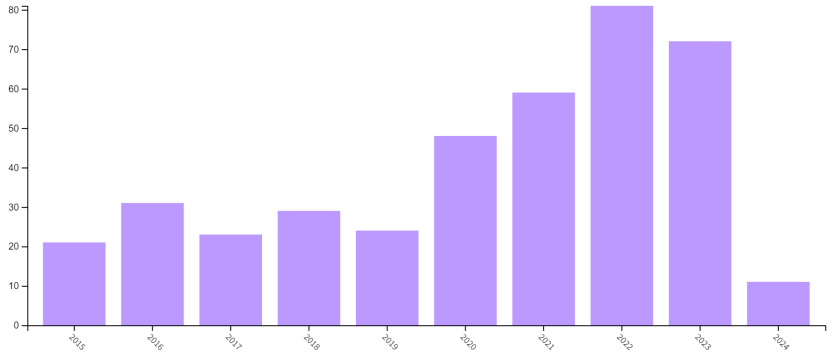
Veriler, VOSviewer 1.6.20 yazılımı ile analiz edilmiştir. Bu yazılım, araştırmacıların belirli bir alandaki çalışmaları analiz ederek yazar, kurum, ülke, doküman ve anahtar kelimeler gibi alanlarda ölçüm ve analiz yapmalarına, böylece literatürü haritalandırmalarına olanak tanımaktadır (Arslan, 2022).

Bulgular

Sorgulama topluluğu bibliyometrik analizi için çıkan 526 makale için sonuçlar; yıl, ülke, ülkelere göre ortak yazarlık, yayınlanan dergi, yazar, ortak yazarlık ağ haritası ve anahtar kelimeler bazında incelenmiştir.

Makalelerin Yıllara Göre Dağılımı

Yapılan analiz sonucunda açık ve uzaktan öğrenmede sorgulama topluluğu üzerine yayınlanmış makalelerin yıllara göre dağılımına bakıldığında bu arama kriterlerine uyan ilk çalışmanın 1999 yılında yapıldığı ve günümüze (2024) kadar çalışmaların yapılmaya devam ettiği görülmektedir. Grafik 1'de son on yıldaki makale sayılarının dağılımı verilmiştir.



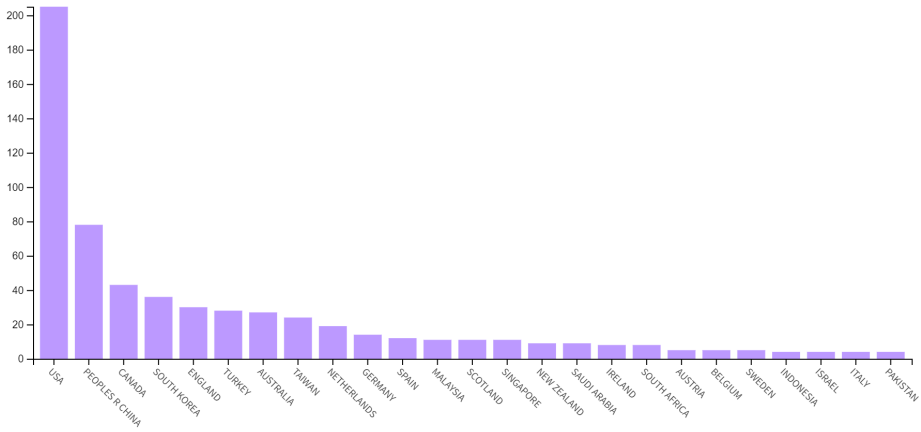
Grafik 1. Yıllara göre dağılım

Grafik 1 incelendiğinde en çok yayın yapılan yılların sırasıyla; 2022 (81 makale), 2023 (72 makale) ve 2021 (59 makale) olduğu görülmüştür. 2024 yılının mayıs ayına kadar olan veriler bazı alındığı için 2024 yılındaki makale sayısının gerçek değerinde olmadığı söylenebilir.

Makalelerin Ülkelere Göre Dağılımı

Açık ve uzaktan öğrenmede sorgulama topluluğu konusundaki makalelerin ülkelere göre dağılımı Grafik 2'de verilmiştir. İlgili grafik incelendiğinde Amerika Birleşik Devletleri, 205 makale ile bu alandaki en fazla yayını

yapan ülke konumundadır. Bunu, 77 makale ile Çin Halk Cumhuriyeti ve 43 makale ile Kanada takip etmektedir. Güney Kore ve İngiltere ise sırasıyla 35 ve 30 makale ile bu alandaki önemli katkı sağlayan diğer ülkelerdir.

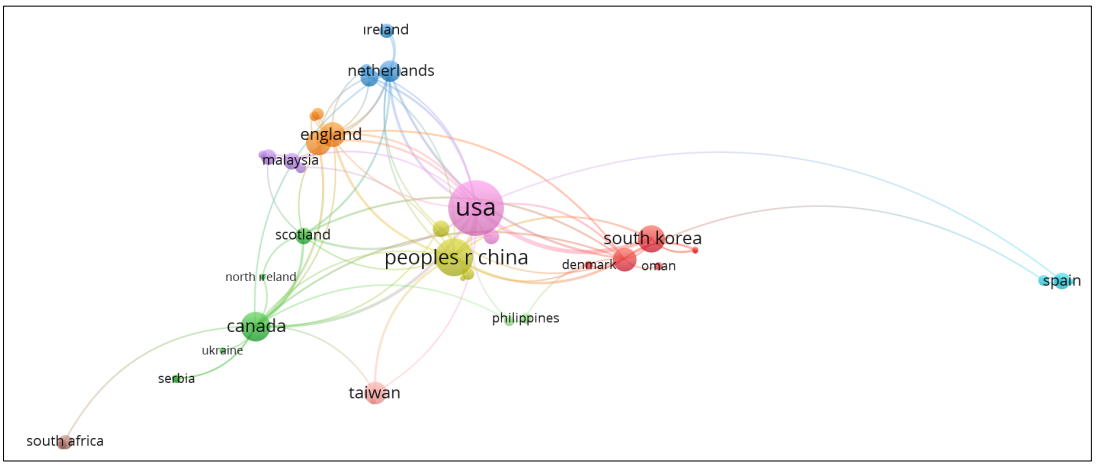


Grafik 2. Ülkelere göre dağılım

Bibliyometrik analiz yapılan alanla ilgili 30 makalesi olduğu tespit edilen Türkiye'nin, hem "Turkey" hem de "Türkiye" olarak iki farklı şekilde isimlendirilmesi, toplam yayın sayısını grafik üzerinde tam olarak yansımamasına neden olmaktadır. Bu nedenle, Türkiye'nin de İngiltere ile aynı sayıda yayın yaptığını vurgulamak önem arz etmektedir.

Ülkelere Göre Ortak Yazarlık Haritası

Şekil 2, açık ve uzaktan öğrenmede sorgulama topluluğu konusundaki makalelerin ülkeler arası ortak yazarlık ilişkilerini göstermektedir. Şekilde, ülkeler arasındaki iş birliği ağları ve bu ağların yoğunluğu görselleştirilmiştir.

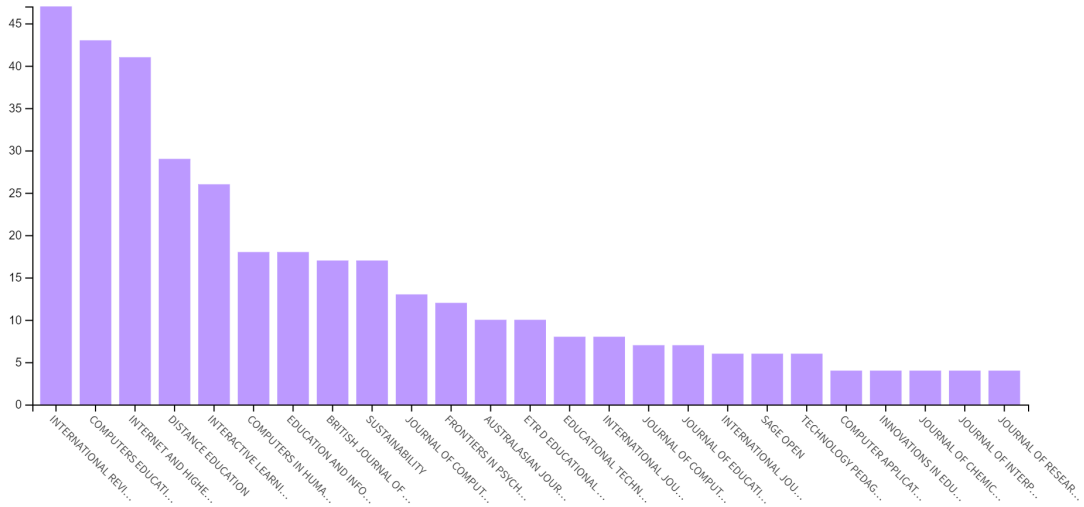


Şekil 2. Ülkelere göre ortak yazarlık haritası

Amerika Birleşik Devletleri, en büyük düğüm olarak merkezi bir rol oynarken, Çin Halk Cumhuriyeti, Kanada, İngiltere ve Güney Kore gibi ülkeler de önemli iş birliği bağlantılarına sahiptir.

Makalelerin Dergilere Göre Dağılımı

Açık ve uzaktan öğrenmede sorgulama topluluğu konusundaki makalelerin yayınlandığı dergilere göre dağılımını Grafik 3'te verilmiştir. En fazla makale yayınlayan dergi, 47 makale ile "International Review of Research in Open and Distributed Learning"dir. Bu dergiyi, 43 makale ile "Computers & Education" ve 41 makale ile "Internet and Higher Education" dergileri takip etmektedir.

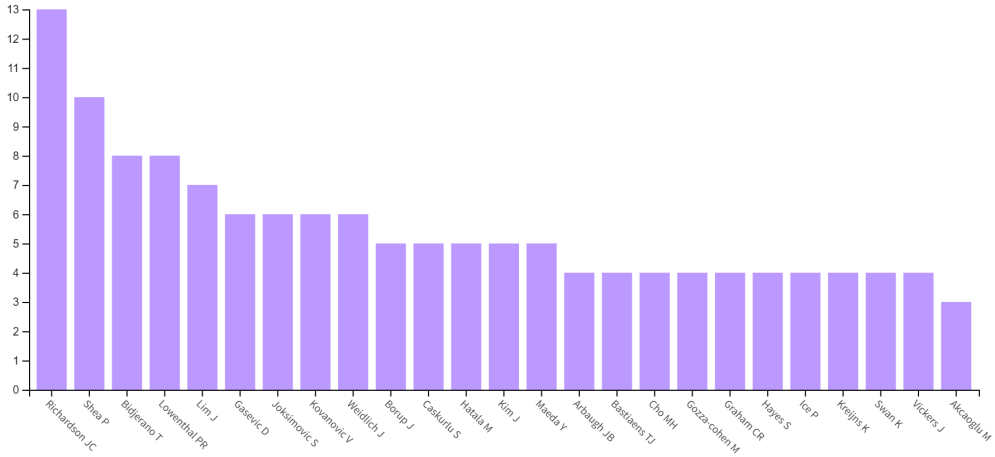


Grafik 3. Dergilere göre dağılım

"Distance Education", "Interactive Learning Environments", "Education and Information Technologies", "British Journal of Educational Technology" ve "Sustainability" gibi dergiler de konu ile önemli sayıda makale yayınlayan diğer dergiler arasındadır.

Makalelerin Yazarlara Göre Dağılımı

Bu çalışmada elde edilen 526 makale, 1356 yazar tarafından yayınlanmıştır. Grafik 4'te, açık ve uzaktan öğrenmede sorgulama topluluğu konusundaki makalelerin yazarlara göre dağılımı gösterilmektedir.

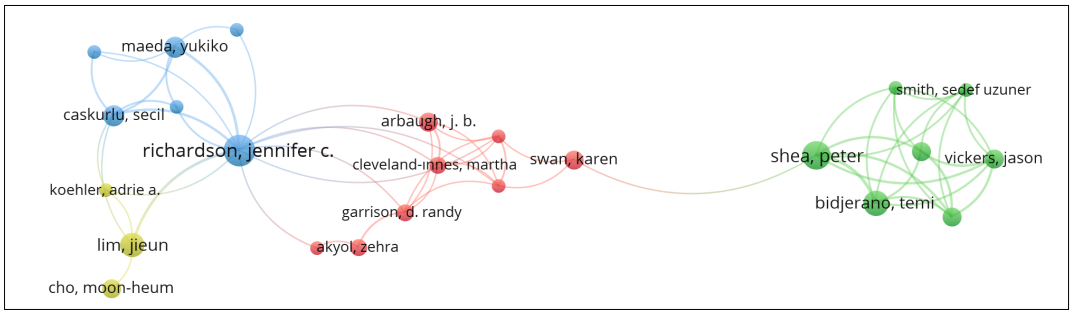


Grafik 4. Yazarlara göre dağılım

En fazla yayın yapan yazar, 13 makale ile Jennifer C. Richardson'dır. Bunu, 10 makale ile Peter Shea ve 8 makale ile Temi Bidjerano ve Patrick R. Lowenthal takip etmektedir.

Ortak Yazarlık Ağ Haritası

Şekil 3, çalışma yapılan alan ile ilgili olarak en az 2 makale ve en az 2 atıf sayısına sahip 122 yazarın ortak yazarlık ağ haritasını göstermektedir.

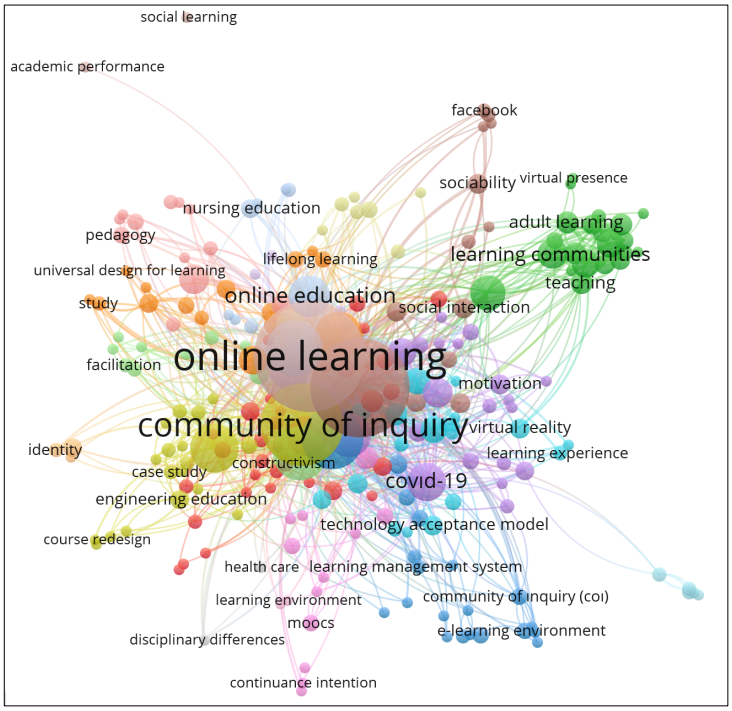


Şekil 3. Ortak yazarlık ağ haritası

Şekil 3'te görüldüğü gibi, yazarlar arasında 4 ortak yazarlık kümelenmesi oluşmuştur. Buradaki durum, Jennifer C. Richardson ve Peter Shea'nın bu alandaki merkezi araştırmacılar olduğunu ortaya koymaktadır.

Makalelerdeki Anahtar Kelime Haritası-1

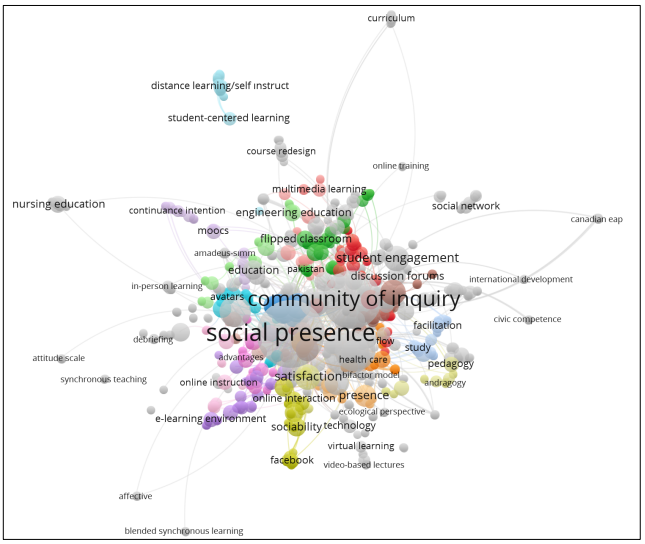
Açık ve uzaktan öğrenmede sorgulama topluluğu üzerine yayınlanmış 526 makaleden elde edilen anahtar kelimeler, üzerinde hiçbir hariç tutma işlemi yapılmadan olduğu haliyle Şekil 4'te sunulmuştur. Şekilde, "online learning" (çevrimiçi öğrenme), "community of inquiry" (sorgulama topluluğu) ve "cognitive presence" (bilişsel bulunuşluk) en büyük düğümler olarak öne çıkmıştır.



Şekil 4. Anahtar kelimeler-1

Makalelerdeki Anahtar Kelime Haritası-2

Şekil 4'ten farklı olarak başka bir anahtar kelime haritalaması yapılmıştır. Şekil 5'teki anahtar kelimeler arama kriterindeki açık ve uzaktan öğrenmeye ilişkin arama sözcükleri çıkarılarak yalnızca sorgulama topluluğunu baz alacak şekilde haritalandırılmış ve çıkan sonuçlar verilmiştir.

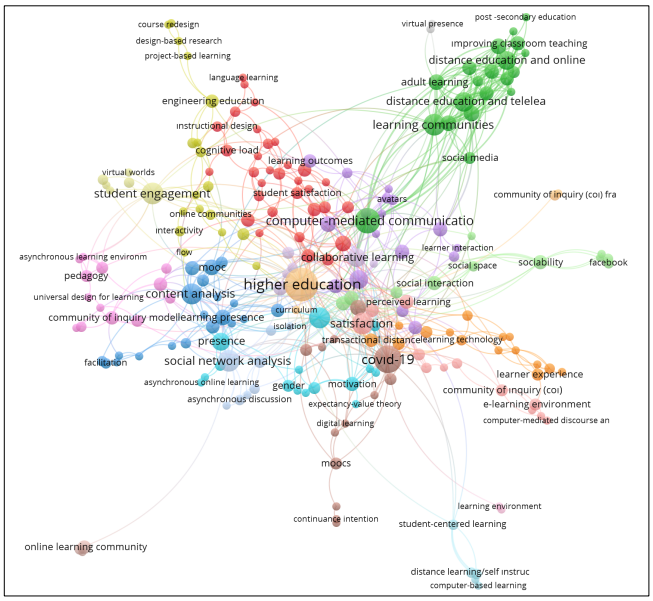


Şekil 5. Anahtar kelimeler-2

Sorgulama topluluğu kuramının üç temel unsurundan biri olan "Social presence" (sosyal bulunuşluk), makalelerde en çok seçilen anahtar kelimedir. "Community of inquiry" (sorgulama topluluğu) ve "teaching presence" (öğretimsel bulunuşluk) anahtar kelimeleri de ön plana çıkmaktadır. Bu durum bu terimlerin sorgulama topluluğu literatüründe en merkezi ve en sık kullanılan anahtar kelimeler olduğunu göstermektedir.

Makalelerdeki Anahtar Kelime Haritası-3

Şekil 6, açık ve uzaktan öğrenme ve sorgulama topluluğunu çağrıştıran tüm anahtar kelimeler hariç tutulduğunda elde edilen anahtar kelime ağını göstermektedir.



Şekil 6. Anahtar kelimeler-3

"Higher education" (yükseköğretim), "computer-mediated communication" (bilgisayar destekli iletişim) ve "student engagement" (öğrenci katılımı) gibi anahtar kelimeler, merkezi düğümler olarak öne çıkmıştır.

Sonuç

Bu çalışma, açık ve uzaktan öğrenmede sorgulama topluluğu alanındaki akademik literatürü bibliyometrik analizler kullanarak incelemeyi amaçlamıştır. Çalışma kapsamında, Web of Science veri tabanından elde edilen veriler Vosviewer yazılımı aracılığı ile analiz edilmiştir. Bu analizler sonucunda elde edilen 526 adet SSCI ve SCI-E indexlerinde taranan makalenin yıllara, ülkelere, dergilere, yazarlara ve ortak yazarlık ağlarına göre dağılımları

incelenmiş ve anahtar kelime ağ haritaları oluşturulmuştur. Alan yazın incelendiğinde sorgulama topluluğu kuramı üzerine yapılan analiz çalışmalarında da çoğunlukla Web of Science veri tabanının kullanıldığı ve analiz başlıklarının mevcut çalışma ile paralellik gösterdiği görülmüştür (Aksoy vd., 2022; Olpak, 2022; Turgut ve Kutay, 2023; Yu ve Li, 2022; Das ve JV, 2024).

Bu çalışmanın sonuçları, sorgulama topluluğu kuramı konusunu hedef alan yayınların yıllar bazında zaman içinde artış gösterdiğini ortaya koymaktadır. Yu ve Li (2022) ile Turgut ve Kutay (2023), ilgili alandaki yayın sayılarının yıllara göre dağılımına baktıklarında, 2015 yılından itibaren genel olarak bir artış eğilimi içerisinde olduğu sonucuna ulaşmışlardır. Özellikle Amerika Birleşik Devletleri, bu alandaki yayın sayısı ile açık ara lider konumundadır ve onu Çin Halk Cumhuriyeti ve Kanada takip etmektedir. Türkiye'de açık ve uzaktan öğrenme alanında yapılan akademik çalışmaların da sorgulama topluluğu konusuna önemli ölçüde katkı sağladığını görülmüştür. İspanya, Malezya, İskoçya, Singapur, Yeni Zelanda, Suudi Arabistan, İrlanda, Avusturya, Belçika, İsveç, Endonezya, İtalya ve Pakistan gibi ülkelerdeki araştırma faaliyetleri daha sınırlı kalmıştır. Bu durum, bu ülkelerde sorgulama topluluğu konusunun diğer araştırma alanlarına göre daha az öncelikli olabileceğini göstermektedir.

Ülkelere göre ortak yazarlık bağlamında özellikle Amerika Birleşik Devletleri ve Çin arasındaki güçlü bağ, iki ülkenin sorgulama topluluğu literatürüne olan katkılarının büyüklüğünü yansıtmaktadır. Yu ve Li (2022) ülke bazlı analizlerinde mevcut çalışma ile benzer sonuçlara ulaşmışlardır. Çalışmanın sonuçlarında, sorgulama topluluğu alanında yapılan araştırmaların farklı dergilerde yayınlandığı ve özellikle eğitim teknolojileri ve uzaktan eğitim konularına odaklanan dergilerde yoğunlaştığı tespit edilmiştir. Çakıroğlu vd. (2016), Olpak (2022), Yu ve Li (2022) çalışmalarında sorgulama topluluğu ile ilgili yapılan çalışmaların yayınlandığı dergiler konusunda mevcut çalışma ile benzer sonuçlara ulaşmışlardır. Makalelerin yazarlara göre dağılımına bakıldığında Jennifer C. Richardson ve Peter Shea'nın sorgulama topluluğu kuramı literatüründe önde gelen araştırmacılar olduğu görülmektedir. Bu sonuç, sorgulama topluluğu üzerine yayın yapan yazarların analizini içeren çalışmalarla tutarlıdır (Olpak, 2022; Yu ve Li,2022). Jennifer C. Richardson, Yukiko Maeda ve Secil Caskurlu gibi yazarlarla güçlü iş birlikleri kurarken, Peter Shea ise Temi Bidjerano ve Mary Gozza-Cohen ile sıkı iş birlikleri yapmaktadır.

Anahtar kelime ağ haritaları, "online learning" (çevrimiçi öğrenme), "community of inquiry" (sorgulama topluluğu) ve "cognitive presence" (bilişsel bulunuşluk) gibi terimlerin literatürde en sık kullanılan ve en merkezi kavramlar olduğunu ortaya koymaktadır (Olpak, 2022). Bu terimler etrafında yoğunlaşan diğer anahtar kelimeler, bu alanlardaki araştırmaların geniş kapsamlı olduğunu ve çeşitli alt konuları içerdiğini göstermektedir. Örneğin, "social network analysis" (sosyal ağ analizi), "computer-mediated communication" (bilgisayar destekli iletişim) ve "satisfaction" (memnuniyet) gibi terimler, çevrimiçi öğrenme bağlamında sıkça incelenen konulardır. Sonuç olarak yapılan bu çalışmada açık ve uzaktan öğrenmede sorgulama topluluğu üzerine yapılan araştırma eğilimlerini ve anahtar kavramları görselleştirerek, araştırmacılara mevcut literatürdeki önemli odak noktalarını ve boşlukları belirleme konusunda önemli bilgiler sunmaktadır. Gelecekteki araştırmalarda, daha az temsil edilen ülkelerdeki araştırma kapasitelerinin artırılması ve bu alandaki çalışmaların teşvik edilmesi önem arz etmektedir. Açık ve uzaktan öğrenmede sorgulama topluluğu, öğrenci katılımını artırarak eleştirel düşünme, anlamlı öğrenme gibi temel eğitim hedeflerine ulaşmayı desteklediği için, bu çalışma ile açık ve uzaktan öğrenme sorgulama topluluğu literatürünün daha da genişleyip ve küresel bir perspektifle zenginleşebilmesi çerçevesinde bir durum tespiti yapılmıştır.

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Mikro Yeterliliklerin Kredilendirilmesinde Kalite Güvencesi ve Akreditasyon Konusunda Öne Çıkan Yaklaşımlar ve Gelecek Senaryoları

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Özet

Kalite güvencesi ve akreditasyon mikro-kredilerin yükseköğretime entegrasyonunda önemli konulardan ve güçlüklerden biri olarak görülmektedir. Mikro-krediler, yükseköğretim ve mesleki eğitim sistemlerinin doğasını değiştirmeden, eğitim-öğretim, hayat boyu öğrenme ve istihdam edilebilirlik ekosistemlerini tamamlamak ve geliştirmek için kullanılabilir. Dolayısıyla, mikro-kredilere karşı güven oluşturmak, anlaşılmasını ve tanınmasını kolaylaştırmak, geçerlilik ve güvenirliğini sağlamak ve mikro-kredilerin yükseköğretim kurumlarında sürdürülebilir olmasını desteklemek için kalite güvencesi ve akreditasyon ölçütlerini oluşturmak önemlidir. Bu betimsel çalışmada mikro-kredilerin akreditasyonu ve yükseköğretime entegrasyonu konusunda öne çıkan yaklaşımlar ele alınmaktadır. Çalışma kapsamında uluslararası kuruluşlar, kalite kuruluşları ve üniversiteler tarafından mikro-krediler konusunda 2020-2024 yılları arasında yayınlanan güncel raporlar taranmış, kalite güvencesi ve akreditasyon ile ilgili olan 29 rapor tematik doküman analizi yoluyla incelenmiştir. Yapılan analiz sonucu ulaşılan yüze yakın kod 19 kategori ve 5 tema altında toplanmıştır. Mikro-kredilerde kalite güvencesi ve akreditasyon çalışmaları bağlamında ortaya çıkan temalar 1) Yükseköğretim Ekosistemine Entegrasyonu ve Tanınma 2) Kurumsal Sorumluluk ve Kapasite 3) Dış Kalite Güvencesi 4) Paydaş Katılımı 6) Şeffaflık ve Hesap Verilebilirlik olarak belirlenmiştir. Temalar ve kategoriler bağlamında öne çıkan yaklaşımlar sunularak, mikro-kredilerde kalite güvencesi ve akreditasyon konusunda gelecek senaryoları tartışılmaktadır.

Anahtar Kelimeler: Mikro-krediler, mikro-yeterlilikler, kalite güvencesi, akreditasyon, yükseköğretim

Giriş

Kalite konusu, mikro-kredilerin tasarımlanmasında ve verilmesinde Avrupa'nın ilk ilkesi olarak ifade edilmekte (Avrupa Komisyonu, 2022) ve mikro-kredilerin yükseköğretime entegrasyonunda kalite güvencesi ve akreditasyon önemli konulardan, kabul edilmesinin önündeki engellerden biri olarak görülmektedir (Raj vd., 2024; Tamoliune vd., 2023). Mikro-kredilerde kalite güvencesi, mikro-kredilerin yükseköğretim ve mesleki eğitim-öğretim sistemlerini etkilemeden, mevcut yeterlilikleri ve dereceleri zayıflatmadan ve bozmadan, eğitim-öğretim, hayat boyu öğrenme ve istihdam edilebilirlik ekosistemlerini tamamlamak ve geliştirmek için kullanılabilir olması nedeniyle önemlidir (Avrupa Komisyonu, 2022; ENQA, 2023). Cirlan (2023) mikro-kredilere karşı güven oluşturmak, anlaşılmasını ve tanınmasını kolaylaştırmak söz konusu olduğunda kalite güvencesinin elzem olduğunu ifade etmiştir. O'Leary vd., (2022) mikro-kredilerin geçerlilik, güvenilirlik ve tanınırlıklarını desteklemek için tutarlı, sağlam ve yenilikçi bir kalite çerçevesinin geliştirilmesinin önemli olduğunu belirtmekte ve bunun şimdiye kadarki faaliyetleri ile daha büyük hacimli öğrenme deneyimlerine odaklanmış olan herhangi bir Yükseköğretim Kurumu için zor olduğunu ifade etmektedirler. Öte yandan Modus (2023) projesi raporunda mikro-kredilerin yükseköğretim kurumlarında sürdürülebilir olması için tüm yükseköğretim kurumlarında zorunlu olan kalite güvence standartlarına ihtiyaç olduğu belirtilmektedir. Rapor kapsamında mikro-kredilerde kalite güvencesi iki açıdan ele alınmış, yükseköğretim kurumlarının sağlayıcı olarak takip etmesi gereken kalite güvencesi ve alternatif sağlayıcılar tarafından verilen mikro-kredilerin tanınma prosedürlerinin kalite güvencesi önlemlerine dahil edilerek üniversitelerin çözüm üretmesi gerektiği ifade edilmiştir.

Mikro-krediler Avrupa Komisyonu (2021) tarafından *"öğrenenlerin küçük öğrenme deneyimlerinin ardından edindiği öğrenme çıktılarının kayıt altına alınması"* (s.1*)* olarak tanımlanmaktadır ve komisyon tarafından mikro-kredilerde olması gereken 10 temel ilke belirlenmiştir. Bu özellikler *kalite, şeffaflık*, farklı ve belirli *amaca yönelik* yeterlilikler için olması, g*eçerli* bir ölçme-değerlendirme süreci sunması, e*snek ve biriktirilebilir* öğrenme deneyimleri sağlaması, *resmi olarak tanınması*, Europass gibi dijital cüzdanlarda *saklanıp paylaşılabilmesi*, ö*ğrenen merkezli* olması, *öğrenenin ve sağlayıcının yasal kimliğinin ve mikro-kredinin verildiği tarih ve yerin kontrol edilebilmesi*, öğrenenlere kariyer seçimlerini oluşturmalarında *rehberlik eden bilgi sistemlerine sahip olması* (s. 3) olarak sıralanmıştır. Komisyon tarafından (2022) yayınlanan raporda ise "*İlgili sektör veya faaliyet alanında kabul edilmiş kalite güvencesi standartları ile desteklenirler*" (s.21) maddesi tanımda yer alarak kalite güvencesinin önemi vurgulanmıştır.

Mikro-krediler için yapılan diğer bir tanım UNESCO tarafından sunulmuş, 50 uzman tarafından ortaya konulan tanımın kapsamlı ve küresel çeşitlilikte olabileceği ifade edilmiştir (Van der Hijden ve Martin, 2023). Mikro-

kredilerin tanımı konusunda fikir birliği eksikliğinin kalite güvencesi açısından da sorun oluşturduğu belirtilen raporda kalite güvencesi vurgusu göze çarpmakta, mikro-kredilerin ulusal yeterlikler çerçevesinin hangi seviyesine uygunsa ona referans vermesi gerektiği, seviyenin belirlenmesinin öğrenenlerin başarısının ölçülmesine ve dersin kalite güvencesinin sağlanmasına yardım edeceği ifade edilmektedir.

ENQA (2023) mikro-kredilerin yükseköğretimden daha büyük bir olgu olduğunu belirterek mikro-kredilerde kalite güvencesi ile ilgili olarak iki noktaya dikkat çekmiştir. Birincisi mikro-kredilerin yeterlilikler çerçevesinin herhangi bir seviyesinde verilebileceği, ikincisi ise mikro-kredilerin yükseköğretim, ileri eğitim ve mesleki eğitim gibi çeşitli eğitim sağlayıcıları tarafından verilebileceğidir. Ayrıca yükseköğretim tarafından sağlanan mikro-kredilerin alternatif sağlayıcılarınkinden daha kaliteli olduğunu gösteren bir kanıtın da bulunmadığı ifade edilmektedir. Ancak Almanya Rektörler Konferansına göre, yükseköğretim kurumları sadece sağlayıcı olarak değil, aynı zamanda alternatif sağlayıcılar tarafından verilen mikro-krediler için kalite güvencesi sağlayan eşik bekçileri olarak da rol oynamaktadır (Cirlan, 2023). Bu noktada önemli olan mikro-kredi sağlayan ya da bu konuda iş birliği içerisinde olan bütün eğitim sağlayıcıların karşılaması gereken kalite eşiğinin Avrupa Yükseköğretim Alanında Kalite Güvencesi Standartları ve Yönergeleri (ESG) ile uyumlu olması meselesidir (ENQA, 2023). Öte yandan, mikro-krediler daha belirli yeterliliklere odaklandıkları, değişen iş gücü piyasasına uygun hareket etmeleri ve en yeni içerikleri sunmaları nedeniyle daha çevik bir tasarım, onay, sunulma şekli ve denetim mekanizmaları gerektirmektedir (ENQA, 2023). Dolayısıyla yükseköğretimdeki dereceler için kullanılan kalite güvencesi mekanizmalarının mikro-krediler için çok etkili olmayabileceği de göz önünde bulundurulmaktadır.

Microbol (2022) raporuna göre Bologna araçları mikro-kredilerde kalite güvencesinin sağlanması için kullanılabilir ve Avrupa Komisyonu (2022) raporuna göre mikro-kredilerde kalite güvencesi şeffaflığın Bologna araçlarıyla artırılması yoluyla desteklenebilir. ICDE tarafından açık, esnek ve uzaktan eğitimde küresel kalite perspektifleri üzerine yayınlanan raporda ESG (2015) ile belirlenen standartların Avrupa yükseköğretiminde temel olmaya devam etmekle birlikte ek referans çerçevelere de gereksinim olacağı belirtilmektedir (Chand vd., 2023). Bu konuda Avrupa Uzaktan Eğitim Üniversiteleri Birliği (EADTU) tarafından hazırlanan E-xcellence kıyas aracının ve Avrupa Yükseköğretimde Kalite Güvencesi Birliği (ENQA) tarafından yapılan çalışmaların bir yol haritası oluşturacağı, ayrıca bu çalışmaların kalite güvencesi çerçeveleri ve ajansları için öngörüleri haritalandırdığı ifade edilmektedir (Chand vd., 2023). Ek olarak, EADTU ve Avrupa KAÇED Konsorsiyumu (EMC), Kısa Öğrenim Programları (30 AKTS'den büyük olmayan) sunan yükseköğretim kurumlarının yanı sıra Avrupa KAÇED sağlayıcıları tarafından sunulan mikro-kredilerin tanımlanması, tasarımlanması ve tanınmasını kolaylaştıran bir araç olan Ortak Mikro Kredi Çerçevesini (CMF) geliştirmiştir (Antonaci vd., 2021). Ortak Mikro-kredi Çerçevesinin, şeffaflık için karşılıklı güven oluşturmak ve tanınmayı sağlamak adına Avrupa Yeterlilikler Çerçevesi, Avrupa Kredi Transferi ve Biriktirme Sistemi (AKTS) ve Diploma Eki gibi 'Bologna araçları' ile uyumlu olduğunu belirten Antonaci vd. (2021), çerçevenin kurumlar arasında ortak bir dil oluşturduğunu ifade etmektedirler. Mikro-krediler için kullanılan diğer bir referans çerçeve olarak Ward vd. (2023) 13.485 beceriyi ve 2.942 mesleği tanımlayan Avrupa Becerileri, Yeterlilikleri ve Meslekleri (The European Skills, Competences and Occupations- ESCO) çerçevesinden bahsetmektedirler. ESCO'nun, nitelikler, beceriler, mikro-kredi çerçeveleri ve istihdam arasında bir bağlantı sağlayarak, açık rozetler ve dijital sertifikalandırma yoluyla yaygın ve informal öğrenmeyi örgün öğrenme ile uyumlu hale getirmeyi amaçladığını belirtmektedirler. Ayrıca, son yıllarda mikro-kredilere odaklanan, Avrupa Komisyonu ve Microbol projesi doğrultusunda mikro-kredilerin kalite güvencesine yönelik vizyonunu ve yaklaşımını tanımlayan bir başka kuruluş da Avrupa Yenilikçi Üniversiteler Konsorsiyumu (ECIU) olarak karşımıza çıkmaktadır. (Brown vd., 2021; ENQA, 2023; Mac Lochlainn vd., 2022).

Kalite güvencesi ve akreditasyon konusunun mikro yeterliliklerin kredilendirilmesindeki önemi göz önüne alınarak bu çalışmada mikro-kredilerin kalite güvencesinin sağlanmasında ve akreditasyonunda öne çıkan yaklaşımları belirlemek ve gelecek senaryolarını tartışmak amaçlanmaktadır. Çalışmada "Mikro yeterliliklerin kredilendirilmesi ve yükseköğretime entegrasyonu sürecinde kalite güvencesi ve akreditasyon konusunda öne çıkan yaklaşımlar ve gelecek senaryoları nelerdir?" sorusuna cevap aranmıştır.

Yöntem

Çalışma kapsamında uluslararası kuruluşlar, ülkelerin kalite kuruluşları ve üniversiteler tarafından 2020-2024 yılları arasında yayınlanan güncel raporlar taranmış, en son 2024 Nisan ayı olmak üzere, mikro-kredilerde kalite güvencesi ve akreditasyon ile ilgili olan 29 rapor tematik doküman analizi yoluyla incelenmiştir. Bowen (2009) doküman analizinin, taramayı, kapsamlı okumayı ve yorumlamayı içerdiğini, bu tekrar eden sürecin içerik analizi ve tematik analizin unsurlarını birleştirdiğini ifade etmektedir. Çalışmada yansıtıcı tematik analiz kullanılmış (Braun ve Clarke, 2021), analiz 1) veri tanıma, 2) sistematik kodlama, 3) ilk temaları oluşturma, 4) temaları geliştirme ve gözden geçirme, 5) tema netleştirme, tanımlama ve adlandırma, 6) analiz sonuçlarını raporlama aşamalarında gerçekleştirilmiştir. Veri tanıma ve kodlama aşaması yaklaşık sekiz ay sürmüş, tümevarım yöntemiyle yüzün üzerinde kod belirlenmiş, bu kodlardan yola çıkarak ilk temalar oluşturulmuştur. 27 kategori ve 7 tema şeklinde ortaya çıkan ilk temalar geliştirme ve gözden geçirme aşamasında 19 kategori ve 5 tema altında

toplanmıştır. Mikro yeterliliklerin kredilendirilmesinde kalite güvencesinin sağlanması ve akredite edilmesine yönelik yaklaşımlar ve gelecek senaryoları ortaya çıkan 5 tema ve alt kategoriler bağlamında tartışılmıştır.

Temalar, Bulgular ve Analiz

Çalışmada mikro-kredilerin kalite güvencesi ve akreditasyonu süreçlerinde öne çıkan yaklaşımlar temalar bağlamında açıklanmış, mikro-kredilerin yükseköğretim ekosistemine nasıl entegre edildiğine, çeşitli paydaşların rollerine, karşılaşılan zorluklara ve kalite güvencesi için gelecekteki yönelimlere ilişkin olarak veriler sentezlenmiştir. Analiz 19 alt kategoriden oluşturulan 5 tema etrafında yapılanmıştır.

Tablo 1.

Mikro yeterliliklerin kredilendirilmesinde öne çıkan temalar, kategoriler ve tanımlar

Temalar	Kategoriler	Tanımlar/ Açıklamalar
1.Yükseköğretim Ekosistemine Entegrasyonu ve Tanınma	✓ Mikro-kredilerin tanımlanması ve kapsamının belirlenmesi ✓ Mevzuat veya Çerçeve Uyumluluğu ✓ Yenilikçi yaklaşım ihtiyacı ✓ (Dijital) Sistemler arası uyumlu, biriktirilebilir, taşınabilir, ulaşılabilir olması ✓ Düzenleyici ve finansman sağlayıcı kurumların kriterleri ve gerekliliği	- Yeni yeterlilikler/ yetenek geliştirme/ tamamlayıcı/ alternatif/ dereceleri ayrıştırma/ kümülatif olma/ bağımsız olma - Yeterlilik Çerçeveleri (AYÇ, TYÇ, ESCO) - Kalite Çerçeveleri (ESG) - Bologna Araçları (AKTS, AYÇ, Diploma Eki) - Standardizasyona karşı esneklik / Çevik ve sağlam tasarımlar - Yükseköğretim, mesleki eğitim, yaşam boyu öğrenme ön öğrenmeler ve iş gücü piyasası arası ve dijital sistemler arası (EDCI) aktarılabilir. - Kim finanse/teşvik edecek? Hangi koşullarda?
2.Kurumsal Sorumluluk ve Kapasite	✓ Stratejik planlama ile uyumu ve kurumsal motivasyon ✓ İç kalite güvencesi süreçlerine dahil etmek ✓ Akademik sorumluluk/ Öğretim Elemanlarının Yeterlilikleri ✓ Teknik altyapı	- Görünürlük elde etmek/ İtibar kazanmak/ Gelir akışı sağlamak/ Maliyetleri azaltmak /Yenilikleri benimsemek/ Öğrenenlerin talep ve ihtiyaçlarını karşılamak - Sağlayıcı olarak /Eşik bekçisi (gatekeepers) olarak / Mikro-kredilerin yapısına uygun olarak - Öğretim elemanlarının yeterliliklerini geliştirmek/ Stratejik ortaklıklar geliştirmek / İş birliklerinde akademik dürüstlüğü sağlamak - Sunma, değerlendirme ve sürekli iyileştirmede gerekli teknolojik alt yapıyı sağlamak - Yenilikçi yaklaşımlara açık olarak değişim kapasitesini geliştirmek
3.Dış kalite güvencesi	✓ Dış değerlendirme ve Akreditasyon kuruluşlarının rolü ✓ Kalite etiketleri ve Değerlendirme kriterleri ✓ Program akreditasyonu veya kurum akreditasyonuyla ilişkisi ✓ Sürekli ve düzenli izleme ve Önlem alma (PÜKO)	- Tarafsız değerlendirme/ Sağlam ve dinamik süreçler geliştirme ve uygulama - Güçlükler: Çeşitlilik (formal, non-formal, informal) Değişim hızı /Değişken belgelendirme ve değerlendirme kriterleri - Farklı türdeki mikro-kredilere uyum sağlayabilecek kalite güvence çerçevelerine olan ihtiyaç / DEQAR'ın genişletilmesi/ Paydaş görüşleri - Değişen eğitim ihtiyaçlarına ve pazar taleplerine ayak uydurmak / Geri bildirim ve değerlendirme verilerine dayalı iyileştirme / İş dünyası ve öğrenen beklentileriyle uyum

4.Paydaş Katılımı	✓ Mesleki, yasal ve düzenleyici kurumların kalite süreçlerine katılımı ✓ Mikro-kredilerin öğretim elemanları ve işveren iş birliğinde planlanması ✓ Kalite yönetimine öğrenci katılımı	- Politikaların ve yönergelerin işbirlikli ağlar aracılığıyla geliştirilmesi /Geniş tabanlı destek ve doğrulama / Geri bildirime dayalı gelişme - Paydaş bakış açılarını birleştirmek /Başarı ve sürdürülebilirlik /Güven ve tanınırlık - Öğrencinin geçmişine, deneyimine, amacına ve ihtiyaçlarına yönelik olma / Farklı öğrenen grupları için erişilebilir ve ilgili olma / Öğrenci merkezli olma
5.Şeffaflık ve Hesap Verilebilirlik	✓ Şeffaf ve net politikalar, sistemler ve öğrenme çıktıları ✓ Kimlik doğrulama ✓ Ölçmeye ve kanıta dayalı değerlendirme	- Açık ve şeffaf iletişim /Açık politikalar ve kalite güvence uygulamaları/ Sonuçların kamuya açıklanması (DEQAR) /Kapsamlı değerlendirme - Açık/şeffaf standartlaştırılmış doğrulama süreçleri/ iç kalite ve dış kalite güvence mekanizmaları - Kabul sürecinde adalet ve şeffaflığın sağlanması - Öğrenme çıktılarının ayrıntılı ve yeterlilik odaklı tanımları - Değerlendirme yöntemlerinin adil, şeffaf, geçerli ve tutarlı olması

Şekil 1.

Mikro yeterliliklerin kredilendirilmesinde öne çıkan kalite güvencesi ve akreditasyon yaklaşımları

Yükseköğretim Ekosistemine Entegrasyonu ve Tanınma

Mikro-kredilerin çok çeşitli nedenlerle verilebilmesi (yetenek geliştirme, yeni yeterlilikler kazandırma, tamamlayıcı özellikte olma, yaşam boyu öğrenme amaçlı olma, iş piyasasına uyum sağlama zorunluluğu ve ön öğrenmelerin tanınması gibi), mevcut derecelerin ayrıştırılması ile elde edilebildikleri gibi kendi başına anlamlı da olabilmeleri, hem yükseköğretim ekosistemi içerisinde hem de dışında biriktirilebilir özellikte olması gibi durumlar mikro-krediler konusunda ortak bir anlayışın, işlevsel bir sistemin oluşmasını ve kalite güvencesi süreçlerini güçleştirmektedir. Bu durum ESG gibi halihazırda kullanılan çerçevelerle uyumlu, net tanımlara (Zhivkovikj ve Munjishvili, 2024) ve uyarlanabilir kalite güvence standartlarına olan ihtiyacı ortaya koymakta (ENQA, 2023), aynı zamanda kalite güvence uygulamalarının mikro-krediler aracılığıyla yükseköğretim, yaşam boyu öğrenme, ön öğrenmelerin tanınması süreci ve mesleki gelişimi nasıl bütünleştirdiğini ve desteklediğini de

yansıtmaktadır (Cirlan, 2023). Mikro-kredilerin güvenilirliğini ve güncelliğini korumak, öğrenciler için değerli, işverenler tarafından saygı duyulan nitelikte kalmasını sağlamak açısından çok önemlidir.

Tema mikro-kredilerin mevcut ulusal ve uluslararası eğitim normlarına ve politikalarına uyumlu hale getirilmesini, ESG, AKTS ve Avrupa Yeterlilikler Çerçevesi seviyeleri (veya sisteme uygun olarak kullanılan başka çerçeveler TYÇ, ESCO vb.) gibi sistemlerle uyumlu olmalarının sağlanmasını ve ilgili akreditasyon standartlarını karşılamasını ifade etmektedir. Mikro-kredilerin tanınmasını ve taşınabilirliğini kolaylaştırmak için belirlenmiş kurallara ve yönergelere uyma ihtiyacını vurgulamaktadır (Modus, 2023). Tema mevcut standartlara uyumun kaliteyi sağlamanın yanında mikro-kredilerin yükseköğretime entegrasyonunu kolaylaştırması ve çeşitli sektörlerde tanınırlığını artırması konusunu da ele almaktadır. Ulusal eğitim standartları ile uyumun sağlanmasında düzenleyici ve finanse edici rol üstlenen kurumların gerekliliği de bu tema bağlamında ortaya çıkmaktadır.

Kalite güvence çerçeveleri, güvenilir mikro-kredilerin olmazsa olmazıdır. Bu çerçeveler, mikro yeterliliklerin akademik bütünlüğünü ve eğitimin kalitesini sağlayan mevcut kalite güvence mekanizmaları olarak tanımlanmakla beraber, politika ve süreçlerin mikro yeterliliklerin kendine has özelliklerine göre uyarlanması gerekliliği de vurgulanmaktadır. Tema, standartları korurken esnekliği de de barındıran dinamik bir kalite güvence yaklaşımını ortaya çıkarmakta (BAC, 2022), sağlayıcıların belirli mikro-kredilere göre uyarlanmış kalite yönetim çerçeveleri tasarlama ve uygulama konusundaki özerkliğini vurgulamakta, mikro-kredilerin sunduğu öğrenme yollarındaki esneklik ile sıkı kalite standartlarını koruma ihtiyacını dengelemenin zorluğunu yansıtmaktadır. Yaklaşımların çevikliği, hızla gelişen bir eğitim ortamında çok önemlidir ve kurumların programların sağlamlığından veya bütünlüğünden ödün vermeden değişikliklere hızla uyum sağlamasına olanak tanır. Katı kalite standartlarına bağlı kalırken yaratıcı program tasarımlarına izin veren dengeli bir yaklaşım, mikro-kredilerin uzun vadeli başarısı için gerekli görülmektedir (Modus, 2023).

Tema mikro-kredilerin daha geniş eğitim ve kariyer süreçlerine entegre olabilmesini, daha büyük yeterliliklere doğru istiflenebilir veya biriktirilebilir olmasını ve mikro-kredilerin farklı yetki alanları, sistemler ve sektörler arasında geçirgen olabilmesini ele almaktadır. Europass Dijital Krediler Altyapısı (EDCI) gibi yenilikler, mikro-kredilerin üye devletler arasında kusursuz bir şekilde tanınmasını destekleyen birleşik bir Avrupa dijital çerçevesine doğru ilerleme anlamına gelir (Orr vd., 2020). Mikro-kredilerin biriktirilebilir olmasını ve aktarılabilirliğini destekleyen kalite çerçevelerinin geliştirilmesi, yükseköğretime ve kariyer gelişim programlarına entegrasyonunu kolaylaştıracak ve öğrenenler için değerini artıracaktır. Bu tema ayrıca, mikro-kredilerin çeşitli dijital platformlarda ve sistemlerde çalışacak, öğrencilerin farklı ihtiyaçlarını karşılayacak (toplumsal, kişisel, kültürel ve işgücü piyasası gereksinimlerine yanıt verecek) şekilde tasarlanmasının profesyonel ortamlara entegrasyonunu kolaylaştırmasını ve aynı zamanda küresel erişilebilirliklerini geliştirmesini ele almaktadır. (Ossiannilsson ve Singh, 2021).

Kurumsal Sorumluluk ve Kapasite

Kurumlar sundukları eğitim fırsatlarını çeşitlendirmek, gelir akışı sağlamak, değişen öğrenen profillerine hitap etmek, yerel ve küresel istihdam edilebilirlik taleplerine etkili bir şekilde yanıt vermek gibi çeşitli motivasyonlarla mikro-kredi sağlamak istemektedirler. Tema kurumların stratejik olarak mikro-kredileri nasıl konumlandıracaklarına karar vermeleri ve iç kalite güvence sistemlerine hem sağlayıcı olarak hem de alternatif sağlayıcılar tarafından verilen mikro-kredileri hangi koşullarda entegre edeceklerine dair kriterlerini belirlemiş olmaları gerekliliğini ifade etmektedir (Modus, 2023). Yükseköğretim kurumları alternatif sağlayıcılar için de *kalite güvencesi sağlayan eşik bekçileri* olarak tanımlanmaktadır (Cirlan, 2023). Ayrıca kurumlar iç kalite güvence mekanizmalarını mikro-kredilerin özelliklerine uygun bir şekilde uyarlamaktan, bu kapsamda öğretim elemanlarının yeterliliklerini geliştirmekten (BAC, 2022; ENQA, 2023), çeşitli paydaşların uzmanlık ve kaynaklarından yararlanarak stratejik ortaklıklar geliştirmekten, iş birliklerinde akademik dürüstlüğü korumak ve beklenen standartları karşılamaktan, mikro-kredilerin sunulmasında, değerlendirilmesinde ve sürekli iyileştirilmesinde gerekli teknolojik alt yapıyı sağlamaktan sorumludurlar. Kurumların sahip oldukları itibar ve sağladıkları kalite güvencesi mikro-krediler sağlamalarına imkân tanıyacaktır (Orr vd., 2020).

Dış Kalite Güvencesi

Mikro-kredilere yönelik kalite güvencesinin başarılı bir şekilde uygulanmasında kurumların sahip oldukları iç kalite güvencesi sorumluluğu yanında kalite güvence kuruluşlarının da dış kalite güvencesini sağlamada ve tarafsız değerlendirmede önemli rolleri vardır (ENQA,2023; Modus, 2023). Mikro-kredilerin çeşitliliği ve gelişim hızı gibi zorluklar, kalite güvence süreçlerinin standartlaştırılmasında önemli bir engel teşkil etmektedir. Tema, belgelendirme, değerlendirme kriterlerindeki değişkenlik ve mikro-kredilendirmedeki hızlı yeniliklere uyum sağlayabilecek esnek kalite güvence modellerine duyulan ihtiyaç gibi dış kalite güvencesindeki belirli zorlukları ortaya koymakta, çözüm olarak sağlam ve dinamik kalite güvence süreçlerinin geliştirilmesinin önemini ve bu standartların geliştirilmesinde ve uygulanmasında kalite güvence kuruluşlarının rolünü vurgulamaktadır. Dış değerlendirmeler ve bu bağlamda oluşturulan kapsamlı mekanizmalar mikro-kredilerin yüksek kalite standartlarını karşılamaya devam etmesini sağlayarak hesap verebilirliğin ve sürekli iyileştirmenin korunmasına ve mikro-

kredilerin tanınmasına yardımcı olur (Ossiannilsson ve Singh, 2021). Tema kapsamında ortaya çıkan program düzeyi ve kurum düzeyi kalite güvencesi arasındaki tartışma, farklı türdeki mikro-kredilere uyum sağlayabilecek kalite güvence çerçevelerine olan ihtiyacı vurgulamaktadır (Cirlan 2023). Dış Kalite Güvence Sonuçları Veritabanı'nın (DEQAR) alternatif sağlayıcıları ve program düzeyinde akreditasyonları içerecek şekilde genişletilmesi (Zhivkovikj ve Munjishvili, 2024) eğitim standartlarına uygunluğun sağlanması için kalite süreçlerine birden fazla paydaşın dahil edilmesi, bu vurguyu yansıtan sonuçlardır. Bu tema ayrıca, değişen eğitim ihtiyaçlarına ve pazar taleplerine ayak uydurmak için düzenli incelemelerin ve güncellemelerin gerekli olduğu, geri bildirim ve değerlendirme verilerine dayalı olarak mikro-kredilerin iyileştirilmesini kolaylaştırdığını ve bunların endüstri standartları ve öğrenen beklentileriyle sürekli uyumunu sağladığını ifade etmektedir.

Paydaş Katılımı

Paydaş katılımı, mikro-kredilerin kalite güvencesinin güvenilirliği ve etkinliği için oldukça önemlidir. Bu tema, farklı paydaşlar -eğitim sağlayıcılar, öğrenciler, işverenler ve kalite güvence kurumları- arasındaki dinamikleri ve bunların etkileşiminin kalite güvence sürecini nasıl etkilediğini yansıtmakta, paydaşların aktif katılımının sadece kalite güvence süreçlerini geliştirmekle kalmayıp aynı zamanda işgücü piyasasında ve eğitim sektörlerinde mikro-kredilere olan güveni ve tanınırlığı da artırdığını ortaya koymaktadır (ENQA, 2023). Tema, mikro-kredilerin başarısını ve sürdürülebilirliğini sağlamak için geniş tabanlı destek ve doğrulamanın önemini vurgulamakta (Modus, 2023), mikro-kredilerin küresel düzeyde tanınması ve eşdeğerliğinin sağlanması için uluslararası iş birliğinin altını çizmektedir (Cirlan, 2023). Tema, kurumların, geri bildirime değer veren ve onu kullanan bir ortamı teşvik etmesini, değişiklikleri yönlendirmek için paydaş geri bildirimlerini kullanan kurumsal inceleme mekanizmalarının önemini de vurgulamaktadır. Bu bağlamda, politikaların ve yönergelerin işbirlikli ağlar aracılığıyla geliştirilmesinin ve bu şekilde birden fazla bakış açısının dikkate alınmasının önemi ortaya çıkmaktadır. Akreditasyon kuruluşları, paydaş bakış açılarını birleştirerek, mikro-kredilerin öğrencilerin ve sektör gereksinimlerinin gelişen ihtiyaçlarını karşılamasını sağlayabilir. Mikro-kredilere yönelik kalite güvence süreçlerinde, öğrencinin geçmişine, deneyimine, amacına ve ihtiyaçlarına verilen öncelik ön plana çıkmaktadır. Bu öncelik, mikro-kredilerin yaşam boyu öğrenme ve mesleki gelişimle ilgili olanlar da dahil olmak üzere, farklı öğrenen grupları için erişilebilir ve ilgili kalmasını sağlar. Öğrencinin kalite yönetimi süreçlerine katılımı yalnızca öğrenme deneyimini geliştirmekle kalmaz, aynı zamanda mikro-kredilerin öğrenci merkezli ve öğrenci geri bildirimlerine duyarlı kalmasını da sağlar.

Şeffaflık ve Hesap Verilebilirlik

Mikro-kredilerin oluşturulmasında, öğrenme çıktılarında ve değerlendirme yöntemlerinde şeffaflık, öğrenciler, işverenler ve eğitim kurumları da dahil olmak üzere tüm paydaşlar için çok önemlidir. Öğrenme çıktılarının ayrıntılı ve yeterlilik odaklı tanımları, paydaşların sertifikanın ya da kredinin değeri konusunda net beklentilere sahip olmasını sağlar. Akran değerlendirmeleri ve geri bildirim mekanizmaları hesap verebilirliği ve sürekli kalite iyileştirmeyi daha da artırır (Modus, 2023). Tema, mikro-kredilerin belgelendirdikleri becerileri gerçekten temsil ettiğinden emin olmak için hem sağlayıcı içinde hem de dış kurumlar tarafından tanınan detaylı ve geçerli değerlendirmelerin önemine vurgu yapmaktadır. Kapsamlı değerlendirmelerin ve açık şeffaflık içeren standartlaştırılmış doğrulama süreçlerinin oluşturulmasının, mikro-kredilerin kabulünü artıracağı ve mikro-kredilerin evrensel olarak kabul görmesini sağlayacağını ifade etmektedir (Ossiannilsson ve Singh, 2021). Bu bağlamda iç kalite ve dış kalite güvence mekanizmaları mikro-kredilerin değerine ilişkin şeffaflığı ve güveni korumak açısından kritik öneme sahip mekanizmalar olarak ön plana çıkmaktadır. Mikro-kredilere yönelik kabul sürecinde adalet ve şeffaflığın sağlanması, değerlendirme yöntemlerinin adil, geçerli ve tutarlı olması, açık ve şeffaf iletişim, açık politikalar ve kalite güvence uygulamalarının ve sonuçlarının kamuya açıklanması, paydaşların mikro-kredilerin değerlendirilmesinde kullanılan kriterleri ve bu değerlendirmelerin sonuçlarını anlamalarını sağlar. Kalite güvencesinde dürüstlüğün desteklenmesi, mikro-kredilerin öğrencilerin, işverenlerin ve eğitim kurumlarının gözünde değerini ve güvenilirliğini korumasına yardımcı olur.

Sonuç

Mikro-kredilerde kalite güvencesi ve akreditasyon konusu mikro-kredilerin tanınması ve mevcut sistemlerin mikro-krediler aracılığı ile geliştirilebilmesi açısından önem taşımaktadır. Mikro-krediler konusu yükseköğretim sisteminden büyük bir olgu olmakla beraber, yükseköğretim kurumları mikro-kredilerin tanınmasında önemli bir role sahiptir. Bu nedenle mikro-kredilerin kalite güvencesi ve akreditasyonunda bağlamsal, mevcut sistemlerle uyumlu ve aynı zamanda mikro-kredilerin doğasına uygun kalite çerçeveleri geliştirmek önemlidir. Kurumların iç kalite güvence süreçlerinde mikro-kredileri stratejik olarak nasıl konumlandıracaklarına, mevcut derecelerden ayrıştırılan, tek başına anlamlı olan veya alternatif sağlayıcılar tarafından verilen mikro-kredileri, mikro-yeterliliklerin de doğasına uygun olarak iç kalite güvence süreçlerine nasıl entegre edeceklerine karar vermeleri gerekmektedir. Dış kalite güvence süreçlerinde ise kurum ve program akreditasyonu ikilemini iş yükü dengesi ve orantı açısından çözen, kalite güvence kuruluşlarının rolünü (denetleyici, destekleyici ya da rehber) ve alternatif

sağlayıcıların konumunu belirleyen bir kalite anlayışı gerekliliği ortaya çıkmaktadır. Bu bağlamda mikro-krediler için esnekliğe ve değişime açık, sistemlere açık, paydaşlar arası iş birliğine açık, şeffaflık, kümülatif olma ve taşınabilirliğin ön planda olduğu yeni ve çevik bir kalite anlayışına ihtiyaç olduğunu söylemek mümkündür.

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Okul Öncesi Öğretmenlerinin STEM Kavramına Yönelik Öz Yeterlik İnançlarının İncelenmesi

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Özet

Gelişmiş toplumlarda yüksek yaşam kalitesine ulaşmak için nitelikli bir eğitime ihtiyaç duyulmaktadır. Yenilikçi eğitim modelleri eğitim sistemine aktarıldıktan sonra uygulayıcılar aracılığıyla yaygınlaştırılmaktadır. Bu çalışmanın amacı okul öncesi öğretmenlerinin STEM eğitimine yönelik öz yeterlik inançlarının incelenip, okul öncesi öğretmenlerinin STEM eğitimi ile ilgili kendilerine olan güvenlerini, görüşlerini derslere entegre etme durumlarının incelenmesidir. Bu amaç kapsamında karma yöntemin kullanıldığı çalışmada 48 okul öncesi öğretmenine anket uygulanmış ve veriler istatistiksel olarak analiz edilmiştir. Nitel verilerin toplanması için de 8 öğretmen ile yarı yapılandırılmış görüşme yapılmıştır. Analiz edilen veriler doğrultusunda okul öncesi öğretmenlerinin STEM eğitimine yönelik öz yeterlik inançlarının yüksek düzeyde olduğu saptanmıştır. Fakat öğretmenlerin derslerinde STEM eğitimine yer verme durumlarının orta düzeyde olduğu görülmüştür. Yapılan görüşmeler sonucunda da öğretmenler STEM eğitimini faydalı bulmakta ancak sınıfların kalabalık olması, fiziki şartların uygun olmaması, materyal eksikliği gibi durumlardan dolayı ders içeriklerini oluştururken zorluk yaşamaktadırlar. Öğretmenlerin hizmet için eğitimlerde uygulamalı STEM eğitimi, teknoloji entegrasyonu vb. eğitimlerin faydalı olacağı düşüncesine sahip oldukları görülmüştür. Okul öncesi öğretmenleri ile alanda uzman akademisyenler bir araya gelerek, öğretmenlerin hazırladıkları STEM etkinlikleri birlikte değerlendirilmesi ve öğretmenlerin akademisyenlerin tecrübelerinden yararlanması sağlanarak STEM etkinliklerine yönelik yeterlik artırılabilir. Öğretmenlerin meslek hayatlarında da akademik bilgilerini geliştirmek için Milli Eğitim Müdürlükleri tarafından STEM Eğitim Merkezleri açılabilir. Öğretmenler için hizmet içi kurslarla STEM etkinlikleri konusunda bilgilendirme yapılabilir.

Anahtar Kelimeler: STEM eğitimi, Okul öncesi, Öz yeterlik.

Investigation of Preschool Teachers' Self-Efficacy Beliefs towards the Concept of STEM

Abstract

A qualified education is needed to achieve a high quality of life in developed societies. After innovative education models are transferred to the education system, they are disseminated through practitioners. The aim of this study is to examine the self-efficacy beliefs of preschool teachers towards STEM education and to examine the self-confidence of preschool teachers about STEM education and their integration of their views into lessons. For this purpose, in the study where mixed method was used, a survey was applied to 48 preschool teachers and the data were analyzed statistically. Semi-structured interviews were conducted with 8 teachers to collect qualitative data. In line with the analyzed data, it was determined that preschool teachers' self-efficacy beliefs towards STEM education were at a high level. However, it was observed that teachers' inclusion of STEM education in their lessons was at a medium level. As a result of the interviews, teachers find STEM education useful, but they have difficulties in creating course content due to crowded classes, unsuitable physical conditions, and lack of materials. Applied STEM education, technology integration, etc. in teachers' in-service training. It was observed that they thought that the training would be useful. Proficiency in STEM activities can be increased by bringing together preschool teachers and academicians who are experts in the field, evaluating the STEM activities prepared by teachers together, and enabling teachers to benefit from the experiences of academics. STEM Education Centers can be opened by the Directorate of National Education to improve the academic knowledge of teachers in their professional lives. Teachers can be informed about STEM activities through in-service courses.

Keywords: STEM education, Preschool, Self-efficacy.

Giriş

Teknoloji ve bilim bakımından gelişmiş ülkeler, bilim çağının yaşandığı ve her geçen gün değişim ve gelişmelere uğrayan dünyamızda değişimlere hızlı adapte olup lider ülke olmak hedefiyle matematik ve fen eğitimini de içine kapsayan, öğrencilerin gerçek sorunlara çözüm bulup gelişmelerden uzak kalınmaması amacıyla STEM eğitim modeli ortaya çıkmıştır (Yenilmez ve Balbağ, 2016). STEM eğitimi ile bireyin kişisel ve mesleki açıdan gelişmelerine katkı sağlamanın yanı sıra toplumsal ve ekonomik yapının her geçen gün güçlenmesi açısından önem kazanmış ve bu konuda çalışmalar yürütülmektedir (Akgündüz ve diğ., 2015).

Bireyin günlük hayatta bağ kurup karşılaştığı problemlere çözüm üreterek anlamlı ve kalıcı öğrenme sağlayabilmesinde disiplinlerarası entegrasyon sayesinde bilgi ve hayat arasında güçlü bir köprü oluşur. Biyoloji içerikli bir ders verilirken robotikle ilişkilendirilip matematiksel ve mühendislik hesaplamalarla disiplinlerarası entegrasyon sağlanabilir (Çolakoğlu ve Gökben, 2017). Bireyin gerçek hayatta karşılaştığı sorun ile disiplinlerarası ilişkiler kurulmasıyla gerçekleştirilen STEM eğitimi ile birçok dersin ayrı ayrı öğretilmesi yerine bütüncül bir öğretim süreci hedeflenmektedir (Pang ve Good, 2000). Eğitimin sadece teoriden ibaret olmaktan çıktığı, günlük yaşamda uygulanarak pratikliğin kazanıldığı bir süreçte dersler ve disiplinlerarası koordinasyon önemli bir yere sahiptir (Gencer ve diğ., 2019). Günlük yaşamda bir arada olan STEM disiplinleri birbirinden bağımsız düşünülemez (Moomaw, 2013). STEM disiplinleri iç içe geçmiş bütünsel bir yapıdır (Gülhan ve Şahin, 2016). STEM'in tanımı konusunda uzmanlar öğrencilerin fen, teknoloji, mühendislik ve matematik gibi birçok disiplinlerarası bağlantı kurduğu bir yaklaşım olduğu noktasında birleştiği görülmektedir (Thomas, 2014). Disiplinlerarası bütünleşik yapıya sahip STEM eğitimi sayesinde çocukların kalıcı akademik başarısının yanı sıra ülkelerin ekonomik kalkınması üzerine önemli bir yere sahiptir (Quigley ve Herro, 2016). Ekonomi alanında Nobel ödülü alan James Heckman okul öncesi eğitime yapılacak 1 dolarlık yatırımın ülke ekonomisine katkıda 13 dolarlık dönüt sağlayacağını düşünmektedir (Arkan ve Öztürk, 2018).

STEM eğitiminin temel amaçları doğrultusunda ezber yerine çocukların uygulamada başarılı olmaları hedeflenip üretimin yapıldığı ve öğrenilenlerin somutlaştırıldığı bir yaklaşım sunulmaktadır (Pehlivan ve Uluyol, 2019). Gelişmiş ülkelerin eğitim sistemlerinde kullanılmakta olan STEM eğitimi bir model olmaktan öte yaşam tarzı olarak eğitim kurumlarında uygulanmaktadır (Pehlivan ve Uluyol, 2019). Uygulamada olumlu sonuçlar alınan Amerika'nın ardından birçok ülke eğitim sistemlerinde belirli düzenlemeler yaparak STEM eğitimini programlarına dahil etmiştir. Ülkemizde de okul öncesi kademesinden üniversiteye kadar eğitimin her kademesinde ivedilikle STEM eğitiminin uygulanması gerektiği MEB YEĞİTEK tarafından belirtilmiştir (MEB YEĞİTEK, 2016). 21. Yüzyıl becerilerine sahip bireyler yetiştirmeyi esas alan MEB Okul Öncesi Eğitim Programı çocukların okul öncesi eğitimle bireysel farklılıklarına uygun motor, sosyal, duygusal, dil ve bilişsel becerilerinin geliştirilmesinin yanı sıra hayal gibi, iletişim becerileri, yaratıcılık ve eleştirel düşünme becerilerinin de geliştirilmesini temel ilkeleri arasına almıştır (MEB, 2013). Çakır ve Altun Yalçın (2020) okul öncesi öğrencileri üzerine yaptığı çalışmada çocukların gelişim açısından en verimli oldukları bu dönemin aynı zamanda STEM eğitimi açısından da en uygun dönem olduğu sonucuna ulaşmıştır. Okul öncesi dönem çocuklarında STEM eğitiminin uygulanması sonucu takım çalışması, sunum, ürün ortaya koyma ve mühendislik becerilerine yönelik çocuklarda pozitif etki oluşturduğu ve okul öncesinde uygulanabilir bir program olduğu vurgulanmaktadır (Başaran, 2018). Erken çocukluk döneminde işbirliği becerilerinin, odaklanma, keşfetme ve yaratıcılığın gelişmesinde STEM eğitiminin önemli bir rolü vardır (Moomaw ve Jaumall, 2010). 5-6 yaş grubu çocuklarda STEM eğitimi ile yaratıcılık düzeylerinde gelişme olduğu sonucuna varılmıştır (Üret, 2019). Aynı zamanda STEM eğitimi ile çocuklarda akıl yürütme, analiz ve değerlendirme gibi eleştirel düşünme becerilerinin de geliştirilebileceği vurgulanmaktadır (Linh ve diğ., 2019). Okul öncesi eğitimi alan çocuklarda STEM eğitiminin uygulanması çocuklarda bilimsel süreç becerilerinin ve problem çözme becerilerinin gelişimine katkı sağladığı görülmüştür (Bal, 2018). Öcal (2018) ve Atik (2019) de okul öncesi çocuklar üzerine yaptığı çalışmalarda STEM eğitiminin çocuklarda bilimsel süreç becerilerine kalıcı katkı sağladığı sonuçlarına ulaşmışlardır. Akçay (2019) yaptığı çalışmada okul öncesi çocuklarında STEM etkinlerinin problem çözme becerilerine kalıcı ve anlamlı etki oluşturduğu sonucuna ulaşmıştır.

STEM eğitiminin amacına ulaşabilmesi için disiplinlerarası problemlere çözüm üretebilecek çocukları yetiştirebilecek öğretmenlerin öncelikli olarak bu yaklaşım konusunda bilinçli ve donanımlı olmaları sayesinde etkili planlamalar yapması, ihtiyaç duyulan materyalleri geliştirip eğitim ortamını hazırlayabilmeleri gerekmektedir (Çevik, Danıştay ve Dağcı, 2017). Öğretmen öz yeterliği, eğitim sürecindeki bu planlama, etkinlikleri gerçekleştirme yeteneklerine yönelik inançlarıdır (Skaalvik ve Skaalvik, 2007). Yapılan araştırmalarda öğretmenlerin öz yeterliği öğrencilerin öğrenmelerinde önemli bir yere sahip olduğu tespit edilmiştir (Yoon, Evans ve Strobel, 2012). Öğretmenlerin STEM eğitiminde öz yeterliklerinin geliştirilmesi uygulamada etkili bir eğitim verilmesi için oldukça önemlidir (Knowles, 2017). Eğitim sürecinde uygulayıcı olan okul öncesi öğretmenlerinin öz yeterliklerini destekleyici ve geliştirici STEM eğitimi alarak mevcut kavram yanılgılarını düzelttikleri ve STEM eğitimine yönelik algılarının değiştiği sonucuna ulaşılmıştır (Erol, 2021).

Yöntem

Bu bölümde araştırma modeli, çalışma grubu, veri toplama araçları, uygulama süreci ve verilerin analizi başlıklarına yer verilmiştir.

Araştırma Modeli

Bu araştırmada nicel ve nitel yöntemlerin bir arada olduğu karma desen kullanılmıştır. Bu çalışmada öğretmenlerin öz yeterlik düzeylerini belirlemek için nicel veri toplama aracı olarak ön test ve son test şeklinde "STEM uygulamaları öğretmen öz yeterlik ölçeği" uygulanmıştır. Bu araştırmanın nicel boyutunda basit deneysel desende sadece deney grubu oluşturulmuştur. Nitel verileri toplamak için "Yarı yapılandırılmış görüşme formu" kullanılmıştır.

Çalışma Grubu

Araştırmanın çalışma grubunu Elazığ Milli Eğitim Müdürlüğü 48 okul öncesi öğretmeni oluşturmaktadır. Çalışma grubu amaçlı örnekleme yöntemi ile belirlenmiştir. Durum çalışmalarında bir amaca yönelik örnekleme yönteminin kullanılmasının faydalı olduğu ifade edilmektedir (Mills, Durepos ve Wiebe, 2010).

Veri Toplama Araçları

Araştırmada nicel veri toplama aracı olarak Yaman ve diğerleri (2018) tarafından geliştirilen "STEM Uygulamaları Öğretmen Öz Yeterlik Ölçeği" kullanılmıştır. 18 maddeden oluşan ölçek Hiçbir zaman (1)- Her zaman (5) şeklinde beşli likert tipi ölçeklendirilmesi ile derecelendirilmiştir. Tek boyuttan oluşan ölçekten en yüksek 90, en düşük 18 puan alınmaktadır. Ölçek tek faktörlü yapıya sahip olup Cronbach's Alpha güvenirlik katsayısı ise 0.97'dir.

Araştırmada nitel veri toplama aracı olarak okul öncesi öğretmenleri ile yarı yapılandırılmış görüşmeler yapılmıştır. Görüşme rastgele seçilen 8 gönüllü öğretmene uygulanmıştır. Öğretmenlere 3 farklı soru sorulmuştur. Yarı yapılandırılmış görüşme soruları ekte verilmiştir.

Uygulama Süreci

Bu araştırmada öğretmenlere STEM uygulama planları verilmiştir. Bu uygulamaların öğretmenlerin STEM öz yeterlikleri üzerindeki etkisinin incelenmesi amaçlanmıştır. Bu amaca yönelik 48 okul öncesi öğretmenine uygulama öncesinde ön test olarak STEM uygulamaları öğretmen öz yeterlik ölçeği uygulanmıştır. Öğretmenlerden 6 hafta boyunca gönderilen STEM içeriklerini uygulamaları istenmiş uygulama sonunda aynı ölçek son test olarak uygulanmıştır.

Tablo 1. Uygulama Süreci Haftalık İçerik Tablosu.

Uygulama Süreci	İçerik
1.Hafta	STEM'in amacı hakkında bilgilendirme
2.Hafta	Makineler Dünyası teması kapsamında problem durumu belirleme haftası
3.Hafta	Bilgi edinme haftası
4.Hafta	Fikir geliştirme haftası
5.Hafta	Ürün oluşturma haftası
6.Hafta	Ürün sergisi ve sunum haftası

Verilerin Analizi

Nicel verilerin analizinde SPSS paket programı kullanılmıştır. STEM uygulamaları öğretmen öz yeterlik ölçeğinden elde edilen veriler öğretmenlerin ön test ve son testlere vermiş olduğu cevapların ortalamaları ile elde edilmiştir. Verilerin analizinde ön-son testler normal dağılım gösterdiğinden parametrik testlerden t-testi kullanılmıştır. Araştırmada tek örneklemede ön test ve son test arasındaki ortalamaların farkı incelendiği için ilişkili örneklem t testi kullanılmıştır.

Nitel verilerin analizinde toplanan verileri açıklamak ve ilişkilere ulaşmak amacıyla içerik analizi kullanılmıştır. Öğretmenler tarafından sıklıkla tekrar edilen 3 kelime kodlanmıştır. Elde edilen kodların yüzde ve frekans değerleri belirlenerek değerlendirilmeye alınmıştır. Araştırma verileri rastgele seçilmiş 8 gönüllü öğretmen ile toplanmıştır. Öğretmenlerden veriler etiklik açısından Ö1, Ö2, Ö3… şeklinde kodlanarak elde edilmiştir.

Bulgular

STEM Uygulamaları Öz yeterlik Nicel Bulgular

Okul öncesi öğretmenlerine uygulanan STEM uygulamaları öğretmen öz yeterlik ölçeğinden elde edilen ön test ve son test ortalamalarının incelendiği ilişkili örneklem t testi sonuçları Tablo 2'de verilmiştir.

Tablo 2. Okul Öncesi Öğretmen Adaylarının STEM Uygulamaları Öğretmen Öz Yeterlik Ölçeği Ön Test Son Test İlişkili Örneklem t Test Analizi.

	N	X	S	Sd	t	p
Ön Test	48	2.23	.43	48	,95	.000
Son Test	48	3.39	.31			

*p<0.05

Tablo 2 incelendiğinde ilişkili örneklem t testi sonuçlarına göre STEM uygulamaları öğretmen öz yeterlik ölçeği uygulanan okul öncesi öğretmenlerinin ön test ortalamaları ve son test ortalamaları arasında istatistiksel olarak anlamlı bir farkın olduğu görülmektedir (p<.05). Son test lehine olan bu anlamlı fark da uygulamanın olumlu yönde etkisi olduğu saptanmış, öğretmenlerin öz yeterlik düzeylerinin arttığı görülmüştür.

Yarı Yapılandırılmış Görüşme Nitel Bulgular

Okul öncesi öğretmenlerine yönelik STEM öz yeterliliklerini ölçen 3 soru yöneltilmiştir.

Soru 1."STEM kavramı deyince aklınıza ne geliyor ?"

Soru 2."Uyguladığınız STEM süreci ile ilgili görüşleriniz neler ?"

Soru 3. "STEM etkinliklerini yaparken kendinizi yeterli buluyor musunuz ?"

Tablo 3. Okul Öncesi Öğretmenlerinin "STEM kavramı deyince aklınıza ne geliyor ?" sorusuna vermiş oldukları cevaplar.

Soru	Tema	Kod	Frekans	
STEM kavramı deyince aklınıza ne geliyor?	Disiplinlerarası bütünleşik ders	Fen ve matematik	3	8
		Fen,Teknoloji, matematik	2	
		Fen ve Mühendislik	3	
	Aktif Öğrenme	Öğrencinin etkin olması	4	11
		Yaparak yaşayarak öğrenme	5	
		Öğrencinin problem çözmesi	2	

Düşünme Becerisi	Hayal gücünü kullanmak	4	8
	Fikir üretmek	4	

Tablo 3 incelendiğinde "STEM kavramı deyince aklınıza ne geliyor?" sorusuna yönelik okul öncesi öğretmenlerinin verdikleri cevaplar "Disiplinlerarası bütünleşik ders, aktif öğrenme ve düşünme becerisi" temaları altında birleştirilmiştir. Öğretmenlerin verdiği bazı cevaplar aşağıda verilmiştir.

Ö5: "Çocukların pasif dinleyici olarak değil aktif kendi düşünerek sorunu çözen ve üreten bir süreçte olması diyebilirim."

Ö8: "STEM kavramı fen, matematik temel derslerinin teknoloji ile birleştirilerek aktarımı olarak tanımlanabilir."

Ö6: "Öğrencinin yaşı gereği bu kadar aktif olması derslerin eğlenceli geçmesini sağlıyor.Ancak ürün oluşturma sürecinde malzeme eksikliği yaşıyoruz."

Tablo 4. Okul Öncesi Öğretmenlerinin "Uyguladığınız STEM süreci ile ilgili görüşleriniz neler?" sorusuna vermiş oldukları cevaplar.

Soru	Tema	Kod	Frekans	
Uyguladığınız STEM süreci ile ilgili görüşleriniz neler	Süreç odaklı olması	Deney Gözlem	4	8
		Problem tespit etme	2	
		Hikayeden ürüne	2	
	Sistem ve Plan	Kolay uygulanabilir olması	4	9
		Ön hazırlık gerektirmesi	3	
		Malzeme ihtiyacı	2	

Tablo 4 incelendiğinde "STEM kavramı deyince aklınıza ne geliyor?" sorusuna yönelik okul öncesi öğretmenlerinin verdikleri cevaplar "Süreç odaklı olması, sistem ve plan" temaları altında birleştirilmiştir. Öğretmenlerin verdiği bazı cevaplar aşağıda verilmiştir.

Ö1: "Öğrencilerin aktif olarak katıldığı süreçte eğlenerek öğrendik. Zorlayıcı değildi, kolaylıkla uyguladık."

Ö2: "Hikaye ile başlayan bir sürecin problem tespiti ve sonucunda ürün oluşturulması kolay bir süreçti."

Ö6: "Sınıfın kalabalık olması ürün oluşturma aşamasında malzeme ve fiziki şartlar sınıf yönetimi konusunda beni zorladı."

Tablo 5. Okul Öncesi Öğretmenlerinin "STEM etkinliklerini yaparken kendinizi yeterli buluyor musunuz?" sorusuna vermiş oldukları cevaplar.

Soru	Tema	Kod		Frekans
STEM etkinliklerini yaparken kendinizi yeterli buluyor musunuz?	Yeterli buluyorum	Uygulanabilirliğinin olması	6	13
		Eğlenceli olması	4	
		Fen içeriklerinin olması	3	
	Yeterli bulmuyorum	Sınıf yönetimi	3	8
		Fiziki şartlar	3	
		Ön hazırlık gerektirmesi	2	

Tablo 5 incelendiğinde "STEM etkinliklerini yaparken kendinizi yeterli buluyor musunuz?" sorusuna yönelik okul öncesi öğretmenlerinin verdikleri cevaplar "Yeterli buluyorum ve yeterli bulmuyorum" temaları altında birleştirilmiştir. Öğretmenlerin verdiği bazı cevaplar aşağıda verilmiştir.

Ö6: "Okul öncesi çocukları ile aktif ortamı kontrol altında tutmak beni zorladı."

Ö8: "Kendimi yeterli buluyorum. Zaten uyguladığımız içerikler, kompleks hale getirilmiş ve farklı şekilde aktarımı sağlanıyor. Çocuklar da bu süreçte aktif bir şekilde keyifle öğrendi. Kendim STEM etkinliklerini uygulamaya devam edeceğim."

Sonuç, Tartışma ve Öneriler

Literatür incelendiği zaman STEM kavramının kullanıldığı araştırmaların okul öncesi öğretmenlerinin ve öğretmen adaylarının yaratıcılık becerilerine (Çakır, Yalçın & Yalçın, 2019), eleştirel düşünme becerilerine (Çakır, Yalçın & Yalçın, 2020; Şimşek, 2022), sınıf içi uygulamalarına (Karamete Gözcü, 2019), STEM yaklaşımına yönelik görüşlerine (Akarsu, Akaçy & Öcal, 2021; Günşen, Uyanık & Akman, 2019; Uğraş & Genç, 2018; Yıldırım & Türk, 2018), yansıtıcı düşünme becerilerine (Samur &Yalçın, 2021), STEM öz-yeterliklerine (Sütçü, Uçak & Toprak, 2023) olumlu etkileri olduğu görülmektedir.

Ülkemizde okul öncesi öğretmenleri üzerinde yapılan araştırmalarda bilimsel süreç becerileri ile STEM becerilerini kullanma düzeylerinin yeterli olmadığı sonucuna ulaşılmıştır (Kefi, Çeliköz, Erişen, 2013). Ersoy (2018), yaptığı çalışmasında STEM öğretimine yönelik öz yeterlik inançlarının okul öncesi öğretmenlerinde çok düşük düzeyde olduğu sonucuna ulaşmıştır. (Kubat, 2016),kavram bilgisi ve alan bilgisinde yetersiz olan öğretmenlerin STEM eğitimini uygulamada kavram karmaşasına sebep olabileceğini belirtmiştir. Bu durumda kendini yeterli donanımda hissetmeyen ve bilimsel alan yetersizliği olan öğretmenlerimiz bireysel ya da hizmet içi eğitimlerle takviye alması fayda sağlayacaktır (Kırıkkaya, 2009).

Değirmenci (2020), STEM eğitimi almış 122 öğretmenle yaptığı çalışmasında genel olarak öz yeterliklerinin ortalamanın üzerinde çıktığı, branş bazlı ise en yüksek öz yeterlik sonuçlarını okul öncesi ve bilişim öğretmenliği alanında olduğu sonucuna ulaşmıştır. Aynı zamanda en fazla mühendislik alanında yetersizlik hissettikleri sonucuna ulaşmıştır. Polat (2021), yürüttüğü doktora çalışmasında okul öncesi öğretmenlerinin fen ve doğa etkinliklerine yönelik yeterlik düzeylerinde etkinlik planlama, yöntem teknik ve uygulamalarda farklılıklar olduğunu tespit etmiştir. Karamete Gözcü (2019), STEM eğitimi almış 10 okul öncesi öğretmenle yaptığı çalışmasında öğretmenlerin rutin okul öncesi etkinliklerini STEM etkinliklerine uyarlayabildikleri ancak mühendislik alnında gerek materyal gerekse uygulama aşamasında zorluk yaşadıkları sonucuna ulaşmıştır.

Bu araştırma kapsamında okul öncesi öğretmenlerinin STEM eğitimine yönelik öz yeterlik inançlarının yüksek düzeyde olduğu saptanmıştır. Yapılan görüşmeler sonucunda öğretmenlerin fen etkinliklerini severek yaptıklarını ve STEM kavramına yabancı olmadıklarını dile getirmişlerdir. Öğrencilerin süreç boyunca aktif olmaları öğretmenler tarafından da olumlu karşılanmış ve STEM etkinliklerinin uygulanabilirliğini artırmıştır. Ünal (2019) da yaptığı araştırmada STEM uygulamalarının çocukların süreç becerilerini geliştirmede aktif olduklarını belirtmiştir.

Yapılan görüşmeler sonucunda da öğretmenler STEM eğitimini faydalı bulmakta ancak sınıfların kalabalık olması, fiziki şartların uygun olmaması, materyal eksikliği gibi durumlardan dolayı ders içeriklerini oluştururken zorluk yaşamaktadırlar. Öğretmenlerin hizmet için eğitimlerde uygulamalı STEM eğitimi, teknoloji entegrasyonu vb. eğitimlerin faydalı olacağı düşüncesine sahip oldukları görülmüştür. Okul öncesi öğretmenleri ile alanda uzman akademisyenler bir araya gelerek, öğretmenlerin hazırladıkları STEM etkinlikleri birlikte değerlendirilmesi ve öğretmenlerin akademisyenlerin tecrübelerinden yararlanması sağlanarak STEM etkinliklerine yönelik yeterlik artırılabilir. Öğretmenlerin meslek hayatlarında da akademik bilgilerini geliştirmek için Milli Eğitim Müdürlükleri tarafından STEM Eğitim Merkezleri açılabilir. Öğretmenler için hizmet içi kurslarla STEM etkinlikleri konusunda bilgilendirme yapılabilir. Ayrıca yapılacak yeni araştırmalarda okul öncesi öğretmenlerine temalar sunularak STEM planları oluşturmaları ve öz yeterlik düzeylerinin karşılaştırılması sağlanabilir.

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Öğretmenlerin Yapay Zekâ Okuryazarlığı Düzeylerinin İncelenmesi

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Özet

Teknoloji iş hayatında olduğu gibi gündelik hayatımızında vazgeçilmez bir parçası olmuştur. Teknolojik araçlar geçmişten günümüze kadar insan hayatına entegre olmuş ve yenilikleri ile çeşitli avantajlar ortaya çıkmasına imkan sağlamıştır. Bu araştırmanın konusu olan yapay zeka ve yapay zeka okur yazarlığı da iş, eğitim, sağlık ve çeşitli alanlarda insanların yaratıcı ürünler ortaya çıkartmasını sağlamıştır. Bu araştırmada yapay zeka teknolojileri eğitim alanı üzerinde incelenecektir. Eğitimde kullanılan yapay zeka teknolojileri öğretmenlerin ders işleyişlerini, planlamalarını, aktivite vb. konular üzerinde çeşitli etkiler yaratmaktadır. Ancak bu teknolojilerden faydalanabilmek için öğretmenlerin yapay zeka okuryazarlığının belirli bir seviyeye ulaşmış olması gerekmektedir. Ancak bu şekilde yapay zeka teknolojilerinden hem öğretmenler hem de öğrenciler etkin bir şekilde faydalanabilmektedir. Bu araştırmada öğretmenlerin yapay zeka okuryazarlıkları düzeylerini ölçmek için *Yapay Zeka Okuryazarlığı Ölçeği (*Çelebi vd., 2023) kullanılmıştır. 388 öğretmenden veri toplanmıştır. Ayrıca, öğretmenlerin yapay zeka ile ilgili görüşlerini incelemek için 6 öğretmenle görüşmeler yapılmıştır. Öğretmenlerin verdiği yanıtlar doğrultusunda doktora ve yüksek lisans eğitimi, yapay zeka deneyimi ve yapay zeka kullanma becerisi olan öğretmenlerin yapay zeka okuryazarlığının daha yüksek olduğu tespit edilmiştir.

Anahtar Kelimeler: Yapay Zeka, Yapay Zeka Okuryazarlığı, Eğitim

Investigation of Teachers' Artificial Intelligence Literacy Levels

Abstract

Technology has become an indispensable part of our daily lives as well as in business life. Technological tools have been integrated into human life from the past to the present and have provided various advantages with their innovations. Artificial intelligence and artificial intelligence literacy, which are the subject of this research, have enabled people to create creative products in business, education, health and various fields. In this research, artificial intelligence technologies will be examined in the field of education. Artificial intelligence technologies used in education create an effective working system on teachers' course work, planning, activities, etc. It also enables students to be more efficient in their education. Artificial intelligence used in education generally consists of tools such as smart boards, online-offline applications, QR code, smart books. However, in order to benefit from these technologies, teachers should have reached a certain level of artificial intelligence literacy. Only in this way can both teachers and students effectively benefit from artificial intelligence technologies. In this study, it is aimed to measure the artificial intelligence literacy of teachers and to evaluate their perspectives on artificial intelligence. In order to measure teachers' AI literacy, mixed analysis was used in the study. In the qualitative part of the analysis, a semi-structured interview form was applied to 6 teachers. According to the responses of the teachers, AI literacy was associated with achievement and technology. In the quantitative part of the study, the Artificial Intelligence Literacy Scale taken from Çelebi et al. (2023) was applied. The questionnaire applied in the quantitative part consists of two parts: personal information form and scale questions. A total of 388 teachers (277 female and 211 male) participated in the study. In line with the responses of the teachers, it was determined that teachers with doctorate and master's degree education, artificial intelligence experience, and the ability to use artificial intelligence had higher AI literacy.

Keywords: Artificial Intelligence, Artificial Intelligence Literacy, Education

Giriş

Tarih boyunca insanlar, canlı olmayan nesneleri hareket ettirme isteklerini ifade etmenin çeşitli yollarını bulmuşlardır. İlk insanlar taşları birbirine vurarak temel aletler oluşturarak, doğal dünyayla bağlarını güçlendirmiştir (Pirim, 2006). Teknolojinin gelişimi ve insanların hayal gücü tarih boyunca çok değişmiştir. İnsanlar tarih boyunca makineler, motorlar ve robotlar gibi mekanik cihazlar yaratarak daha fazla güç kazanmaya çalışmıştır. Ancak bilgisayar teknolojisinin ortaya çıkmasıyla gerçek bir dönüşüm başlamıştır. Hesaplama gücü ve veri işleme yetenekleriyle donatılmış bilgisayarlar, bireylere daha önce hayal bile edilemeyen görevleri yerine

getirme yetkisi vermiştir. Ancak bu bilgisayarlar yapay zeka teknolojisiyle entegre edildiğinde önemli bir değişim meydana gelmiştir (Öztürk ve Şahin, 2018).

Zekâ kavramı bireylerin becerilerinin ortaya çıkarılmasında önemli bir rol oynamaktadır. Zeka, insanların çeşitli zihinsel becerileri kullanarak ve ayrıntılara dikkat ederek alışılmadık veya öngörülemeyen koşullara uyumlu olmasını sağlamaktadır. Kişi aynı zamanda soyut düşünmeyi kullanabilmekte, kararlar verebilmekte, şeyler arasında bağlantılar bulabilmekte ve bu zihinsel yetenekleri zeka ile bir amaç için uygulayabilmektedir (Nabiyev, 2012). Kazu ve Özdemir (2009) zekanın belirli bir konuya odaklanarak, bilgi edinerek, uzmanlık kazanarak ve bir durumu veya olayı (başka kelimelerle ifade ederek) inceleyerek geliştirilebileceğini savunmaktadır. Zekanın işleyişini taklit eden yazılım ve donanımların gelişmesiyle birlikte yapay zeka fikri tartışma konusu haline gelmiştir (Elmas, 2003). Bu durumda zeka, yapay zekanın temelidir. Literatürde yapay zeka ile zekanın farklı özellikleri ve faydaları olduğu iddia edilmektedir. Adalı (2017) öğrenmeyi sürdürmede yapay zekanın zekaya göre bazı farklılıklarının olduğunu belirtmiştir. İnsanların öğrendiği ya da yaşadığı şeyler ve olaylar yaşları ilerledikçe hafızalarında kalmayabilmektedir. Yapay zekada bu mümkün değildir. Buna ek olarak yapay zeka güvenilirdir. İnsanların aynı olaya farklı tepkileri olsa da yapay zeka sürekli olarak aynı tepkileri göstermektedir. Zeka, öğrenme ve deneyimler yoluyla kendini geliştirebilir, yaratıcı ve hızlı çözümlere yol açabilmektedir. Ancak yapay zeka sahip olduğu verilerle sınırlıdır. Fakat yapay zekanın üretebileceği çözümler ancak sahip olduğu veriler ve bildiği teknikler kadar iyidir. Yapay zeka sistemi programlanmadan hiçbir şey öğrenemez (Kaku, 2016: 91). Yapay zeka her ne kadar karmaşık programlardan oluşsa da zekaya sahip olan insan beyni kadar karmaşık ve gelişmiş değildir (Çelebi ve İnal, 2019).

1. Eğitimde Yapay Zeka

Eğitim-öğretim süreci oldukça karmaşıktır. Eğitimde öğrenme hedefleri, öğretim materyalleri, ölçme ve değerlendirme, öğrenme ortamı gibi çeşitli unsurları içerir (Latif vd., 2023; Mahler, 2022). Öğretmen, asli sorumluluğu olan bu süreçlerin gözetimi konusunda ciddi zihinsel ve fiziksel zorluklarla karşı karşıya kalmaktadır. İnsan düzeyinde bilişsel yeteneklere sahip olan Yapay Genel Zeka (YGZ), büyük miktarda veriyi verimli bir şekilde analiz edebildiği ve eylemlerini istenen hedeflerle hizalayabildiği için öğrenme ve öğretme süreçlerinde değerli bir müttefik olabilmektedir (Lin vd., 2023, Mahler, 2022, Zhao ve diğerleri, 2023).

Mevcut sınırlamalarına rağmen günümüzün gelişmiş yapay zeka modelleri, yapay genel zekaya ulaşma yolunda ilk adımlar olarak görülmektedir. Chounta vd. (2022), YGZ sistemlerinin büyük miktarda veriyi verimli bir şekilde işleyerek, öğretimi her öğrencinin gereksinimlerine göre uyarlayarak, anında geri bildirim sunarak ve ilgi çekici ve dinamik öğrenme ortamlarını teşvik ederek eğitim sonuçlarını büyük ölçüde artırabileceğini ileri sürmektedir. YGZ (Chen vd., 2023), öğretmenlerin başkalarından yardım alarak öğretme ve öğrenmelerini geliştirebileceklerini öne sürmektedir.

Yapay Genel Zeka (YGZ) teknolojisinin etkisinin bir sonucu olarak, eğitimciler odaklarını yalnızca bilgi vermek yerine mentorluk ve rehberlik sağlamaya kaydırabilmektedir. Bu yönelim, öğrencilerin kendi güçlü yönlerini ve yeteneklerini daha iyi bulmalarına ve geliştirmelerine yardımcı olabilmektedir. Önümüzdeki yıllarda YGZ'nin yeteneklerini daha iyi anlamak ve gelişiminin bir sonraki aşamasına doğru ilerleyişini gözlemlemek mümkündür. Beklenen değişimlere hazır olmak ve öğretmen eğitimini buna göre düzenlemek şarttır. Bu çalışmaları yürüterek anlayışı artırabilir ve öğretmenlerin ve eğitim sisteminin gelecekteki değişikliklere hazırlanmasına yardımcı olmak mümkündür. Karmaşık görevleri insanlar kadar veya onlardan daha iyi gerçekleştirebilen makinelerin geliştirilmesi, güçlü yapay zeka veya insan düzeyinde yapay zeka olarak da bilinen yapay genel zeka (AI) olarak bilinmektedir (Chibuye ve Phiri, 2023).

Yapay Zeka terimi ilk kez 1900'lerin ortalarında kullanılmıştır. Bilim insanı Alan Turing, Konrad Zuse ve John McCarthy, makinelerin düşünceleri olabileceğini öne sürmüştür. 1950'li yıllarda bir makinenin insan gibi davranıp düşünemeyeceğini görmek için Turing testi yapılmıştır. 1960'larda yapay zeka araştırmaları oyun, doğal dil işleme ve makine çevirisi gibi belirli alanlara odaklanmıştır. 1980'lerde yapay zeka araştırmaları odağını daha çok yönlü sistemler geliştirmeye başlanmıştır. 2000'li yıllarda yapay zeka araştırmaları, büyük veri ve makine öğrenimi gibi yeni teknolojilerin kullanılmasıyla ilerlemiş ve sonuçta YZG'nin ortaya çıkmasına neden olmuştur.

YGZ'nin ortaya çıkışı, yapay zeka alanında, belirli görevler için tasarlanmış sistemlerden daha çok yönlü ve kendi kendini yöneten sistemlere doğru önemli bir değişime işaret etmektedir. YGZ sistemleri çeşitli alanlardaki mevcut bilgileri kavrayabilir, kullanabilir, inceleyebilir, yargılayabilir, birleştirebilir. Problem çözme, karar verme ve

yaratıcı düşünme gibi ileri düzey zihinsel görevleri gerçekleştirme kapasitesi, YZG'nin karmaşık bilişsel faaliyetleri gerçekleştirmesine olanak sağlamıştır (Goertzel, 2014; Obaid, 2023).

YGZ, insan zekasını taklit eden, onun dünyayı algılamasını, mantıksal olarak akıl yürütmesini ve insanlar gibi iletişim kurmasını sağlayan algoritmalar ve modeller geliştirebilir (Pennachin ve Goertzel, 2007). YGZ henüz emekleme aşamasında olmasına rağmen yetenekleriyle bizi şaşırtıyor. Üniversitelerde yapılan araştırmalar ve şirketlerdeki Ar-Ge faaliyetleriyle YGZ'nin sınırları sürekli genişletilmektedir. Yakın gelecekte yapay zekanın bir sonraki seviyesi olan YGZ'nin yeteneklerini daha iyi anlamak mümkündür.

Geleneksel sınıflarda eğitimciler, dengeli bir öğretim yöntemi aracılığıyla farklı öğrenme stilleri, yetenekleri ve tercihleri olan çok çeşitli öğrencilere eğitim vermeye çalışır. YGZ, öğrencilerin nasıl yaptıkları, neyi sevdikleri ve neyi bilmedikleri hakkındaki verilere bakarak ve onların daha iyi yapmalarına yardımcı olmak için öğrenme hızlarını değiştirerek geri bildirimde bulunabilir (Chounta ve diğerleri, 2022). Özelleştirilmiş bir yöntem geliştirildiğinde öğrencinin katılımını ve coşkusunu artırabilir (Bundick vd., 2014).

YGZ, öğretmenlerin öğrencilerinin yaratıcılığını, eleştirel düşünme ve problem çözme becerilerini geliştiren etkileşimli ve teşvik edici öğrenme alanları tasarlamalarına olanak tanır. Eğitimciler, YGZ'yi kullanarak her öğrencinin özel gereksinimlerine ve tercihlerine hitap eden, multimedya kaynaklarını, simülasyonları ve sanal gerçeklik uygulamalarını içerebilecek özelleştirilmiş eğitim materyalleri geliştirebilirler (Lin ve diğerleri, 2023). Bu esnek öğrenme ortamlarında öğrenciler bilgiyi kendi hızlarında araştırabilirler ve bu da aktif öğrenme, eleştirel düşünme ve problem çözme becerilerini geliştirebilir.

YGZ, sonuçların ölçülmesi ve değerlendirilmesinde kullanılan yöntemlerde de önemli iyileştirmeler yapabilir. Standart, eğitmen odaklı değerlendirme teknikleri verimsizdir, sıkıcıdır, uzundur ve sınırlı geri bildirim sağlar. YGZ sistemleri, değerlendirme sürecini otomatik olarak yaparak, basitleştirerek ve daha iyi bir forma dönüştürerek daha verimli, daha kolay ve daha adil hale getirebilir. YGZ sistemleri, öğrencilerin anlayışlarını hızlı bir şekilde değerlendirebilir ve anında geri bildirim yoluyla zayıf yönlerine anında yardım sağlayabilir (Flogie ve Aberšek, 2022, Nazaretsky ve diğerleri, 2023, Zhai ve Nehm, 2023).

Eğitimde YGZ'nin faydalarından tam olarak yararlanmak için YGZ sistemlerinin eğitim alanındaki uzmanlar tarafından öğretilmesi ve oluşturulması önemlidir. YGZ, öğrencinin güçlü yönlerini tespit edebilir ve öğretmenlere kariyer tavsiyesi ve desteği konusunda yardımcı olabilir. AGI öğretmenin iş yükünü hafifletse de aynı zamanda duygusal destek, rehberlik ve mentorluk gibi insanlara özgü alanlarda öğrencilere yardımcı olmalarına da olanak tanır.

YGZ, verileri kullanarak birlikte iyi çalışan gruplar oluşturarak öğrencilerin daha iyi öğrenmesine yardımcı olabilir. YGZ, her öğrencinin öğrenme stilini, becerilerini ve gelişim alanlarını hızlı bir şekilde tespit edebilmekte ve bu bilgilere dayanarak dengeli, üretken ve işbirlikçi gruplar oluşturabilmektedir (Holmes vd., 2023). YGZ, öğrencilerin benzersiz yeteneklerini tanımlayarak ve işbirlikçi öğrenme ve bilgi paylaşımı için uygun ekipler oluşturarak, destekleyici ve ilgi çekici bir öğrenme ortamı geliştirebilir (Abramczyk ve Jurkowski, 2020). Öğrenciler birlikte çalışarak kendi beceri ve yeteneklerini geliştirebilir ve aynı zamanda öğrenmede birbirlerine destek olabilir (Wentzel ve Watkins, 2002). Bu yararlı işbirlikçi ortamlar sayesinde her öğrenci, sınıf arkadaşlarının yardımıyla eksikliklerinin üstesinden gelebilir (Gamlath, 2022).

YGZ, öğrencilerin grup projelerine katılımlarını izlemek, harcanan zamanı analiz etmek, üstlendikleri görevleri belirlemek, işbirliği kalıplarını incelemek ve sosyal etkileşimleri ortaya çıkarmak için kullanılabilir. Öğrenciler nelerle mücadele ettikleri, akranlarıyla ne gibi anlaşmazlıklar yaşadıkları ve ortaya çıkan sorunlarla nasıl baş edebilecekleri konusunda görüşlerini paylaşabilir. Ayrıca işbirlikçi görevlerde iyileştirme yapılabilecek potansiyel alanları belirleyebilir ve hem öğrencilere hem de eğitimcilere rehberlik sağlayabilir.

YGZ'nin öğretmenlerin yerini alacağına inanılmasa da, YGZ'yi öğretim yöntemlerinde etkili bir şekilde kullanan öğretmenlerin, uygulamada zorluk yaşayanların yerini alacağı kesindir. YGZ'yi en iyi şekilde kullanmak için eğitimcilerin bu yeni teknolojinin yeteneklerini kavramak için yardıma ve kaynaklara ihtiyacı vardır. YGZ'nin eğitim ve öğretimde başarılı bir şekilde uygulanmasını sağlamak için öğretmenlerin uygun eğitimi alması gerekmektedir (Chounta vd., 2022).

YGZ, eğitimcilerin geleneksel öğretim yaklaşımlarının ötesine geçerek daha yenilikçi ve verimli öğrenme alanları oluşturmalarına yardımcı olabilir. Bunun için öğretmenlerin iş yükü azaltılmalı ve YGZ'yi deneyimlemelerine izin verilmelidir. YGZ'nin öğretimde kullanımını teşvik etmek için öğretmenlere YGZ'yi temel alan yenilikçi eğitim ve öğretim projelerine destek sağlanması önemlidir.

YGZ'nin öğretmenlerin yerini alacağına inanılmasa da YGZ'yi öğretim yöntemlerinde etkili bir şekilde kullanan öğretmenlerin, uygulamada zorluk yaşayanların yerini alacağı kesindir. YGZ'yi en iyi şekilde kullanmak için

eğitimcilerin bu yeni teknolojinin yeteneklerini kavramak için yardıma ve kaynaklara ihtiyacı vardır. YGZ'nin eğitim ve öğretimde başarılı bir şekilde uygulanmasını sağlamak için öğretmenlerin uygun eğitimi alması gerekmektedir (Chounta vd., 2022).

Öğretmenler, uygun eğitim ve hazırlıkla YGZ çağına başarılı bir şekilde uyum sağlayabilir, teknolojiyle iş birliği yapabilir ve sunduğu fırsatlardan yararlanabilir. Eğitimcilerin YGZ hakkında bilgi alışverişinde bulunabilecekleri ve karşılaşmalarını tartışabilecekleri platformların oluşturulması, YGZ'nin benimsenmesinin ve verimli bir şekilde uygulanmasının teşvik edilmesi açısından avantajlı olacaktır. AGIyi öğretimlerine dahil eden meslektaşlar, akranlarına rehberlik sunabilir. Bu mentorluk programları, öğretmenlere YGZyi etkili bir şekilde kullanmak için ihtiyaç duydukları pratik rehberlik ve perspektifleri sağlayabilir.

YGZ'nin öğretim sistemlerinde kullanılması, akademik başarılar ve davranış kalıpları da dahil olmak üzere kapsamlı kişisel bilgilerin toplanmasına ve analiz edilmesine yol açabilir. YGZ etik ve adil kullanımı, ortaya çıkabilecek çeşitli etik konulara ve sorunlara dikkat edilmesini gerektirir (Memarian ve Doleck, 2023). Kişisel verilerin işlenmesi, mahremiyet hakkına ve temel hak ve özgürlüklerin korunmasına saygılı olmalıdır. Öğrenci gizliliğini korumak ve kişisel verilere yetkisiz erişimi veya kötüye kullanılmasını önlemek için şifreleme, güvenli depolama ve erişim kontrollerini içeren güçlü veri koruma önlemlerinin uygulanması çok önemlidir.

1.2. Yapay Zeka Okur Yazarlığı

Bilgisayarlar, yapay zeka teknolojisi sayesinde çeşitli görevleri öğrenip bize yardımcı olarak işimizi kolaylaştırabilmektedir. Mevcut yapay zeka teknolojisini kullanmamıza rağmen, mevcut teknolojimizin yapay zeka teknolojisini içerdiği gerçeğinden habersiz kalıyoruz. Yapay zeka teknolojisi ilerledikçe görevlerimizi daha hızlı tamamlayabilmemiz mümkündür. Örneğin, tasarım alanında, gelişmiş tasarım yeteneklerine sahip bir yapay zeka sistemi, işbirliği yaparak çoğu bireyin yeteneklerinin ötesinde görevler üretebilir.

Örneğin, Bir firma, yazılım aracılığıyla desenler ve renkler oluşturan bir yapay zeka tasarlamıştır. Bu sayede 7 milyon kavanoz tasarlamak için yapay zekadan yararlanmıştır. Her biri kendine özgü görünüme sahip olan benzersiz kavanozlar bir ay içinde tamamen tükenmiştir. Eğer bu tasarımlar yapay zeka yerine insanlar tarafından yapılmış olsaydı, daha fazla zaman gerekirdi ve 7 milyon özgün tasarımın üretilmesi zor olurdu. Günümüzde makineler çok çeşitli posterler, film posterleri ve logolar oluşturabilmektedir.

Yapay zeka okuryazarlığı eğitiminin amacı, bireyleri makinelerin öğrenme süreçleriyle tanıştırarak, basit yapay zeka uygulamaları oluşturmalarını sağlayarak, yapay zekanın temellerini kavramalarını sağlamaktır. Yapay zekanın temellerini kavramalarını sağlayarak yapay zekanın geleceği için gerekli zihinsel hazırlıkla donatmaktır.

1.3. Öğretmenlerin Eğitim Hayatında Teknoloji Kullanımının Önemi

Eğitim faaliyeti, öğrencilerin öğretmenlerin yardımıyla aktif olarak meşgul olmalarına olanak tanımaktadır. Eğer farklı yaparsak eğitim daha eğlenceli ve daha hızlı olabilmektedir. Öğrencilere kalıpların dışında düşünme konusunda ilham verebilmektedir. Eğitim teknolojisi, öğrencilerin görseller ve video gösterileri gibi gerçekte mümkün olmayan deneyimlere erişmelerini sağlamaktadır. Kendilerini bu deneyimlere kaptırıp daha iyi ve daha çeşitli bir eğitim alabilmektedir. Uzaktan eğitim, bireylerin fiziksel olarak gidemedikleri okullarda eğitime erişmelerini sağlayarak eşitliği teşvik etmektedir. Öğrenciler kaydettikleri dersleri gözden geçirip tekrar ziyaret edebilir, diledikleri zaman çalışmalarına devam edebilmektedir.

Öğretmenin sadece eğitimde teknolojiden faydalanması değil, aynı zamanda öğrencilerine teknolojiyi amacına uygun ve etkili bir şekilde nasıl kullanabileceklerini öğretmesi de önemlidir. Öğrenciye kendi bilgeliğini ve kişisel karşılaşmalarını aktararak sürecin sağlıklı bir şekilde yürütülmesini garanti edebilmektedir. Güven (2001) Öğretmenlerin sürekli gelişen dünyaya uyum sağlamaları gerektiğini belirtmektedir. Dünya her zaman değişiyor ve gelişiyor ve öğretmenlerin buna ayak uydurmak için çok çalışması gerekiyor. Öğretmenler, çocukların ve gençlerin sürekli değişimlere uyum sağlamalarında ve kendi refahlarını korumalarında önemli bir rol oynamaktadır. Bu görevleri etkili bir şekilde yerine getirebilmek için eğitimcilerin güncel trendlerin gerisinde kalmamaları ve becerilerini sürekli olarak güncellemeleri gerekmektedir.

Sever (2010) öğretmenlerin eğitimde hayati bir rol oynadığını savunmaktadır. Öğretmenler günümüzde öğrencilerin öğrenme yolculuğunda kolaylaştırıcı olarak görülse de öğretmen bu süreçte rehberlik rolünü yerine getirmezse başarılı bir eğitim ortamına sahip olmak mümkün değildir. Öğretmenler eğitim teknolojilerini etkili bir şekilde planlamalı ve teknoloji kullanımında örnek teşkil etmelidir. İyi bir öğretmen sınıfta teknolojiyi iyi kullanıp öğretebilmekte, öğrencilerine de teknolojinin nasıl yapılacağını gösterebilmektedir.

Metod

Öğretmenlerin yapay zeka okuryazarlık seviyelerini ölçmek amacı ile yapılan bu çalışmada kalitatif ve kantitatif yöntemden faydalanılmıştır. Araştırmanın kalitatif bölümünde öğretmenlere yarıyapılandırılmış görüşme soruları yöneltilerek, yapay zeka ve yapay zeka okuryazarlık seviyeleri ölçülmüştür. Kantitatif bölüm iki aşamadan oluşmaktadır. İlk aşamada öğretmenlere kişisel bilgilerinin sorulduğu bölüm oluşturulmuştur. İkinci bölümde 4 değişken, 12 sorudan oluşan Wang vd. (2022) tarafından geliştirilen Çelebi vd. (2023) tarafından Türkçeye uyarlanan "Yapay Zeka Okuryazarlığı Ölçeği "uygulanmıştır.

Örneklem: Örneklem grubunu Sakarya ilinde görev yapan 388 öğretmen oluşturmaktadır. Çeşitli okullardan rastgele örnekleme yöntemi ile katılımcı sağlanmıştır.

3. Bulgular

3.1. Nitel Analiz

3.1.1. Öğretmenlerin Yapay Zeka il ilgili Bilgilerine Yönelik Bulgular

Öğretmenlerin yapay zeka okuryazarlığına ilişkin bulgularına yönelik "Sizce yapay zeka nedir? Neleri kapsar? Diğer teknolojilerden farkı nedir? "sorusu yöneltilmiştir. Öğretmenlerin yapay zeka ile ilgili bulguları aşağıda yer alan tabloda gösterilmiştir.

Tablo 1. Öğretmenlerin Yapay Zeka Okuryazarlığına İlişkin Bulguları

Kodlar	Öğretmenler
Teknoloji	K1, K4, K5, K6
İnsan Zekasının Taklidi	K2, K3, K1
Kolaylık	K2, K4, K5

"*Yapay zeka ; İnsan gücünün üzerinde , insan gücünün yerine , insanın ürettiği bir teknolojidir. İnsan ve var olan her şeyle ilgili tüm alanlara hitap edebilir. Diğer teknolojilere nazaran eskimeyen, sürekli güncellen , kuşak farkı olmaksızın oyun , sağlık , ulaşım , eğitim vb. alanlarda herkese hitap edebilen evrensel bir teknoloji türüdür*" (K1)

'' İnsan hayatını kolaylaştıran şuan geliştirilebilir teknoloji, daha az insanla daha çok işi yapılabilir." (K5)

"*Yapay zeka verilen görevleri geliştirilmiş yazılımlar ile yerine getiren teknoloji olabilir. Diğer teknolojilerden farkı geliştirilebilir ve her alanda uygun yazılımlar yazılarak uygulanabilir*" (K6)

"*Internet sayesinde güncel teknoloji olma özelliği farkını oluşturabilir, Insana benzetilmesi en önemli farkı olabilir*" (K2)

3.1.2. Öğretmenlerin Günlük Hayatında Yapay Zeka Kullanımına Yönelik Bulgular

Öğretmenlerin günlük yaşamlarına yönelik yapay zekanın belirlenmesi için "Yapay zeka teknolojileri insanlara günlük hayatında nasıl yardımcı olur? Siz günlük hayatınızda kullanıyor musunuz? Hangilerini kullanıyorsunuz? Size nasıl yardımcı oluyor? Hayatınızı hangi açılardan kolaylaştırıyor? "sorusu yöneltilmiştir. Öğretmenlerin günlük yaşamında yapay zeka okuryazarlığına yönelik bulguları Tablo 2 'de gösterilmektedir.

Tablo 2. Öğretmenlerin Günlük Hayatında Yapay Zeka Kullanımına Yönelik Bulgular

Kodlar	Öğretmenler
Akıllı saat, planlama	K1, K3, K6
ev eşyaları,	K2, K6
Zamandan tasarruf	K2, K4, K5, K6

"*Kendi hayatımda da sık sık yapay zeka kullanımına baş vuruyorum . Akıllı saat kullanarak gece uyku kalitemi, kalp ritim düzenimi , stres düzeyimi , günlük harcadığım kalori miktarını , içtiğim su miktarı , hareketsiz kaldığımda aldığım uyarılar vb. takip edebiliyorum . Evde temizlik robotlarıyla , planlamalarımda siri /google asistan kullanarak , çocuğumun konumunu takip etmek vb. Bir çok alanda kullanımına başvuruyorum* ."(K1)

"*Zamandan tasarruf sağlıyor çocuğuma kendime daha çok vakit ayırabiliyorum, Daha az zamanda çok iş yapabiliyorum enerji ve zaman kazanıyorum*" (K2)

"*Ses tanıma, yüz tanıma, harita sistemleri gibi alanlarda kullanıyorum. Özellikle yüz tanıma sistemleri online bankacılık faaliyetlerinde, güvenlik sistemlerinde oldukça faydalı oluyor. Harita uygulamaları sayesinde hiçbir yer bilinmez ve ulaşılmaz kalmıyor*" (K3)

"*Yapay zeka teknolojileri insanların hayatını kolaylaştırmaktadır. Zaman tasarrufu sağlamaktadır. "(*K4)

"*Uzun uğraş ve araştırma yapmaya gerek kalmadan sunum ve bir konu hakkında proje üretilebilir. Günlük hayatımda yapay zeka destekli yabancı dil çeviri programından yararlanıyorum. Google Translate kullanıyorum. Birebir çeviri yapıyor zaman kazandırıyor. "*(K5)

"*Yapay zeka teknolojileri insanların günlük hayatını kolaylaştırır. Günlük hayatımızda akıllı robotlar, akıllı telefonlar, yüz tanıma sistemleri, küçük ev aletleri dijital fırınlar air fry kahve mkineleri akıllı saatler navigasyonlar hayatımızda her gün kullandığımız yapay zeka örnekleridir. Hayatımızı her biri kendi alanında zaman ve enerji tasarrufu olarak kolaylaştırmaktadır.*" (K6)

3.1.3. Öğretmenlerin Mesleklerinde Yapay Zeka Kullanımına Yönelik Bulgular

Öğretmenlerin mesleklerinde yapay zeka kullanımına yönelik bulgularını belirlemek için "Yapay zeka teknolojilerini mesleğinizle ilgili herhangi bir şey için kullanıyor musunuz? Hangilerini kullanıyorsunuz? Nasıl kullanıyorsunuz? Hangi konularda işinizi kolaylaştırıyor? "soruları yöneltilmiştir. Öğretmenlerin cevaplarına göre oluşturulan bulgular Tablo 3'te gösterilmektedir.

Tablo 3. Öğretmenlerin Mesleklerinde Yapay Zeka Kullanımına Yönelik Bulgular

Kodlar	Öğretmenler
İçerik hazırlama,	K1, K4, K5, K6
evrak işleri	K2, K6

"Slayt hazırlama konusunda bu tarz uygulamaları faydalı da buluyorum lakin bu teknolojinin bir sınırı olmadığından verdiğim ödevleri tamamen yapay zekaya yaptıran öğrencilerimi de hiç bir fayda sağlayamadıkları için bundan uzak tutmaya çalışıyorum. Sınıflarımızda bulunan akıllı tahtalara akıllı sınıf uygulamaları yükleyip öğrenciler için oturum açarak sene başından itibaren gösterdikleri tüm ilerlemeyi/gerilemeyi onlarla enteraktif bir şekilde takip edebiliyor ve gerekli önlemleri alabiliyoruz." (K1)

…"farklı dillerde vatandaşa hizmet vermem gerekirken sesli çeviri programları kullanıyorum bu ismi kolaylaştırıyor .çalışma programı hatırlatıcı uygulamalar unutma dan kaynaklı iş aksamalarının önüne geçiyor "(K2)

"Chatgpt, Siri gibi yapay zeka uygulamalarını kullanmaktayım. Mesleğimle ilgili notlar oluşturmak için kullanmaktayım. Chatgpt birçok konuda fikir vermektedir." (K4)

"Proje ödevlerinde fikir vermesi ve proje üretmesi açısından Yararlı oluyor birçok fikir verebiliyor, chatgpt bir projede yardımcı olmuştu,velilerimin desteğiyle bir yarışmaya 9 tane farklı fikir çıkardık." (K5)

"Bilgisayarda form oluşturma, afiş ve tasarımlar oluşturmada bilgisayar programlarını kullanıyoruz." (K6)

3.1.4. Öğretmenlerin İhtiyaçlarına Göre Yapay Zeka Kullanımına Yönelik Bulgular

Öğretmenlerin gereksinimlerine yönelik yapay zeka kullanımının belirlenmesi için ''İhtiyacınıza yönelik yapay zeka araçlarını nasıl buluyorsunuz? Bu araçları kolayca kullanabiliyor musunuz? Hangi yapay zeka araçlarını kullanacağınızı seçerken nelere dikkat ediyorsunuz? "soruları yöneltilmiştir. Öğretmenlerin cevapları aşağıda gösterilmektedir.

Tablo 4. Öğretmenlerin İhtiyaçlarına Göre Yapay Zeka Kullanımına Yönelik Bulgular

Kodlar	Öğretmenler
İçerik hazırlama, evrak işleri	K1, K4
Sosyal Medya	K1, K2
Düşük maliyet	K3

"Takip ettiğim sosyal mecralar, arkadaş/meslektaş tavsiyeleri, reklamlar gibi bir çok farklı kanal aracılığıyla bu uygulamaları bulabiliyor kullanım şekillerini çoğu zaman deneme yanılma usulüyle öğreniyorum. "(K1)

"Hangi yapay zeka araçlarını kullanacağımı seçerken işlevsel, pratik kullanımlı ve en az maliyetli olmasına dikkat ederim. '(K3)

"Yapay zeka araçları zaman tasarrufu sağlamakta, hayatı kolaylaştırmakta. Yapay zeka araçlarını kullanırken bazen zorluk yaşıyorum. Yapay zeka aracının basit, anlaşılır bir kullanımı olması, güvenilir bir araç olması benim için önemlidir. "(K4)

3.1.5. Öğretmenlerin Yapay Zeka Kullanımına Göre Etik İlkelerine Yönelik Bulgular

Öğretmenlerin yapay zeka kullanımına yönelik etik görüşlerini belirlemek için "Yapay zekanın etik kullanımı ile ilgili ne düşünüyorsunuz? Siz yapay zeka kullanırken etik kullanımına nasıl dikkat ediyorsunuz? Bu konuda ne gibi tedbirler alıyorsunuz? "sorusu yöneltilmiştir. Öğretmenlerin cevapları aşağıda gösterilmektedir.

Tablo 5. Öğretmenlerin Yapay Zeka Kullanımına Göre Etik İlklerine Yönelik Bulgular

Kodlar	Öğretmenler
Olumlu, olumsuz dönüş	K1, K4, K5, K6
Geri bildirim	K1, K3, K5, K6
Verilerin gizliliği	K3, K4, K5, K6

"Evimde , mesleğimde , sağlığımla ilgili kullandığım yapay zeka uygulamalarında olumlu ya da olumsuz geri bildirimde bulunarak teknolojinin geliştirilmesine fayda sağlamaya hassasiyet gösteriyorum."

"Kişisel verilerimi paylaşmamaya özen gösteriyorum. Gerekli olmayan izin ve bilgileri kaldırıyorum. "(K3)

"Yapay zekanın avantajları ve dezavantajları değerlendirilmelidir. Verilerin gizliliği benim için önemlidir. "(K4)

"Insalığın gelişimi için yararlı gelecek için korkutucu geliyor, kötü amaçlarla kullanılabilir, kesinlikle bir sınır olması lazım, şuan bi tedbir almıyorum. "(K5)

"Yapay zeka aletlerine kişisel verilerin gizliliğini önemsiyor bu konudaki etiği önemsiyoruz. Kişisel verilerimizin paylaşılmaması için ve başkalarının haklarını ihlal etmemek için dikkatli davranıyoruz. "(K6)

3.2. Nicel Analiz

3.2.1. Yapay Zeka Okuryazarlık Düzeyi

Çalışma kapsamında katılımcılara ait Sosyodemografik dağılımlar Tablo 1'de verilmiştir.

Tablo 6. Cevaplayıcılara ait Tanımlayıcı İstatistikler

	Sayı	**Yüzde**
Cinsiyet	277	56,8
Kadın	211	43,2
Erkek		
Yaş		
22-25 Yaş	82	16,8
26-33 Yaş	176	36,1
34-40 Yaş	116	23,8
41-50 Yaş	85	17,4

51 Yaş ve üzeri	29	5,9
Gelir Durumu		
17.002-35.000	152	31,1
35.001-55.000	260	53,3
55.001-75.000	51	10,5
75.001-90.000	12	2,5
90.001 ve üzeri	13	2,7
Eğitim Durumu		
Lisans	315	64,5
Yüksek Lisans	148	30,3
Doktora	25	5,1
Deneyim		
5 yıl ve altı	93	19,1
6-10 yıl	186	38,1
11-15 yıl	106	21,7
16-20 yıl	39	8,0
20-25 yıl	42	8,6
25 yıl ve üzeri	22	4,5
Kullanma Beceri Seviyesi		
Zayıf	93	19,1
Orta	184	37,7

İyi	133	27,3
İleri	52	10,7
Mükemmel	26	5,3

Tablo 6 incelendiğinde katılımcıların 35.001-55.000 TL gelir düzeyine sahip, en az lisans mezunu, 6-15 yıl deneyime sahip, bilgi teknolojileri araçları bilgisayar, akıllı cep telefonu, tablet vb. kullanma beceri seviyesi orta ve iyi düzeyde kadın-erkeklerden oluştuğu görülmektedir.

Ölçeğin güvenirliğinin hesaplanması için Cronbach Alpha Katsayı değerlerine bakılmış ve sonuçlar Tablo 7'de verilmiştir.

Tablo 7. Yapay Zekâ Okuryazarlık Ölçeğinin boyutlarına ait Cronbach Alpha Katsayı değerleri

Boyutlar	**Cronbach's Alpha**	**Madde Sayısı**
Genel	,862	12
Farkındalık	,425	3
Kullanım	,361	3
Değerlendirme	,901	3
Etik	,422	3

Tablo 7'ye göre, uygulanan ölçeğin güvenilirliğinin test edilmesi sonucunda Cronbach's Alpha katsayısı genel olarak 0,862 olarak bulunmuştur. Bu katsayı 0,70'in üzerinde olduğundan ölçeğin oldukça güvenilir olduğu söylenebilir.

Verilerin analizi için varsayımların sağlanıp sağlanmadığı kontrol edilmiştir. Verilerde önemli uç değerler tespit edilmemiştir. Verilerin normal dağılıp gösterip göstermediğini çarpıklık ve basıklık değerleriyle kontrol edilmiştir. Tablo 8'de yer alan değerlere göre veriler normal dağılım göstermektedir.

Tablo 8. Normallik Testi Sonuçları

Boyutlar	**Kolmogorov-Smirnov**			**Çarpıklık**	**Basıklık**
	İstatistik	**df**	**p**		
Genel	,068	488	,000	-,067	-,228

Farkındalık	,114	488	,000	,098	-,726
Kullanım	,144	488	,000	,351	-,200
Değerlendirme	,159	488	,000	-,680	,042
Etik	,141	488	,000	,163	-,685

Tablo 8'de yer alan verilere göre boyutların normal dağılmadığı gösterdiği görülmektedir.

Yapay Zekâ Okuryazarlık Ölçeğinin boyutları ile cevaplayıcıların cinsiyetleri arasında anlamlı bir farklılık olup olmadığı belirlenmek istenilmiştir. Farklılığın test edilmesi için parametrik testlerden olan bağımsız örneklem t testi kullanılmış olup analiz yapılmadan önce gerekli varsayımlar incelenmiş ve kabul edilmiştir. Varsayımların tamamı gerçekleştirildiğinden dolayı parametrik testlerden olan bağımsız örneklem t testi gerçekleştirilmiştir ve analiz sonuçları Tablo 9'da verilmiştir.

Tablo 9. Yapay Zekâ Okuryazarlık Ölçeğinin Boyutları ile Cevaplayıcıların Cinsiyetlerinin Karşılaştırılması

		n	**$\bar{X}$**	**Ss.**	**t**	**Sd.**	p
Genel	Kadın	277	3,48	,729	-1,404	486	,161
	Erkek	211	3,57	,715	-1,408		
Farkındalık	Kadın	277	3,57	,794	-1,288	486	,198
	Erkek	211	3,66	,776	-1,292		
Kullanım	Kadın	277	3,33	,766	-1,140	486	,255
	Erkek	211	3,41	,766	-1,140		
Değerlendirme	Kadın	277	3,51	1,056	-,930	486	,353
	Erkek	211	3,60	1,010	-,935		
Etik	Kadın	277	3,50	,782	-1,545	486	,123
	Erkek	211	3,61	,786	-1,544		

**p<0.05 Kullanılan Test: Bağımsız Örneklemler T-Testi*

Tablo 9 incelendiğinde katılımcıların cinsiyetleri ile yapay zekâ okuryazarlık ölçeğinin boyutları arasında anlamlı farklılık belirlenmemiştir (Sig değeri >0,05).

Yapay Zekâ Okuryazarlık Ölçeğinin boyutları ile cevaplayıcıların gelir durumları arasında anlamlı bir farklılık olup olmadığı belirlenmek istenilmiştir. Farklılığın test edilmesi için parametrik testlerden olan ANOVA (Varyans Analizi) kullanılmış olup analiz yapılmadan önce gerekli varsayımlar incelenmiş ve kabul edilmiştir. Varsayımların tamamı gerçekleştirildiğinden dolayı parametrik testlerden olan ANOVA (Varyans Analizi) gerçekleştirilmiştir ve analiz sonuçları Tablo 10'da verilmiştir.

Tablo 10. Yapay Zekâ Okuryazarlık Ölçeğinin Boyutları ile Cevaplayıcıların Gelir Durumlarının Karşılaştırılması

Genel Ortalama	**Kareler Toplamı**	**df**	**Kareler Ortalaması**	**F**	**Sig**	**Farklılık**
Gruplar arasında	2,593	4	,648	1,239	,293	
Gruplar dışında	252,716	483	,523			
Toplam	255,309	487				

Farkındalık	**Kareler Toplamı**	**df**	**Kareler Ortalaması**	**F**	**Sig**	**Farklılık**
Gruplar arasında	3,395	4	,849	1,372	,242	
Gruplar dışında	298,700	483	,618			
Toplam	302,094	487				

Kullanım	**Kareler Toplamı**	**df**	**Kareler Ortalaması**	**F**	**Sig**	**Farklılık**
Gruplar arasında	2,287	4	,572	,972	,422	
Gruplar dışında	283,988	483	,588			

Toplam	286,275	487

Değerlendirme	Kareler Toplamı	df	Kareler Ortalaması	F	Sig	Farklılık
Gruplar arasında	4,807	4	1,202	1,120	,346	
Gruplar dışında	518,323	483	1,073			
Toplam	523,129	487				

Etik	Kareler Toplamı	df	Kareler Ortalaması	F	Sig	Farklılık
Gruplar arasında	3,159	4	,790	1,284	,275	
Gruplar dışında	297,012	483	,615			
Toplam	300,170	487				

Tablo 10 incelendiğinde katılımcıların gelir durumları ile yapay zekâ okuryazarlık ölçeğinin boyutları arasında anlamlı farklılık belirlenmemiştir (Sig değeri >0,05).

Yapay Zekâ Okuryazarlık Ölçeğinin boyutları ile cevaplayıcıların eğitim durumları arasında anlamlı bir farklılık olup olmadığı belirlenmek istenilmiştir. Farklılığın test edilmesi için parametrik testlerden olan ANOVA (Varyans Analizi) kullanılmış olup analiz yapılmadan önce gerekli varsayımlar incelenmiş ve kabul edilmiştir. Varsayımların tamamı gerçekleştirildiğinden dolayı parametrik testlerden olan ANOVA (Varyans Analizi) gerçekleştirilmiştir ve analiz sonuçları Tablo 11'de verilmiştir.

Tablo 11. Yapay Zekâ Okuryazarlık Ölçeğinin Boyutları ile Cevaplayıcıların Eğitim Durumlarının Karşılaştırılması

Genel Ortalama	Kareler Toplamı	df	Kareler Ortalaması	F	Sig	Farklılık

Gruplar arasında	1,628	2	,814	1,556	,212	
Gruplar dışında	253,681	485	,523			
Toplam	255,309	487				

Farkındalık	**Kareler Toplamı**	**df**	**Kareler Ortalaması**	**F**	**Sig**	**Farklılık**
Gruplar arasında	2,472	2	1,236	2,001	,136	
Gruplar dışında	299,622	485	,618			
Toplam	302,094	487				

Kullanım	**Kareler Toplamı**	**df**	**Kareler Ortalaması**	**F**	**Sig**	**Farklılık**
Gruplar arasında	4,548	2	2,274	3,915	,021	Doktora<Yüksek lisans Doktora <Lisans
Gruplar dışında	281,726	485	,581			
Toplam	286,275	487				

Değerlendirme	**Kareler Toplamı**	**df**	**Kareler Ortalaması**	**F**	**Sig**	**Farklılık**

Gruplar arasında	1,962	2	,981	,913	,402
Gruplar dışında	521,167	485	1,075		
Toplam	523,129	487			

Etik	**Kareler Toplamı**	**df**	**Kareler Ortalaması**	**F**	**Sig**	**Farklılık**
Gruplar arasında	2,160	2	1,080	1,758	,173	
Gruplar dışında	298,010	485	,614			
Toplam	300,170	487				

Tablo 11 incelendiğinde katılımcıların eğitim durumları ile yapay zekâ okuryazarlık ölçeğinin genel boyut, farkındalık, değerlendirme ve etik alt boyutları arasında anlamlı farklılık belirlenmemiştir (Sig değeri >0,05). Yapay zekâ okuryazarlık ölçeğinin kullanım alt boyutu ile katılımcıların eğitim durumları arasında işe anlamlı farklılık belirlenmiştir (Sig değeri <0,05). Bu anlamlı farklılığın hangi gruplar arasında olduğunu belirlemek için Post Hoc testlerinden LSD uygulanmış olup test sonucuna göre Doktora eğitim durumu ile hem lisans hem de yüksek lisans eğitim durumları arasında anlamlı farklılık belirlenmiştir. Katılımcıların eğitim durumları arttıkça yapay zekâ okuryazarlık ölçeğinin kullanım boyutu azalmaktadır.

Yapay Zekâ Okuryazarlık Ölçeğinin boyutları ile cevaplayıcıların deneyim süreleri arasında anlamlı bir farklılık olup olmadığı belirlenmek istenilmiştir. Farklılığın test edilmesi için parametrik testlerden olan ANOVA (Varyans Analizi) kullanılmış olup analiz yapılmadan önce gerekli varsayımlar incelenmiş ve kabul edilmiştir. Varsayımların tamamı gerçekleştirildiğinden dolayı parametrik testlerden olan ANOVA (Varyans Analizi) gerçekleştirilmiştir ve analiz sonuçları Tablo 12'de verilmiştir.

Tablo 12. Yapay Zekâ Okuryazarlık Ölçeğinin Boyutları ile Cevaplayıcıların Deneyim Sürelerinin Karşılaştırılması

Genel Ortalama	**Kareler Toplamı**	**df**	**Kareler Ortalaması**	**F**	**Sig**	**Farklılık**

Gruplar arasında	12,110	5	2,422	4,800	,000	5 Yıl >16-20 Yıl 5 Yıl> 20-25 Yıl 6-10 Yıl>20-25 Yıl 11-15 Yıl>20-25 Yıl
Gruplar dışında	243,199	482	,505			
Toplam	255,309	487				

Farkındalık	**Kareler Toplamı**	**df**	**Kareler Ortalaması**	**F**	**Sig**	**Farklılık**
Gruplar arasında	11,086	5	2,217	3,673	,003	5 Yıl >16-20 Yıl 5 Yıl> 20-25 Yıl 6-10 Yıl>20-25 Yıl 11-15 Yıl>20-25 Yıl
Gruplar dışında	291,008	482	,604			
Toplam	302,094	487				

Kullanım	**Kareler Toplamı**	**df**	**Kareler Ortalaması**	**F**	**Sig**	**Farklılık**

Gruplar arasında	8,417	5	1,683	2,920	,013	5 Yıl >16-20 Yıl 5 Yıl> 20-25 Yıl 6-10 Yıl>20-25 Yıl 11-15 Yıl>20-25 Yıl
Gruplar dışında	277,858	482	,576			
Toplam	286,275	487				

Değerlendirme	**Kareler Toplamı**	**df**	**Kareler Ortalaması**	**F**	**Sig**	**Farklılık**
Gruplar arasında	21,838	5	4,368	4,200	,001	5 Yıl >16-20 Yıl 5 Yıl> 20-25 Yıl 6-10 Yıl>20-25 Yıl 11-15 Yıl>20-25 Yıl
Gruplar dışında	501,291	482	1,040			
Toplam	523,129	487				

Etik	**Kareler Toplamı**	**df**	**Kareler Ortalaması**	**F**	**Sig**	**Farklılık**

Gruplar arasında	11,595	5	2,319	3,873	,002	5 Yıl >16-20 Yıl 5 Yıl> 20-25 Yıl 6-10 Yıl>20-25 Yıl 11-15 Yıl>20-25 Yıl
Gruplar dışında	288,575	482	,599			
Toplam	300,170	487				

Tablo 12 incelendiğinde katılımcıların deneyim süreleri ile yapay zekâ okuryazarlık ölçeğinin genel boyut, farkındalık, değerlendirme ve etik alt boyutları arasında anlamlı farklılık belirlenmiştir (Sig değeri <0,05). Bu anlamlı farklılıkların hangi gruplar arasında olduğunu belirlemek için Post Hoc testlerinden LSD uygulanmış olup test sonucuna göre 5 yıl deneyime sahip katılımcılar 16-20 yıl ve 20-25 yıl deneyime sahip katılımcılara göre; 6-10 yıl deneyim sahip katılımcılar 20-25 yıl deneyime sahip katılımcılara göre; 11-15 yıl deneyime sahip katılımcılar ise 20-25 yıl deneyime sahip katılımcılara göre anlamlı farklılık belirlenmiştir. Katılımcıların deneyim süreleri arttıkça yapay zekâ okuryazarlık ölçeğinin kullanım boyutu azalmaktadır.

Yapay Zekâ Okuryazarlık Ölçeğinin boyutları ile cevaplayıcıların Kullanma Beceri Seviyeleri arasında anlamlı bir farklılık olup olmadığı belirlenmek istenilmiştir. Farklılığın test edilmesi için parametrik testlerden olan ANOVA (Varyans Analizi) kullanılmış olup analiz yapılmadan önce gerekli varsayımlar incelenmiş ve kabul edilmiştir. Varsayımların tamamı gerçekleştirildiğinden dolayı parametrik testlerden olan ANOVA (Varyans Analizi) gerçekleştirilmiştir ve analiz sonuçları Tablo 13'te verilmiştir.

Tablo 13. Yapay Zekâ Okuryazarlık Ölçeğinin Boyutları ile Cevaplayıcıların Kullanma Beceri Seviyelerinin Karşılaştırılması

Genel Ortalama	**Kareler Toplamı**	**df**	**Kareler Ortalaması**	**F**	**Sig**	**Farklılık**
Gruplar arasında	65,523	4	16,381	41,688	,000	Zayıf> Orta, İyi, İleri, Mükemmel Orta> İyi, İleri, Mükemmel İyi> İleri, Mükemmel İleri>Mükemmel

Gruplar dışında	189,786	483	,393
Toplam	255,309	487	

Farkındalık	**Kareler Toplamı**	**df**	**Kareler Ortalaması**	**F**	**Sig**	**Farklılık**
Gruplar arasında	71,162	4	17,790	37,209	,000	Zayıf> Orta, İyi, İleri, Mükemmel Orta> İyi, İleri, Mükemmel İyi> İleri, Mükemmel İleri>Mükemmel
Gruplar dışında	230,933	483	,478			
Toplam	302,094	487				

Kullanım	**Kareler Toplamı**	**df**	**Kareler Ortalaması**	**F**	**Sig**	**Farklılık**
Gruplar arasında	57,291	4	14,323	30,211	,000	Zayıf> Orta, İyi, İleri, Mükemmel Orta> İyi, İleri, Mükemmel İyi> İleri, Mükemmel İleri>Mükemmel
Gruplar dışında	228,984	483	,474			
Toplam	286,275	487				

Değerlendirme	Kareler Toplamı	df	Kareler Ortalaması	F	Sig	Farklılık
Gruplar arasında	83,641	4	20,910	22,981	,000	Zayıf> Orta, İyi, İleri, Mükemmel Orta> İyi, İleri, Mükemmel İyi> İleri, Mükemmel İleri>Mükemmel
Gruplar dışında	439,488	483	,910			
Toplam	523,129	487				

Etik	Kareler Toplamı	df	Kareler Ortalaması	F	Sig	Farklılık
Gruplar arasında	54,999	4	13,750	27,087	,000	Zayıf> Orta, İyi, İleri, Mükemmel Orta> İyi, İleri, Mükemmel İyi> İleri, Mükemmel İleri>Mükemmel
Gruplar dışında	245,172	483	,508			
Toplam	300,170	487				

Tablo 13 incelendiğinde katılımcıların Kullanma Beceri Seviyeleri ile yapay zekâ okuryazarlık ölçeğinin genel boyut, farkındalık, değerlendirme ve etik alt boyutları arasında anlamlı farklılık belirlenmiştir (Sig değeri <0,05). Bu anlamlı farklılığın hangi gruplar arasında olduğunu belirlemek için Post Hoc testlerinden LSD uygulanmış olup test sonucuna göre zayıf kullanma becerisi orta, iyi, ileri ve mükemmel kullanma becerisine göre; orta kullanma becerisi, iyi, ileri ve mükemmel kullanma becerisine göre, iyi kullanma becerisi ileri ve mükemmel

kullanma becerisine göre, ileri kullanma becerisi ise mükemmel kullanma becerisine göre anlamlı farklılık belirlenmiştir. Katılımcıların kullanma becerileri arttıkça yapay zekâ okuryazarlık ölçeğinin kullanım boyutu azalmaktadır.

Tablo 14. Boyutlar arası İlişkilerin İncelenmesi

		Genel	Farkındalık	Kullanım	Değerlendirme	Etik
Genel	Pearson Correlation	1	,847**	,839**	,897**	,836**
	Sig. (2-tailed)		,000	,000	,000	,000
	N	488	488	488	488	488
Farkındalık	Pearson Correlation	,847**	1	,637**	,692**	,585**
	Sig. (2-tailed)	,000		,000	,000	,000
	N	488	488	488	488	488
Kullanım	Pearson Correlation	,839**	,637**	1	,643**	,631**
	Sig. (2-tailed)	,000	,000		,000	,000
	N	488	488	488	488	488
Değerlendirme	Pearson Correlation	,897**	,692**	,643**	1	,667**
	Sig. (2-tailed)	,000	,000	,000		,000
	N	488	488	488	488	488
Etik	Pearson Correlation	,836**	,585**	,631**	,667**	1
	Sig. (2-tailed)	,000	,000	,000	,000	
	N	488	488	488	488	488

Tablo 14 incelendiğinde ana boyut ile alt boyutların birbirleriyle pozitif yönde anlamlı bir ilişki içerişinde olduğu görülmektedir ($p<0,05$).

Sonuç

Yapay zeka teknolojileri eğitim alanında kullanıldığında öğretmenler ve öğrenciler açısından çeşitli avantajlar sağlamaktadır. Ancak yapay zeka okuryazarlığı bu avantajları sağlamada önemli rol oynamaktadır. Bu araştırmada öğretmenlerin yapay zeka okuryazarlığı düzeylerinin ölçülmesi amaçlanmıştır. Araştırmanın nitel kısmında öğretmenlere yöneltilen yarı yapılandırılmış görüşme sorularına göre öğretmenlerin yapay zeka ile ilgili görüşleri genel olarak belirlenmiştir. Öğretmenler yapay zeka uygulamalarının eğitimde uygulanmasını teknoloji ve başarı olarak nitelendirmiştir. Yapay zeka teknolojileri eğitimde yararlı olduğu gibi etik açıdan da bazı sorunlara neden olabilmektedir. Öğrencilerin yapay zekaya ödev yaptırması gibi olgular buna örnek olarak gösterilebilmektedir. Bu nedenle sistemde bu açığın kapatılması için intihal ölçen benzeri uygulamalara ek olarak yapay zeka kullanımını tespit eden araçlara da gereksinim duyulmaktadır. Analizin nitel bölümünde elde edilen bulgulara göre yapay zeka okuryazarlığının yüksek lisans ve doktora eğitim derecesi olan öğretmenlerde daha yüksek olduğu tespit edilmiştir. Buna ek olarak yapay zeka deneyimi fazla olan öğretmenlerde yapay zeka okuryazarlığı yüksek seviyede çıkmıştır. Bu kapsamda eğitim seviyesi ve deneyim boyutlarının arasında anlamlı bir ilişki vardır. Öğretmenlerin yapay zeka okuryazarlığını geliştirebilmesi için yapay zeka araçlarını etkin bir şekilde kullanması gerekmektedir. Ancak bunun için yeterli maddi imkanlarının da olması gerekmektedir. Çünkü akıllı telefon ve tablet aracılığı ile ulaşılan yapay zeka programları sınırlı kalabilmektedir. Bilgisayar aracılığıyla ulaşılan yapay zeka aracıları da maddi açıdan yüksek olabilmektedir. Bu nedenle öğretmenlerin yapay zeka okuryazarlığının geliştirilmesinde hizmet içi eğitimler, uygulanacak teşviklerin öğretmenler üzerinde olumlu etki yaratacağı düşünülmektedir

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TR Dizinde Yayınlanmış Öğrenme Analitikleriyle İlgili Çalışmalardaki Eğilimlerin İncelenmesi

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Özet

Öğrenme analitikleri öğrenmeyi ve öğrenmenin gerçekleştiği ortamı anlamak ve iyileştirmek amacıyla öğrenenlerle ilgili verilerin toplanması, analiz edilmesi, ölçülmesi ve raporlanmasını bütünsel ele alan bir araştırma alanıdır. Öğrenme analitikleri ile ilgili yapılan çalışmalar gün geçtikçe artmaktadır. Bu araştırmanın amacı, öğrenme analitikleri konusunu ele alan ve TR Dizin indekslenen dergilerde yayınlanmış Türkçe dilindeki çalışmalardaki eğilimlerin incelenmesidir. Bu amaçla TR Dizin veri tabanında 2014–2024 Nisan tarihleri arasında yayımlanan ve başlığında "öğrenme" ve "analitikler" ifadelerini içeren 15 çalışmaya ulaşılmış ve 12 tanesi araştırma amacına uygun olduğu için incelemeye dahil edilmiştir. Belirlenen makalelerin analizi için araştırmacılar tarafından hazırlanan "Makale İnceleme ve Sınıflama Formu" kullanılmıştır. Araştırma sonucunda TR Dizin'de öğrenme analitiği kullanılarak yayınlanan çalışmaların en çok 2022 yılında yayınlandığı, 2016-2018 tarihleri arasında TR Dizin indeksli dergilerde öğrenme analitikleri konusunda yayınlanan makalenin bulunmadığı görülmüştür. Bu çalışmaların türlerinin araştırma çalışmaları ve derleme çalışmaları olduğu görülmüştür. Araştırma yöntemlerine göre incelendiğinde makalelerde nicel ve alan yazın derleme öne çıkan yöntemlerdir. İncelenen makalelerde birden fazla veri toplama aracının birlikte kullanıldığı görülmüştür. İncelenen makalelerde istatistiksel analizlerin %59'unu nicel veri analiz yöntemleri oluşturmaktadır. %41'ini ise nitel veri analiz yöntemleri oluşturmaktadır. Makalelerde kullanılan anahtar kelimeler incelendiğinde en sık kullanılan anahtar kelimenin "öğrenme analitikleri" olduğu ve ardından "e-öğrenme" anahtar kelimesinin geldiği görülmüştür.

Anahtar Sözcükler: öğrenme analitikleri, TR dizin makaleleri, eğilimler.

A Review of Trends in Studies Related to Learning Analytics Published in TR Index

Abstract

Learning analytics is a research field that deals holistically with the collection, analysis, measurement, and reporting of data about learners in order to understand and improve learning and the environment in which learning takes place. Studies on learning analytics are increasing day by day. This study reviews the trends in Turkish language studies on learning analytics published in journals indexed in the TR Index. For this purpose, 15 studies published in the TR Index database between 2014 and 2024 April and containing the expressions "learning" and "analytics" in the title were reached, and 12 of them were included in the analysis since they were suitable for the research purpose. "Article Review and Classification Form" prepared by the researchers was used to analyze the articles. As a result of the research, it was seen that the studies published in the TR Index using learning analytics were primarily published in 2022, and there were no articles published on learning analytics in TR Index-indexed journals between 2016 and 2018. It was observed that the types of these studies were research studies and review studies. When analyzed according to research methods, quantitative and literature reviews are prominent in the articles. It was seen that more than one data collection tool was used together in the analyzed articles. In the articles examined, 59% of the statistical analyses were quantitative, and 41% were qualitative data analysis methods. When the keywords used in the articles were analyzed, it was seen that the most frequently used keyword was "learning analytics," followed by the keyword "e-learning."

Keywords: learning analytics, TR index articles, trends.

Giriş

Öğrenme analitikleri; öğrenmeyi ve içinde gerçekleştiği ortamları anlamak ve daha iyi hale getirebilmek amacıyla öğrenenler hakkındaki verilerin ölçülmesi, toplanması, analiz edilmesi ve raporlanmasını bütüncül bir yaklaşımla ele alan bir araştırma alanıdır (Siemens & Gasevic, 2012). Ifenthaler (2015) bu verilerin bazen öğrenenlerin geçmiş akademik performansı ya da demografik bilgileri gibi statik veriler olabilirken genellikle e-öğrenme ortamlarındaki etkileşimleri sonucu ortaya çıkan dinamik veriler olduğunu ifade etmiştir. Bunun yanı sıra Tempelaar vd. (2015) öğrenme analitiklerini, öğrenme süreçlerini desteklemek ve zengin geri bildirimler sağlamak için elektronik ortamlarda yapılan sistematik ölçümler şeklinde tanımlamışlardır.

Eğitimde öğrenme analitiği kullanmak görünmez verilerin ortaya çıkmasına yardımcı olur. Öğrenme analitikleri öğrenme öğretme süreçlerinden öğrenme deneyimi, öğrenme performansı ve öğrenen katılımını geliştirmek için öngörüler sağlar ve böylelikle bir öğretim sürecinin niteliğini geliştirmek için karar ve müdahaleleri şekillendirir (Brown, 2012). Bir diğer ifadeyle, öğrenme öğretme sürecinde elde edilen verileri iyileştirmek için öğrenme analitiğinden yararlanılır (Clow, 2012). Dyckhoff ve diğerleri (2013) yaptıkları araştırmalarına göre öğrenme analitiklerinin eğitimcilere sağladığı avantajlar şunlardır:

- Öğrenme sürecini ve öğrencilerin çabalarını izleme,
- Öğrenci verilerini ve stratejilerini keşfetme,
- Zorlukları tespit etme,
- Öğrenme materyallerinin başarıya etkisini tespit etme,
- Öğrenenlere müdahalede bulunma,
- Öğrenme ortamını denetleme ve iyileştirme

Sistematik incelemeler, dağınık bir şekilde yayınlanmış çalışmaları bir araya getirerek ve sentezleyerek, bir konudaki tüm bilgileri tek bir yerde sunar. Bu sayede araştırmacılar, konuyla ilgili kapsamlı bir bakış açısına sahip olabilirler. Öğrenme analitikleri alanındaki araştırmaları sistematik bir bakış açısıyla incelemek mevcut durumu ortaya koyarak gelecekte yapılacak olan araştırmalara yol gösterici olacaktır.

Öğrenme analitikleri kullanılarak yapılan çalışmaların sayısı artmaktadır. Bu alanda ülkemizde yayınlanan çalışmalar dünya genelinde yayınlanan çalışmalar ile kıyaslandığında ülkemizde bu alanın henüz gelişmekte olduğu ifade edilmiştir (Börekçi & Sarıtaş, 2023; Gülcüoğlu vd., 2021). Ayrıca öğrenme analitikleri alanında yerli literatürde yapılan sistematik derleme ve doküman incelemesi çalışma sayısının sınırlı olduğu görülmektedir. Bu çalışmalardan birinde Börekçi ve Sarıtaş (2023) öğrenme analitikleri konusunu ele almış 2014-Haziran 2022 tarihleri arasında Yüksek Öğretim Kurulu Tez Merkezinde yayımlanan 11 doktora ve 10 yüksek lisans tezindeki eğilimleri incelemişlerdir. Tütsün (2020) öğrenme analitikleri kapsamında yaptığı literatür taramasında dünya genelinde ve Türkiye'de yükseköğretim kurumlarında uygulanan analitiklere ilişkin örnekler sunarak Türkiye'de öğrenme analitikleri uygulamalarında eksiklik görülen noktaları vurgulanmıştır.

Öğrenme analitikleri alanında sistematik derleme ve betimsel içerik analizi çalışmaları incelendiğinde sadece TR Dizin'e odaklanan bir çalışma görülmemiştir. Bu sebeple bu çalışmada öğrenme analitikleri ile ilgili yerli literatürdeki eğilimleri belirlemek için TR Dizin'de öğrenme analitikleri kavramına odaklanan Türkçe makaleler incelenmiştir.

Araştırmanın Amacı

Bu araştırmanın amacı, öğrenme analitikleri konusunu ele alan TR Dizin indekslenen dergilerde yayınlanmış çalışmalardaki eğilimlerin incelenmesidir. İnceleme ölçütü olarak "öğrenme" ve "analitikleri" anahtar kelimeleri ile 2014-2024 Nisan tarihleri aralığı kullanılmıştır. Bu ölçütlere uygun 16 makale bulunmuş ve bu makalelerden 12 tanesi araştırma amacına uygun olduğu için incelemeye dahil edilmiştir.
Bu araştırmanın amacı doğrultusunda aşağıdaki sorulara yanıt aranmıştır:

- İncelenen çalışmaların yayınlanma yılına göre dağılımları nasıldır?
- İncelenen çalışmaların araştırma türüne göre dağılımları nasıldır?
- İncelenen çalışmaların yöntem ve araştırma desenlerine göre dağılımları nasıldır?
- İncelenen çalışmaların veri toplama araçlarına göre dağılımları nasıldır?
- İncelenen çalışmaların veri analiz yöntemlerine göre dağılımları nasıldır?
- İncelenen çalışmaların anahtar kelimelerine göre dağılımları nasıldır?

Yöntem

Araştırma Deseni

Bu çalışma kapsamında, TR Dizin veri tabanında bulunan 2014-2024 Nisan tarihleri arasında başlığında "öğrenme" ve "analitikleri" ifadelerini içeren araştırma makaleleri incelenmiştir. Araştırma bir nitel araştırma yöntemi olan doküman analizi yöntemi kullanılarak yapılmıştır. Doküman analizinde, araştırmaya konu olan olgu veya olgulara dair bilgiler sunan yazılı materyallerin analizi amaçlanmaktadır (Yıldırım & Şimşek, 2016).

Dahil Etme ve Hariç Tutma Süreci

TR Dizin veri tabanında 2014–2024 Nisan tarihleri arasında yayınlanan ve başlığında "öğrenme" ve "analitikleri" ifadelerini içeren 16 adet çalışmaya ulaşılmıştır ve bu çalışmaların ikisi İngilizce dilinde olduğundan ve bir tanesi de bir TÜBİTAK proje sonuç raporu olduğundan hariç tutulmuş ve 12 tanesi araştırma amacına uygun olduğu için incelemeye dahil edilmiştir. Araştırma konusu kapsamında amaçlı örneklem yöntemi seçilmiştir. Amaçlı örnekleme; kapsamlı bir araştırma yapabilmek için araştırmanın amacı bağlamında çok fazla bilgi içeren durumları seçmektir (Büyüköztürk vd., 2008). Seçilen yöntem doğrultusunda "öğrenme" ve "analitikleri" ifadelerini içeren makalelere yönelik taramalar yapılmıştır. Bu örnekleme türünde araştırmacılar kimi veya neyi seçeceklerine kendi takdirlerine göre karar verirler ve araştırma amaçlarına en uygun örnekler çalışma grubuna dahil edilir (Balcı, 2011). Çalışma grubu seçilirken aşağıdaki kriterler göz önünde bulundurulmuştur;

1. TR Dizin veri tabanında arama kısmına "öğrenme" ve "analitikleri" ifadeleri yazılarak bu ifadeleri içeren makaleler,
2. Nitel, nicel ve karma türünde olan makaleleri,
3. 2014 yılından 2024 Nisan tarihine kadar olan süre içerisinde yayınlanan Türkçe dilinde olan makaleler değerlendirilmiştir. Bu kriterler göz önünde bulundurulduğunda 2 adet Türkçe dilinde olmayan makale çalışmaya dahil edilmemiştir.

Veri Toplama Aracı

2014-2024 Nisan tarihleri arasında TR Dizin veri tabanında öğrenme ve analitikleri kavramlarını içeren araştırma makalelerinin analizini yapmak amacıyla araştırmacılar "Makale İnceleme ve Sınıflama Formu" geliştirmişlerdir. Bu form Göktaş vd. (2012) tarafından geliştirilen makale inceleme formundan yararlanılarak geliştirilmiştir.

Veri Toplama Süreci

Türkiye'de öğrenme analitikleri alanlarında bilimsel dergilerde yayınlanan makalelere ulaşmak için TR Dizin veri tabanı kullanılarak "öğrenme" ve "analitikleri" ifadelerini içeren makaleler taranmış; bu konuda uygun tüm makaleler kapsama dahil edilmiştir. Araştırma kapsamında zaman sınırlamasına gitmek amacıyla 2014-2024 Nisan tarihleri arası seçilmiştir. Bu kriterlere uygun toplam 16 makale bulunmuştur. Bulunan makalelerden Türkçe dilinde olmayan 2 makale, ve bir tanesi de bir TÜBİTAK proje sonuç raporu olduğundan kapsam dışında tutulmuştur ve 12 makale araştırma amacına uygun olduğu için çalışma kapsamına alınmıştır. Bu makaleler geliştirilen "Makale İnceleme ve Sınıflama Formu"nda belirtilen ölçütler doğrultusunda incelenmiştir.

Verilerin Analizi

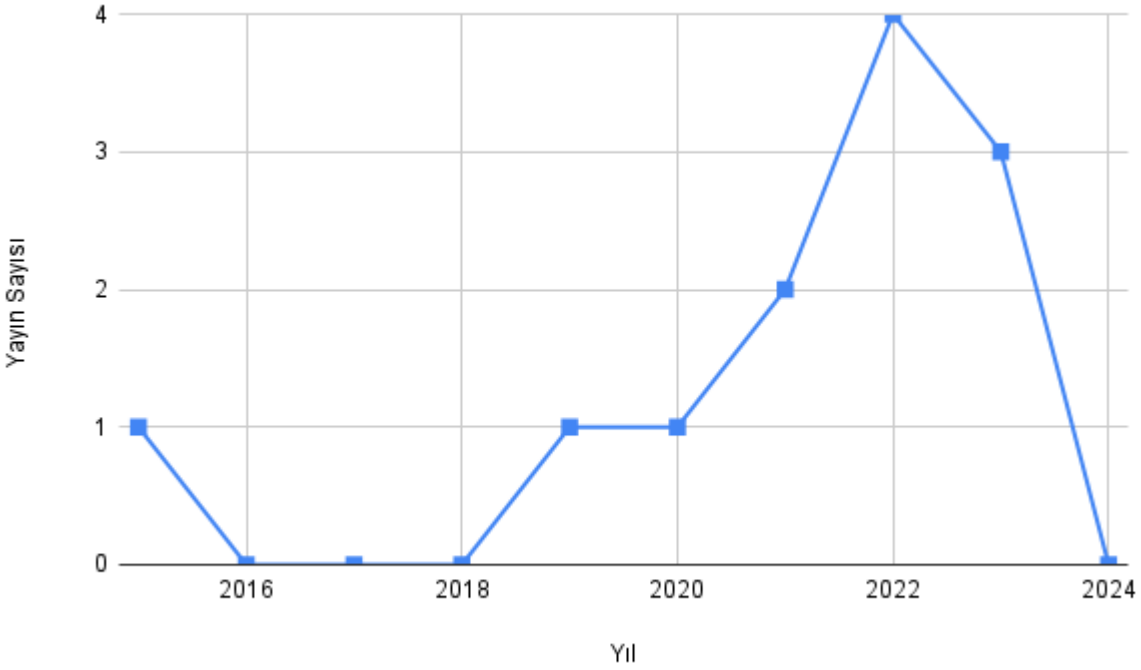
Araştırma verilerinin analizi için nitel veri analizi tekniklerinden betimsel analiz yöntemi kullanılmıştır. Makalelerin incelemesinde, araştırmacıların geliştirdiği "Makale İnceleme ve Sınıflama Formu" kullanılmıştır. Formdan elde edilen bilgilerle frekans ve yüzdeler hesaplanmıştır. Son olarak elde edilen veriler tablo ve grafikler ile sunulmuştur.

Bulgular

Makalelerin Yıla Göre Dağılımları

Çalışma kapsamında ulaşılan makalelerin yayın yılına göre dağılımı Şekil 1'de verilmiştir.

Şekil 1.
İncelenen makalelerin yayın yılına göre dağılımları

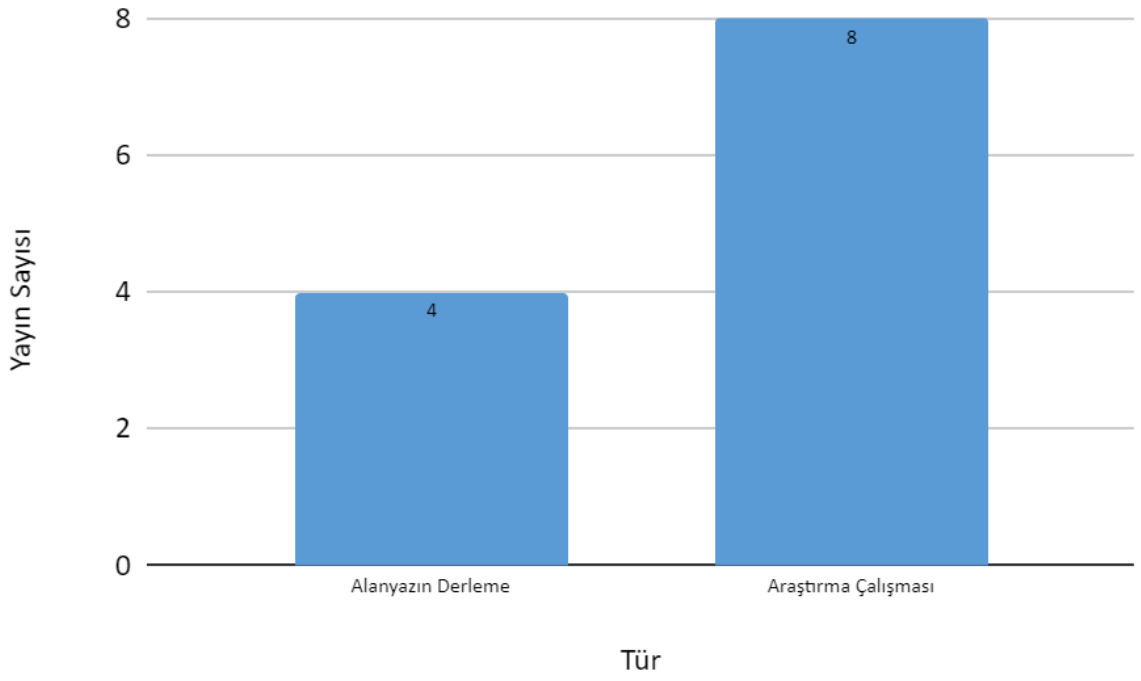


Şekil 1'e göre dört yayınla öğrenme analitikleri ile ilgili en fazla makalenin yayınlandığı yıl 2022'dir. Bunu üç yayınla 2023 yılı takip etmektedir. Son yıllarda bu konuda yapılan yayın sayısında bir artış trendi olduğu görülmektedir. Bununla birlikte 2016-2018 arasında öğrenme analitikleri konusunda TR Dizin indeksli dergilerde makale yayınlanmadığı görülmektedir.

Makalelerin Türlerine Göre Dağılımları

Çalışma kapsamında ulaşılan makalelerin türlerine göre dağılımı Şekil 2'de verilmiştir.

Şekil 2.
İncelenen makalelerin türlerine ilişkin dağılımları

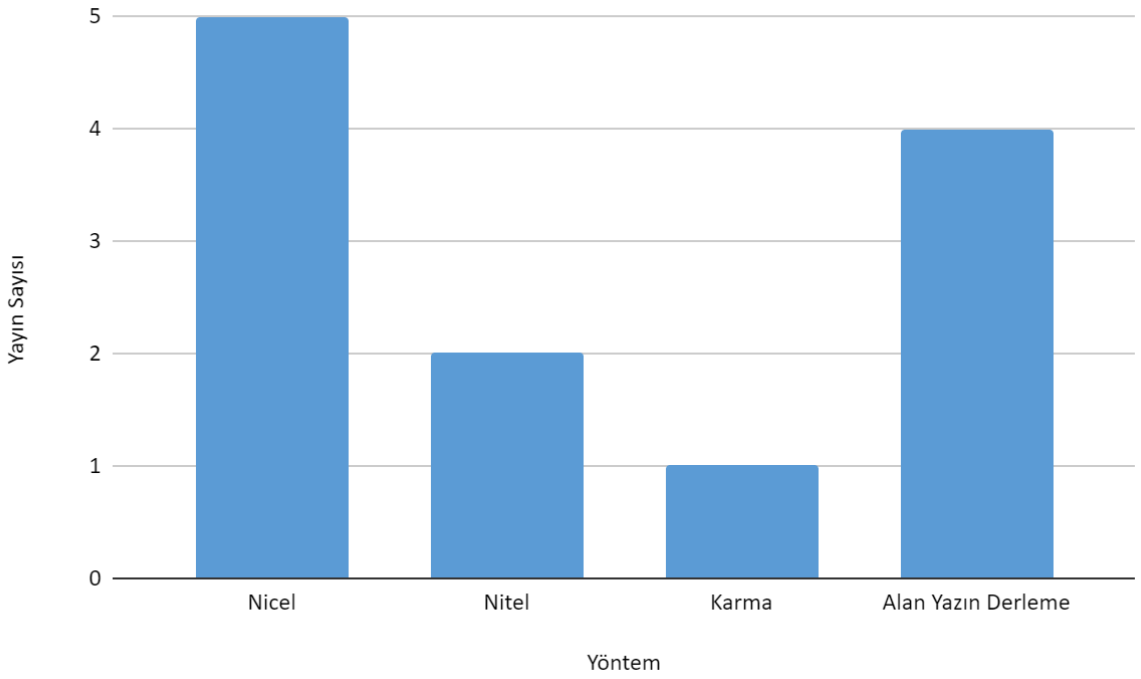


Şekil 2'ye göre, öğrenme analitiklerini konu alan makaleler incelendiğinde, makalelerin alanyazın derleme ve araştırma makalelerinden oluştuğu görülmektedir. Araştırma makalelerinin (f=8) en sık tercih edilen tür olduğu saptanmıştır. Derleme makaleleri (f=4) en az tercih edilen tür olduğu saptanmıştır.

Makalelerin Yöntemlerine Göre Dağılımları

Çalışma kapsamında ulaşılan makalelerin araştırma yöntemlerine göre dağılımı Şekil 3'te verilmiştir.

Şekil 3.
İncelenen makalelerdeki yöntemsel eğilimler



Şekil 3'e göre öğrenme analitikleri bağlamında incelenen makalelerde en sık nicel yöntemin kullanıldığı saptanmıştır. İncelenen makalelerden 5 tanesinde nicel yöntemlerin kullanıldığı görülmüştür. Bunu alanyazın derleme yöntemi takip etmektedir. 4 makalede alanyazın derleme yöntemi kullanıldığı görülmüştür. Nitel araştırma yöntemleri kullanılan 2 makalenin olduğu görülmektedir. En az kullanılan yöntem karma yöntemdir. Karma yöntemlerin kullanıldığı makale sayısının 1 olduğu görülmüştür. Çalışma kapsamında ulaşılan makalelerin araştırma desenlerine ve araştırma alt desenlerine göre dağılımı Tablo 1'de gösterilmiştir.

Tablo 1.
Makalelerin Yöntemine ve Desenine İlişkin Dağılımı

Araştırma Yöntemi	Araştırma Deseni	Frekans (f)	Yüzde %
Nicel	Betimsel	5	41.66
Karma	Keşfedici	1	8.33
Nitel	Olgubilim	1	8.33
	Kavram Analizi	1	8.33

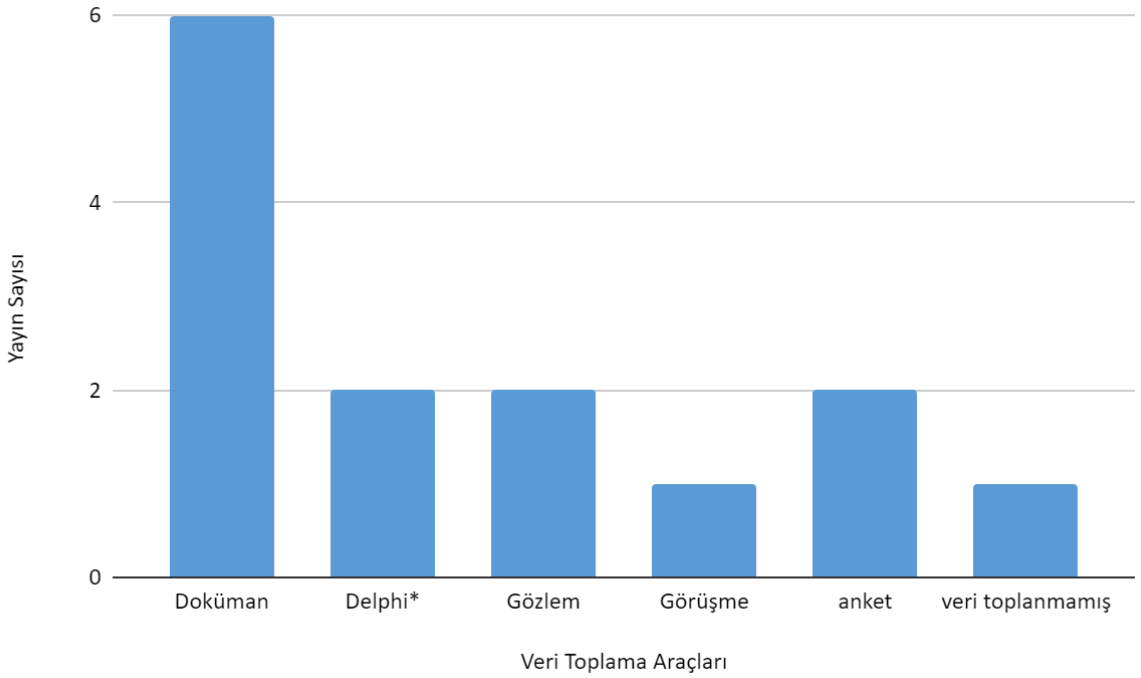
Alanyazın Derleme	Alanyazın Derleme	4	33.33
Toplam		**12**	**100**

Tablo 1'e göre, öğrenme analitiklerini konu alan makaleler incelendiğinde, nicel yöntemlerden betimsel (f=5) yönteminin en sık tercih edilen yöntem olduğu saptanmıştır. Bunu derleme (f=4) yöntemi izlemektedir. Nitel yöntemlerden kavram analizi (f=1) yöntemi ve olgubilim yöntemi (f=1), karma yöntemlerden keşfedici (f=1) yöntemlerin nispeten daha az tercih edildiği gözlenmiştir.

Makalelerin Veri Toplama Araçlarına Göre Dağılımı

Çalışma kapsamında incelenen makalelerin veri toplama araçlarına ilişkin dağılım Şekil 4'te gösterilmiştir.

Şekil 4.
Makalelerin veri toplama araçlarına ilişkin dağılımı

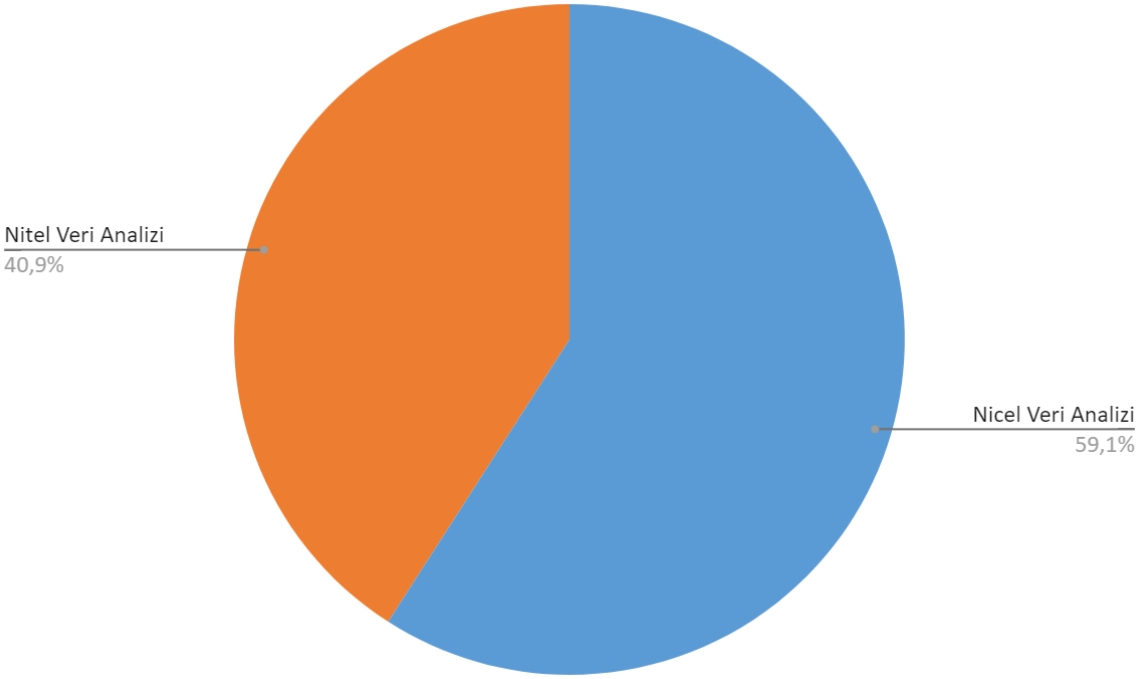


Şekil 4'e göre, öğrenme analitiklerini konu alan makaleler incelendiğinde, dökümanlar (f=6) veri toplama araçlarının en sık tercih edilen veri toplama araçları olduğu saptanmıştır.
Bunu delphi (f=2), gözlem (f=2) ve anket (f=2) tekniği izlemektedir. Delphi tekniği anket tekniği kullanılan iki makalede ek olarak kullanılmıştır. Görüşme (f=1) veri toplama aracının nispeten daha az tercih edildiği gözlenmiştir. Bunun yanı sıra veri toplanmayan 1 makale bulunmaktadır.

Makalelerin Veri Analiz Yöntemlerine Göre Dağılımı

Çalışma kapsamında incelenen makalelerin veri analiz tekniklerine ilişkin dağılımı Şekil 5'te gösterilmiştir.

Şekil 5.
Makalelerin veri analiz yöntemlerine ilişkin dağılımı



Şekil 5'e göre incelenen makalelerde kullanılan veri analiz yöntemlerinden nicel veri analiz yöntemlerinin (%59) en fazla tercih edilen yöntem olduğu görülmüştür.

Tablo 2.
Makalelerin Veri Analiz Yöntemlerine İlişkin Dağılımı

Veri Analiz Yöntemleri			**Frekans (f)**	**Yüzde %**
Nicel Veri Analizi	Betimsel	Frekans	4	18,18
		Grafikle Gösterim	2	9,09
		Süreç Madenciliği	3	13,63
		Çeyrekler Açıklık	1	4,54
		Ortalama/ Standart Sapma	1	4,54
	Kestirimsel Analiz	z testi	1	4,54
		Kutu Grafiği	1	4,54
Nitel Veri Analizi	Nitel Analiz	İçerik Analizi	8	36,36
		Kelime Bulutu	1	4,54
Toplam			22	100

Tablo 2'de görüldüğü üzere makalelerde en fazla tercih edilen veri analiz yönteminin nitel veri analiz yöntemlerinden içerik analizi olduğu saptanmıştır. Nitel analiz yöntemlerinden içerik analizi 8 kez kullanılırken kelime bulutu 1 kez kullanılmıştır. Nicel verilerin analizinde ise betimsel istatistikler 11 kez kullanılırken,

kestirimsel istatistikler 2 kez kullanılmıştır. Betimsel istatistiklerin tercih edildiği makalelerde frekans/yüzde (f=4), grafikle gösterim (f=2), süreç madenciliği (f=3), çeyrekler açıklık (f=1) ve ortalama-standart sapma (f=1) tercih edilmiştir. Kestirimsel istatistiklerin kullanıldığı makalelerde ise z-testi (f=1) ve kutu grafiği (f=1) kullanılan diğer veri analiz yöntemleri olmuştur.

Makalelerin Anahtar kelimelerine Göre Dağılımı

Şekil 6'da makalelerdeki anahtar kelimelerdeki eğilimleri tespit etmek için oluşturulan kelime bulutu sunulmuştur. İncelenen makalelerde 30 farklı anahtar kelime 48 defa kullanılmıştır. Kelime bulutunda öne çıkan anahtar kelime öğrenme analitikleridir. Ayrıca e-öğrenme, sosyal ağ analizleri, web analitikleri, delphi tekniği, eğitsel veri madenciliği ve etik diğer öne çıkan anahtar kelimelerdir.

Şekil 6.
Makalelerin anahtar kelimeleri

Şekil 6'da 30 farklı anahtar kelime ile oluşturulan kelime bulutu görünmektedir..

Sonuç

Öğrenme analitikleri başlığı ile TR Dizin'de yayınlanan çalışmalar araştırıldığında 12 makale kapsama dahil edilmiştir. Yapılan çalışmalar incelendiğinde sonuç olarak en çok makalenin 2022 yılında yayınlandığı görülmektedir. Bununla birlikte 2016-2018 arasında öğrenme analitikleri konusunda TR Dizin indeksli dergilerde makale yayınlanmadığı görülmektedir. Son yıllarda bu konuda yapılan yayın sayısında bir artış trendi olduğu görülmektedir. İlerleyen zamanlarda öğrenme analitiklerini konu alan çalışmaların artması beklenmektedir.
İncelenen makalelerin araştırma çalışması ve alanyazın derleme türünde olduğu görülmektedir. Bununla birlikte incelenen makalelerin büyük bir kısmının araştırma çalışması türünde olduğu görülmektedir.
İncelenen makalelerin 6'sında nicel yöntem kullanılmıştır. Nicel yöntemleri alanyazın derleme yöntemi takip etmektedir. İncelenen makalelerin 4'ünde alan yazın derleme yöntemi kullanılmıştır. İncelenen makalelerin 2'sinde nitel, 1'inde de karma yöntem kullanılmıştır. Börekçi ve Sarıtaş (2023) öğrenme analitikleri konusunu ele almış 2014-Haziran 2022 tarihleri arasında Yüksek Öğretim Kurulu Tez Merkezinde yayınlanan 21 tezin 11'inde karma yöntem, 10'unda nicel yöntemin tercih edildiği sonucuna ulaşmışlardır. Bunun yanı sıra Gülcüloğlu vd. 2016-2019 yılları arası Web of Science veri tabanında yayınlanan ve öğrenme analitiklerinin kullanıldığı 529

çalışmayı incelemiş ve çalışmaların %55,01'inin nicel yöntemlerin kullanıldığı sonucunu ulaşmışlardır. Buradan yola çıkarak nicel araştırmaların daha çok tercih edildiği görülmektedir.
Öğrenme analitikleri için farklı kaynaklardan veriler elde edilebilir. İncelenen makalelerde birden fazla veri toplama aracının birlikte kullanılmıştır. İncelenen makalelerde döküman, delphi yöntemi, gözlem, görüşme, anket ile veri elde edildiği görülmektedir. Bununla birlikte veri toplanmayan bir araştırma türünde makale olduğu görülmektedir. En çok kullanılan veri toplama aracının döküman olduğu, en az kullanılan veri toplama aracının da görüşme olduğu görülmektedir.
Makalelerde toplanan veriler çeşitli yaklaşımlar ile analiz edilmiştir. Bununla birlikte birden fazla veri analizi yöntemi birlikte kullanılmıştır. İncelenen makalelerde nicel veri analizleri (%59,1) en çok tercih edilen veri analizi yöntemidir. Nitel veri analizi yöntemleri ise %40,9 'u oluşturmaktadır. Makalelerde nicel veri analizi yöntemlerinden betimsel analiz ve kestirimsel analiz yöntemleri kullanılmıştır. Betimsel analiz yöntemlerinden frekans, grafikler gösterim, süreç madenciliği, çeyrekler açıklık ve ortalama/ standart sapma veri analizi yöntemleri kullanılmıştır. Kestirimsel analizlerden ise z testi ve kutu grafiği veri analizi yöntemleri kullanılmıştır. Nicel veri analizi yöntemlerinden en sık kullanılan yöntem frekans (f=4) olduğu görülmektedir. Nitel veri analizi yöntemlerinden içerik analizi ve kelime bulutu veri analizi yöntemleri kullanılmıştır. Nitel veri analizi yöntemlerinden en sık kullanılan yöntem içerik analizi (f=8)'dir.
Makalelerde kullanılan anahtar kelimeler incelendiğinde 30 farklı anahtar kelimenin 48 defa kullanıldığı görülmektedir. En sık kullanılan anahtar kelime "öğrenme analitikleri" 9 defa tekrar edilmiştir. Öğrenme analitiklerini 3 defa tekrar eden "e-öğrenme" anahtar kelimesi takip etmektedir.
Sonuç olarak öğrenme analitikleri son yıllarda popülerliği artan bir araştırma alanı olarak karşımıza çıkmaktadır. Öğrenme analitiklerinin amacı öğrenme süreçlerini iyileştirmektir. Bu bağlamda farklı kaynaklardan toplanan verilerin analizi ile öğrenme süreçleri anlamlandırılıp iyileştirilebilir. Öğrenme analitikleri, öğrenme ve eğitim ile ilgili diğer konular ile ilişkilendirilip yeni araştırma konuları oluşturulabilir. Bu bağlamda öğrenme analitikleri kullanımının yakın gelecekte eğitimde artması öngörülmektedir.

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EBA Çalışmalar Bölümü Kullanım Durumunun Öğrencilerin Sınav Başarısına Etkisi

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Özet

Öğrenme Yönetim Sistemleri sunduğu dijital imkânlarla eğitimde tamamlayıcı ve kolaylaştırıcı bir öğrenme ortamı sunmaktadır. Eğitim Bilişim Ağı (EBA); içerisinde yer alan ders içerikleri, sınavlar, öğrenme senaryoları ve kütüphane içerikleri ile milyonlarca öğrenciye ve binlerce öğretmene hizmet vermektedir. EBA içerisinde yer alan "Dijital Çalışmalar" ve "Sözlü ve Yazılı Çalışmalar" bölümleri ile öğrencilerle ders kazanımlarına yönelik çeşitli içerikler paylaşılabilmektedir. Ayrıca öğrencilerin sisteme dosya yükleme özelliği ile sözlü ve proje görevleri notu verme işlemleri yapılabilmektedir. Ancak bu özelliklerine rağmen EBA'da yer alan ilgili bölümlerin kullanım durumlarını inceleyen çalışmalar sınırlıdır. Bu çalışmanın amacı, sözlü/yazılı çalışmalar bölümü ile proje teslimi yapan öğrencilerin Bilişim Teknolojileri ve Yazılım dersi sınav başarısını çeşitli değişkenler açısından incelemektir. Çalışmanın yöntemi, nicel araştırma yöntemlerinden tarama modelinde desenlenmiştir. Çalışmanın katılımcıları, bir devlet okulunun 5. sınıfında öğrenim 39 kız ve 43 erkek öğrenci olmak üzere toplam 82 öğrencidir. Çalışmanın verileri öğrencilerin EBA istatistikleri ve sınav notlarıdır. Verilerin analizinde betimsel istatistikler, bağımsız gruplar t-testi ve korelasyon analizleri kullanılmıştır. Öğrencilere "EBA Dijital Çalışmalar" bölümü üzerinden ders kazanımlarını içeren sunular ve çalışmalar gönderilmiş, "EBA Sözlü ve Yazılı Çalışmalar" bölümü üzerinden de proje görevi olarak hazırlanacak dört farklı proje konu başlığı belirlenmiştir. Öğrenciler seçtiği proje başlığında hazırladıkları sunu, afiş, pano, slogan, hikaye veya şiir gibi türlerinden birini EBA üzerinden dosya yükleyerek veya fiziksel olarak teslim etmiştir. Yapılan analizler sonucunda cinsiyete göre sınav puanları arasında anlamlı farklılık bulunmazken proje ödevini EBA'ya dosya yükleme durumuna göre öğrencilerin sınav notları arasında anlamlı farklılık bulunmuştur. Yapılan korelasyon analizinde ise öğrencilerin dijital çalışmaları takip etme sayısı ile sınav notları arasında orta düzeyde pozitif yönlü ilişki bulunmuştur. Çalışma bulgularına dayanarak EBA'da yer alan çalışmalar bölümünün aktif kullanımının öğrenci başarısı üzerinde etkili olduğu sonucuna ulaşılmıştır. Çalışmalar bölümünü inceleyen uzun süreli boylamsal çalışmaların ve öğrenci görüşlerini derinlemesine inceleyecek nitel çalışmaların yapılması önerilmektedir.

Anahtar Kelimeler: Eğitim Bilişim Ağı (EBA), dijital çalışmalar, sözlü ve yazılı çalışmalar, dijital içerik, öğrenme yönetim sistemi, sınav başarısı.

The Effect of EBA Studies Section Usage Status on Students' Exam Success

Abstract

Learning Management Systems provide a complementary and facilitating learning environment in education with the digital opportunities they offer. The Education Information Network (EBA) serves millions of students and thousands of teachers with its course contents, exams, learning scenarios and library contents. With the "Digital Studies" and "Oral and Written Studies" sections in EBA, students can share various content related to course outcomes. In addition, students can upload files to the system and grade oral and project tasks. However, despite these features, studies examining the usage status of the relevant sections in EBA are limited. The aim of this study is to examine the exam success of students who submit projects with oral/written works section in terms of various variables in Information Technologies and Software course. The method of the study was designed in the survey model, one of the quantitative research methods. The participants of the study were a total of 82 students, 39 female and 43 male students in the 5th grade of a public school. The data of the study are EBA statistics and exam grades of the students. Descriptive statistics, independent groups t-test and correlation analysis were used to analyze the data. Students were sent presentations and studies containing the course outcomes through the "EBA Digital Studies" section, and four different project topics to be prepared as project tasks were determined through the "EBA Oral and Written Studies" section. Students submitted one of the types of presentation, poster, panel, slogan, story or poem they prepared under the project title they chose, either by uploading a file on EBA or physically. As a result of the analysis, no significant difference was found between the exam scores according to gender, while a

significant difference was found between the exam grades of the students according to the status of uploading the project assignment to EBA. In the correlation analysis, a moderate positive relationship was found between the number of students following digital studies and their exam grades. Based on the findings of the study, it was concluded that active use of the studies section in EBA is effective on student achievement. It is recommended to conduct long-term longitudinal studies examining the studies section and qualitative studies that will examine student views in depth.

Keywords: Education Information Network (EBA), digital studies, oral and written studies, digital content, learning management system, exam success.

Giriş

Dijital eğitim, teknolojinin gelişmesi ile yeni öğrenme yaklaşımları sunan ve çevrimiçi eğitimi de kapsayan geniş bir kavramdır (Bozkurt vd., 2021). Dijital okuryazarlık, eğitimde teknoloji entegrasyonu ile birlikte 21. yüzyıl öğrencilerinde ve öğretmenlerinde olması gereken bir beceri olarak belirtilmektedir (ISTE, 2016; UNESCO, 2018). Bu yönüyle ortaokul Bilişim Teknolojileri ve Yazılım (BTY) dersinde dijital okuryazarlık kavramları ön plana çıkmaktadır (MEB, 2018). Dijital okuryazarlık becerilerinin yapılan araştırmalarda ve raporlarda sadece bilgisayar bilimi alanları için değil tüm dersler ve kazanımlar için önemli olduğu söylenebilir. Bu konularda EBA, gelişmiş yapısı, çok sayıda derse ait dijital içeriğe ve özelliğe sahip olması ile kapsamlı bir öğrenme yönetim sistemi (ÖYS) yapısına sahiptir (Hangün, 2023). EBA Çalışmalar bölümü de bunlardan biridir. Çalışmalar bölümü içinde dijital çalışmalar ile sözlü ve yazılı çalışmalar yer almakta; bu bölümler ile öğretmenler öğrencilerine dijital içeriklerin yanında öğrencilerin kendi çalışmalarını yükleyebilecekleri görevler de verebilmektedir (EBA, 2023). EBA kullanım durumlarının kullanıcı görüşlerine benzer şekilde değiştiğini belirten çalışmalara rağmen (Demir vd., 2018) EBA çalışmalar bölümünü inceleyen çalışmalar oldukça sınırlıdır. Çalışmanın amacı, BTY dersinde proje teslim etme yönteminin öğrencilerinin sınav performansı üzerindeki etkisini incelemektir. Bu amaç doğrultusunda aşağıdaki araştırma sorularına cevap aranmıştır:

1. Öğrencilerin BTY sınav notları arasında:
a. Proje teslim etme yöntemine anlamlı farklılık var mıdır?
b. Cinsiyete göre anlamlı farklılık var mıdır?
2. Öğrencilerin dijital çalışmaları takip etme sayısı ile BTY sınav notlarası arasında ilişki varmıdır?

Yöntem

Bu çalışmada, nicel araştırma yöntemlerinden ilişkisel tarama modeli (Büyüköztürk vd., 2014) kullanılmıştır. Araştırma deseni olarak nedensel karşılaştırma deseni benimsenmiştir. Nedensellik karşılaştırmasında, bir değişkendeki değişim ile diğer değişkendeki değişim ilişkisel olarak test edilir (Gürbüz ve Şahin, 2014). Çalışmanın katılımcıları bir devlet ortaokulunun 5. sınıfında öğrenim gören 39 kız, 43 erkek olmak üzere toplam 82 öğrencidir. Üç farklı şubede öğrenim gören bu öğrencilerin tamamına BTY dersi kapsamında EBA'dan dijital içerikler gönderilmiştir. 2023-2024 yılının ilk dönemini kapsayan bu çalışmada, ders kazanımlarına yönelik sunuların yer aldığı altı çalışma öğrencilere dijital çalışmalar başlığı altında gönderilmiştir. Sözlü ve yazılı çalışmalar başlığı altında da öğrencilerin BTY dersi kapsamında teslim edecekleri proje görevleri verilmiştir. Proje görevleri; dijital bağımlılık, sanal zorbalık, iklim değişikliği ve milli teknoloji hamlesi başlıklarından birinin öğrenciler tarafından seçilerek bu başlıkta sunu, afiş, pano, slogan, hikaye veya şiir türünde bir ürün oluşturma şeklindedir. Hazırlanan proje görevlerinin teslimi için tüm öğrencilere EBA sözlü ve yazılı çalışmalar başlığı altında dosya yükleme görevi etkinleştirilmiştir. Bunun dışında alternatif olarak öğrencilerin çalışmalarını fiziksel olarak da teslim edebilecekleri belirtilmiştir. EBA ortamında proje görevini yükleyemeyen öğrenciler ödevlerini fiziksel türde veya taşınabilir bellek ile yüz yüze teslim etmiştir. Öğrencilerin altı hafta sonunda yapılan BTY 1. sınavında aldıkları ders notları ve dijital çalışmalar ile sözlü ve yazılı çalışmalar bölümü kullanım raporları, bu çalışmanın verilerini oluşturmuştur. Verilerin analizinde frekans, yüzde gibi betimsel istatistikler ile iki grup arasındaki ilişkiyi analiz etmek için Pearson korelasyon analizi kullanılmıştır. SPSS paket programına aktarılan veriler analiz edilirken gruplar homojen dağıldığından parametrik testler kullanılmış ve çalışmanın bulguları tablolar halinde raporlanmıştır.

Bulgular

Dijital çalışmalar bölümünde en az bir çalışmayı takip eden 45 öğrenci varken 37 öğrenci hiçbir çalışmayı takip etmemiştir. Bu sonucun ortaya çıkmasında teknolojik erişim imkânları araştırılmamıştır.

BTY Sınav Performansına Ait Bulgular

Öğrencilerin BTY proje görevlerini teslim etme türüne göre sınav notları incelenmiş ve t-testi sonucu Tablo 1'de belirtilmiştir.

Tablo 1. Proje teslim türüne göre BTY sınav notları.

Proje teslim türü	N	Ort.	SS	t	p
EBA ortamı	32	82.94	12.50	2.23	0.028*
Fiziksel	50	76.26	13.58		

Note. $^{*}p < .05$.

Öğrencilerden projesini EBA üzerinden teslim edenler fiziksel ortamda teslim edenlere göre daha yüksek not ortalamasına sahiptir. T-testi sonucuna göre grupların sınav notları arasında anlamlı farklılık bulunmuştur (p=.028<.05).

Cinsiyete göre sınav notları arasında fark olup olmadığını belirlemek için bağımsız gruplar t-testi analizi yapılmış ve sonucu Tablo 2'de raporlanmıştır.

Tablo 2. Cinsiyete göre BTY sınav notları.

Proje teslim türü	N	Ort.	SS	t	p
Kız	39	79.31	12.48	.28	0.780
Erkek	43	78.47	14.49		

Note. $^{*}p < .05$.

Yapılan analiz sonucunda öğrencilerin BTY sınav notları arasında cinsiyete göre anlamlı farklılık bulunmamıştır.

Dijital Çalışmaları Takip Etme Sayısı ile BTY Sınav Performansının İlişkisine Ait Bulgular

Öğrencilerin dijital çalışmaları takip etmesi ile BTY sınav notları arasındaki ilişkiyi incelemek için Pearson momentler çarpımı korelasyon analizi uygulanmış ve sonuçlar Tablo 3'de belirtilmiştir.

Tablo 3. Dijital Çalışmalar takip etme sayısı ile BTY sınav notları arasındaki ilişki.

	Dijital Çalışma takip etme sayısı	N
BTY sınav notu	r=.404**	82

Note. $^{**}p < .01$.

Tablo 3 incelendiğinde 82 öğrencinin dijital çalışmaları takip etme sayısı ile BTY sınav notları arasında orta düzeyde pozitif yönlü anlamlı bir ilişki tespit edilmiştir (Pallant, 2020). Bu bulguya (r=.404, p<.01) dayanarak EBA dijital çalışmaları takip etmenin sınav başarısını %16 yordadığı söylenebilir.

Sonuçlar

EBA çalışmalar bölümünün kullanım durumunu inceleyen bu çalışmada, öğrenci EBA kullanım istatistikleri ve BTY sınav notları veriler olarak kullanılmış ve yapılan analizler değerlendirilmiştir. EBA sözlü ve yazılı çalışmalar ile proje teslimi yapan öğrencilerin sınav notları daha yüksek olduğu sonucuna ulaşılmış, yapılan analizde gruplar arasında anlamlı farklılık bulunmuştur. Bu durum, EBA aktif kullanımının dijital becerileri olumlu yönde etkilediğini göstermektedir. Cinsiyete göre yapılan analizlerde gruplar arasından BTY sınav notları arasında anlamlı farklılık bulunmadığı sonucuna ulaşılmıştır. Literatürde farklı cinsiyet bulguları yer alırken daha fazla nicel araştırmaya ihtiyaç olduğu söylenebilir. Dijital çalışmalar takip etme sayısı ile sınav notları arasında orta düzeyde pozitif yönlü anlamlı ilişki bulunmuştur. Bu sonuca göre EBA dijital çalışmaları aktif takip etmenin sınav başarısını arttırdığı söylenebilir. Sonuçlara dayanarak EBA çalışmalar bölümünü inceleyen uzun dönemli araştırmaların yapılması önerilmektedir. EBA'da çok çeşitli parametrelerin yer aldığı, öğrenci kullanım verilerinin

anonimleştirilerek paylaşılabileceği Milli Eğitim Bakanlığı açık veri paylaşımı sağlanabilir. Bu sayede çok daha nitelikli araştırmalara kapı açılabilir. EBA'da öğrenci görüşlerini inceleyen nitel ve karma desen araştırmaları yürütülebilir. Öğretmenlerin EBA'da paylaşabileceği dijital içerikler ve dönütler ile öğrencilerin derse olan ilgi ve motivasyonları arttırılabilir.

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Otizm Spektrum Bozukluğunda Yapay Zekâ Kullanımı: Sistematik Alanyazın Taraması

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Özet

Yapay zeka zeknolojileri özellikle son yıllarda erişilebilir bir teknoloji haline gelmesiyle eğitimin farklı alanlarında da kullanılmaya başlanmıştır. Bu alanlardan birisi de özel eğitim alanıdır. Bu bağlamda özel eğitim alanında otizm spektrum bozukluğu çalışmalarına odaklanarak sistematik alanyazın çalışması gerçekleştirilmiş ve bu kapsamda 2020-2024 yılları arasında yayımlanmış 51 çalışma incelenmiştir. İlgili çalışmalar incelendiğinde özellikle erken çocukluk döneminde OSB olan çocukları tanılama ve sınıflandırma ile ilgili öne çıkan araştırmalar olduğu görülmektedir. Makine öğrenimi algoritmalarının, OSB'nin tespiti ve sınıflandırılması için yaygın bir şekilde kullanıldığı görülmektedir. İncelenen çalışmalarda yapay zekâ kullanılarak OSB olan çocuklara beceri öğretimi konusu oldukça sınırlıdır. İncelediğimiz çalışmalarda erken tanının önemi vurgulanmış ve bu doğrultuda yapay zekâ teknolojilerinin OSB tanısına erken müdahale ve tedavi için potansiyel bir araç olarak kullanımı üzerinde durulmuştur. Bu kapsam da bu çalışmada öneriler geliştirilmiş ve ileri çalışmalar için sunulmuştur.

Anahtar kelimeler: otizm spektrum bozukluğu, OSB, yapay zeka, yardımcı teknolojiler, eğitim teknolojileri.

Giriş

Yapay zekâ kavramı ilk olarak 1956 yılında Dortmund Konferansı'nda John McCarthy, Marvin L. Minsky, Nathaniel Rochester ve Claude E. Shannon tarafından sunulan bir öneri mektubunda dile getirilmiştir. Ancak bu kavramın mucidi olarak John McCarthy kabul edilmektedir (Alpaydın, 2013). Prof. John McCarthy, yapay zekânın insan gibi düşünebilen, kararlar alabilen, insanların odaklandığı işleri yapabilen ve problemleri çözebilen makineler olduğunu ifade etmiştir (Elmas, 2016). Yapay zekâ üzerine birçok tanım yapılmıştır. Bellman, (1978) yapay zekayı; insan düşüncesiyle ilişkilendirdiğimiz karar verme, problem çözme, öğrenme gibi faaliyetlerin otomasyonu şeklinde tanımlarken Haugeland, (1985) ise yapay zekayı bilgisayarları düşünmeye iten, tam ve gerçek anlamda zihinleri olan makineler olması için heyecan verici çabalamalar olarak tanımlamıştır. Yapay zekâ yöntemleri arasında makine öğrenmesi ve derin öğrenme olmak üzere iki temel alan bulunmaktadır (Sabak, 2023). Makine öğrenmesi, bilgisayarların öğrenmesini sağlayan teknolojidir. Genellikle örnekler kullanılarak olayların girdi ve çıktıları arasındaki ilişkiler öğrenilir (Öztürk ve Şahin, 2018). Derin öğrenme; nesne tanıma, konuşma tanıma, doğal dil işleme gibi alanlarda çok katmanlı yapay sinir ağlarını kullanan bir yapay zekâ yöntemi olup makine öğrenmesinin çeşitlerinden biridir. Derin öğrenme, geleneksel makine öğrenmesi yöntemlerinden farklı olarak kodlanmış kurallar ile öğrenmek yerine; resim, video, ses ve metinlere ait simgelerden otomatik olarak öğrenebilmektedir (Yılmaz ve Kaya, 2022). Yapay zekâ teknolojileri birçok alanda önemli bir rol oynamaktadır. Bu alanlardan birisi de otizm spektrum bozukluğudur. Otizm Spektrum Bozukluğu (OSB), sosyal iletişim ve etkileşimdeki yetersizliklerin yanı sıra tekrarlayıcı ilgi, örüntü ve takıntılı davranışlarla kendini karakterize eden nörogelişimsel bir bozukluktur (American Psychiatric Association [APA], 2023). Erken dönemde eğitim almaya başlayan otizm spektrum bozukluğu olan çocuklarda sosyal gelişim, iletişim becerileri, dil ve konuşma becerileri, oyun ve bilişsel becerilerinde önemli gelişmeler görülmüştür (Landa, 2008). Otizm spektrum bozukluğu olan bireylerin erken yaşta fark edilmesi, tanılanması ve eğitsel-davranışsal müdahalelerin yapılabilmesi için değerlendirmenin uygun bir şekilde yapılması önemlidir (Selimoğlu vd., 2013). Fakat otizm için özel geliştirilmiş standart araçların olmaması/rutinde kullanılmaması ya da müdahaleye ilişkin gecikme gibi sebeplerden ötürü tanılama sürecinin okul öncesi döneme kadar uzayabildiği görülmektedir (Özçelik vd., 2015). Bu nedenle yapay zekâ alanında çalışan araştırmacıların OSB olan çocukların tanılanmasında yapay zekânın hesaplama sistemlerini kullanma konusu ilgilerini çekmiştir (Sağdıç ve Sani-Bozkurt, 2020). Alanyazın incelendiğinde yapay zekâ teknolojisi ile OSB'nin tanılanmasına yönelik derleme çalışmalarının olduğu (örn., Alqaysi vd., 2022; Chaddad vd., 2021; Moridian vd., 2022) görülmektedir. Bununla birlikte özellikle OSB'de yapay zekâ konulu alanyazın incelendiğinde makine öğrenmesinin kullanımına yönelik derleme çalışmalarının olduğu (örn., Cavus vd., 2021; Francese ve Yang 2022; Kollias vd., 2021) dikkat çekmektedir. Bu derleme çalışmalarından biri olan Francese ve Yang (2022)'ın çalışmasında, gelecekteki sistemli derleme çalışmalarında makine öğrenimi ve göz izlemeyle birlikte OSB tanısında kullanılan diğer araçların da çalışmaya dahil edilmesi gerektiği belirtilmektedir. Ayrıca

yapay zekânın OSB ile ilgili olarak son yıllarda derin öğrenme ile gerçekleştirilen yapay zekâ destekli araştırmalarının (Khodatars vd., 2021; Uddin vd., 2024) artışı da dikkat çekmektedir. Dolayısıyla OSB olan bireylerde makine öğrenmesi ve derin öğrenme ile gerçekleştirilen yapay zekâ destekli araştırmaların eğilimlerini belirlemek amacıyla genel çerçevede bir perspektif sunulmasına ihtiyaç olduğu düşünülmektedir (Sağdıç ve Sani-Bozkurt, 2020). Hopcan vd. (2023) tarafından yapılan özel eğitimde yapay zekâ araştırmalarındaki son trendleri ortaya çıkarmayı amaçlayan sistematik derleme çalışmasında dahil edilen 29 makalede ele alınan temel yetersizlik türünün otizm spektrum bozuklukları olduğu ifade edilmektedir. Bu bulgu OSB'nin her 36 çocuktan birinde görülmesiyle (Centers for Disease Control and Prevention, 2023) açıklanabilir. Bu durum da günümüzde OSB olan birey sayısının ne kadar sık arttığının bir göstergesidir. Bu sıklık ve artışın önemi ve bununla birlikte OSB'nin yaşam boyu süren nöro-gelişimsel bir bozukluk ile ilişkili olması (Huang vd., 2019) dikkate alındığında ilgili alanyazında OSB alanında yapay zekâ teknolojisinin kullanımına yönelik çalışmaların incelenmesi, önemle üzerinde durulması gereken konulardan biridir. Sağdıç ve Sani-Bozkurt (2020) tarafından yapılan çalışmada yapay zekâ teknolojilerinin OSB alanında kullanımının incelenmesine yönelik gerçekleştirilen ilgili alanyazın çalışmasında OSB'nin en önemli tanı ölçütlerinden biri olan sosyal etkileşim ve iletişimdeki yetersizlikleri ile sınırlı, yineleyici ve takıntılı davranış, ilgi ve etkinlik örüntüleri bağlamında oldukça sınırlı araştırmalar gerçekleştirildiği dikkat çekmektedir. Bunun yanı sıra çalışmada OSB ve yapay zekâ ile ilgili olarak yapılan çalışmaların sonuçları ümit verici olmakla birlikte bu teknolojinin OSB olan çocuklar için ileride ne tür sonuçlara yol açabileceği üzerinde durulması gereken konulardan biri olarak vurgulanmaktadır. Bunun için alanyazındaki bulguların genişletilmesi ve desteklenmesi amacıyla OSB olan bireylere çeşitli alanlarda yapay zekânın kullanılmasına yönelik ileri araştırmaların yapılması önerilmektedir. Alanyazında yapılan araştırma bulguları incelendiğinde OSB'de yapay zekâ kullanımına ilişkin araştırmalarla ilgili halen bir boşluk olduğu dikkat çekmektedir. OSB olan çocuklarla özellikle teknolojinin gelişimi ile birlikte gelişen ve değişen yapay zekâ konulu araştırmalarının sonuçları ile ilgili olarak mevcut durumu ortaya koymak önemlidir. Bu önem doğrultusunda yukarıda söz edildiği üzere OSB'nin hızlı artışı ve aynı zamanda yapay zekâ teknolojisinin her geçen gün hızla gelişmesi ve çeşitlilik göstermesi nedeniyle özellikle 2020 pandemi sonrası yapay zekâ teknolojisinin OSB alanında kullanılmasıyla ilgili güncel çalışmaları incelemek ve araştırma trendlerini belirlemek amaçlanmıştır.

Yöntem

Bu çalışmanın yöntemi sistematik alanyazın tarama çalışmasıdır. Sistematik alanyazın taraması belli bir konu üzerinde yayımlanmış çalışmaların kapsamlı bir biçimde taranarak, çeşitli dahil etme ve eleme kriterleri ile derlemeye dahil edilecek bulguların sentezlenmesini ifade eder (Karaçam, 2013; Zawacki-Richter vd., 2020). Bu bağlamda anahtar sözcükler "autism spectrum disorders" ve "artificial intelligence" olarak belirlendikten sonra Academic Search Ultimate, EBSCO ve Google Akademik veri tabanlarında tarama yapılmıştır. Genişletici olarak geliştirilmiş bağlantılı konular seçeneği işaretlenmiştir. Böylece yapay zekâ ve otizm ile ilişkili diğer anahtar sözcükler (AI, machine learning, deep learning, autism vb.) de taramaya dahil olmuştur. Academic Search Ultimate veri tabanında anahtar kelimeler aratıldığında 267 makaleye ulaşılmıştır. Kapsam içi ölçütlerden biri olan a) tam metin sınırlandırması yapıldığında bu sayı 233'e b) 2020-2024 yılları arasındaki makaleler sınırlandırması ile sayı 176'ya, c) yayın dili Türkçe ve İngilizce olması sınırlandırması ile 173'e, d) hakemli dergilerde yayımlanmış olması sınırı ile sayı 167'ye düşmüştür. Kapsam içi ölçütler belirlenerek ulaşılan çalışmalardan derleme çalışmaları elendiğinde makale sayısı 58'e düşmüştür. Bu makaleler incelenmiş ve araştırma sonuçlarının yapay zekâ ile analiz edildiği makaleler ve içeriğinde yapay zekânın önerildiği ama yapay zekânın yer almadığı makaleler çalışmadan dışlanmıştır. Bu işlemden sonra 27 makale çalışma kapsamına alınmıştır. EBSCO veri tabanında anahtar kelimeler aratılmış ve kapsam içi ölçütler dahilinde yukarıda söz edilen süreç benzer şekilde yürütülmüş ve 10 çalışma dahil edilmiştir. Google Akademik veri tabanında anahtar kelimeler aratılmış ve kapsam içi ölçütler dahilinde yukarıda söz edilen süreç benzer şekilde yürütülmüş ve 14 çalışma dahil edilmiştir. Bu süreç sonunda Academic Search Ultimate, EBSCO ve Google Akademik veri tabanlarından ulaşılan toplam makale sayısı 51'dir (Kaynakçada * ile gösterilmiştir). Bu 51 çalışmanın içerikleri tabloya dökülmüş ve tablo üzerinden üç araştırmacı aracılığı ile tablo içerikleri kontrol edilerek içeriklerin son hali verilmiştir. Çalışmanın verileri içerik analizi ile analiz edilmiştir.

Bulgular

Katılımcı özellikleri

Katılımcı özellikleri bağlamında katılımcıların yaşları ile ilgili çalışmaların 12'sinin 0-6 yaş (örn., Kim vd., 2022; Chola Raja ve Kannimuthu, 2023; Tilwani vd., 2023), 7'sinin 6-12 yaş (örn., Alsaidi vd., 2024; Khullar vd., 2021; Zhao vd., 2021), 1'inin 12-18 yaş (Torres vd., 2022), 1'inin 18 yaş üzeri (Scott vd., 2021) katılımcıları içeren geniş bir yelpazede gerçekleştirildiği görülmüştür. Ek olarak 16 çalışma (örn., Chi vd., 2022; Selvi vd., 2023; ud Din

vd., 2022;) geniş bir yaş aralığında yapılmıştır. Kalan 14 çalışmada ise (örn., Ali vd., 2023; Shahamiri vd., 2022) katılımcıların yaşları belirtilmemiştir. İncelenen araştırmaların sıklıkla erken yaş dönemindeki katılımcılardan oluştuğu dikkati çekmektedir. Yukarıda söz edildiği üzere otizmde erken tanı ve müdahale amacıyla katılımcı yaşları 18-35 ay (Tang vd., 2023) ve 6-24 ay (Lee vd., 2020) gibi 0-6 yaş döneminde olan çocuklarla çalışmalar yürütülmüştür. Otizm tanısı her yaşta konulabilir ancak erken dönemde tanılamak çocuğun eğitim sürecinde başarılı olmasını sağlayabilir (Alqaysi vd., 2022). Aynı zamanda erken tanı beraberinde erken müdahalenin yolunu açmaktadır. Ancak uzman yetersizliği, hızlı ve doğru tanı araçlarına sınırlı erişim nedeniyle otizmi yaşamın erken dönemlerinde tanılama zor olabilir (Cavus vd., 2021). Katılımcı özellikleri incelendiğinde 0-6 yaş dönemi kadar, geniş aralıklı büyük yaş grupları ile de çalışıldığı görülmektedir (örn., Chi vd., 2022; Selvi vd., 2023; ud Din vd., 2022). 51 makalenin 18'inde (örn., Cantin-Garside vd., 2020; Shahamiri vd., 2022) katılımcılar yalnızca OSB olan bireylerden oluşmaktadır. Araştırmaların 16'sında (örn., Ali vd., 2023; Kim vd., 2023; Wawer vd., 2022) OSB ve tipik gelişim gösteren bireylerin karşılaştırıldığı görülmekteyken; 16 çalışmada ise (örn., Alvari vd., 2021; Awaji vd., 2023; Raj ve Masood 2020) risk altında olan ve/veya tanısı OSB olan bireyler araştırmalara dahil edilmiştir. Araştırmaların 1'inde ise (Yang vd., 2023) katılımcılar OSB ve Dikkat Eksikliği ve Hiperaktivite Bozukluğu (DEBH) olan bireylerden oluşmaktadır. Yalnızca OSB olan bireyler %34'lük bir araştırma dilimini oluştururken OSB olan bireyler ile tipik gelişim gösteren bireylerin karşılaştırıldığı %31'lik bir dilim de görülmektedir. Özellikle OSB olan bireyleri alanyazında tipik gelişim gösteren bireylerle karşılaştırması beklendik bir durum olarak ifade edilebilir. Alanyazın incelendiğinde OSB'li bireyler, tipik gelişim gösteren bireylerden farklı olarak çevrelerine karşı ilgisiz görünürler ve sosyal gülümseme, insan yüzüne karşı ilgi göstermeyip, ilgilerini çevrelerindeki kişiler ile kendiliklerinden paylaşmada ve duygusal karşılık vermede önemli sınırlılıklar sergilemektedirler. Bu anlamda OSB'li bireylerin sosyal davranışları sosyal ortamlarda uygunsuz ve olağan dışıdır (Ceyhun vd., 2016; Tanguay, 2000; Volkmar vd., 2002). Ek yetersizlikler incelendiğinde ise OSB olan bireylerin sıklıkla DEHB olan bireylerle karşılaştırıldığı görülmektedir (Şen, 2020). Geçtiğimiz yıllarda DEHB ve OSB olan bireylerin görülme sıklıklarındaki artışa paralel olarak, DEHB ve OSB arasındaki ilişki hem klinik hem araştırma alanında ilgi odağı olmuştur (Antshel vd., 2013; Şen, 2020). Ayrıca son yıllarda OSB olan çocuklarda DEHB'in birlikte görüldüğü bulgusuna ulaşan araştırmalar alanyazında artmıştır (Ames ve White, 2011; Rao ve Landa, 2014; Şen, 2020). DEHB tanısı alanların da klinik olarak yüksek OSB semptom seviyeleri gösterdiklerine ilişkin çalışmalar (Grzadzinski vd., 2011; Mulligan vd., 2009; Şen, 2020) klinik olarak iki durum arasında önemli bir örtüşme olduğu görüşünü savunan ve giderek artan bir araştırma grubunun doğmasına neden olmuştur. Bu nedenle çalışmalarda birlikte ele alınan çalışma sayısının oldukça fazla olmasının nedeni olarak açıklanabilir.

Çalışılan Konular

Araştırma kapsamında çalışılan konular; tanı amaçlı yapay zekâ kullanımı, beceri öğretimi amaçlı yapay zekâ kullanımı, problem davranışları önleme amaçlı yapay zeka kullanımı olarak üç şekilde sınıflandırılabilir. İncelenen makalelerin çoğunlukla OSB olan bireyleri tanılama ve sınıflandırma (örn., Scott vd., 2021; Selvi vd., 2023; Torres vd., 2023; Yang vd., 2023) kategorisinde olduğu görülmektedir. 48 makalede OSB olan bireyleri tanılama, olasılığı tespit etme ve sınıflama alanında çalışıldığı görülürken beceri öğretimi alanında yalnızca iki makale (Griffen vd., 2023 Wan vd., 2022;), problem davranışı önleme alanında ise 1 makale (Hameed vd., 2022) bulunmaktadır. Tanılama ve sınıflandırma kategorisinde ele alınan makaleler incelendiğinde bazı çalışmalarda yapay zekâ ile göz takibi ve göz teması (Ahmed vd., 2022; Alsaidi vd., 2024; Alvari vd., 2021;) inceleme konu alanları ile OSB bireyleri tanılama çalışmaları yapıldığı tespit edilmiştir. Bununla ilgili olarak Kollias vd. (2021) derleme araştırmasında da çoğu çalışmanın OSB sınıflandırması için Makine Öğrenimi ve göz izleme teknolojisini kullandığını ve %80'den daha yüksek bir doğruluk elde ettiğini belirtmiştir. Dolayısıyla yapılan çalışmanın bulgularının, derleme çalışmaları ile de uyumlu olduğu ve tanılamada göz izleme teknolojisinin sık kullanıldığı ifade edilebilir. Araştırmadaki makalelerin 16 tanesi MRI (örn., Kim vd., 2022; Tang vd., 2020; Yang vd., 2023) ve EEG (örn., Liao vd., 2022; Torres vd., 2022; ud Din vd., 2022) yapay zeka destekli beyin görüntüleme yoluyla yapılan otizmi tanılama çalışmalarıdır. MRI'ın OSB tanılamada oldukça sık kullanıldığı tespit edilmiştir. Chaddad vd. (2021) yaptıkları derleme çalışmasında OSB teşhisi için MRI tabanlı modellerin, göz izleme ve BT görüntü analizinden daha uygun olduğunu ve MRI'ın, beyin hakkında daha fazla detay sağlayabildiğini ifade etmiştir. Yine Moridian vd. (2022), klinik uzmanların, OSB'yi doğru bir şekilde teşhis etmek için MRI yöntemlerini kullandığı belirtilmiştir. EKG sinyallerinin OSB yatkınlığı ile bağlantısının araştırıldığı bir çalışmada (Tilwani vd. 2023) EKG sinyallerinin bir bebeğin OSB geliştirme olasılığı hakkında bilgiler içerdiğini öne sürülmektedir. Tanılama makalelerinin bir diğer çalışma konusu ise duygu tanımadır (örn., Talaat, 2023; Torres vd., 2023; Turan vd., 2023). OSB'li bireylerin yüz hareketlerinin ince analizi ile yapılan tanılama çalışmalarının (Awaji vd., 2023; Alvari vd., 2021) da dikkate değer olduğu söylenebilir. Son olarak kendini yaralayıcı davranışı tespit etme (Cantin-Garside vd., 2020), baş hareketi (Zhao vd., 2021), postür kontrolü (Li vd., 2020), vokal stereotip (Dufour vd., 2020), konuşma seslerindeki tonlama (Chi vd., 2022) jest tanıma (Siddiqui vd., 2021), ses anormalliği (Lee vd., 2020) gibi otizmin kendine has göstergeleri de kullanılarak tanılama yapıldığı görülmektedir. Son yıllarda OSB yaygınlığında bir artış yaşanmaktadır. OSB tanısı, yüksek düzeyde eğitimli uzmanlar tarafından yapılan davranış gözlemi ve standartlaştırılmış testler gerektirir. OSB için erken müdahale 1-2 yaşlarından itibaren başlayabilir,

ancak OSB tanıları genellikle 2-5 yaşları arasında konulur, bu da müdahalenin başlamasını geciktirir. Bebeklikte OSB'yi tespit etmek için alternatif ve güvenilir yöntemler acil bir ihtiyaçtır (Tilwani vd., 2023). Erken tanı erken eğitim için oldukça önemlidir. Bu önem sebebiyle yapay zekâ ile OSB tanılama çalışmalarının bu kadar fazla olduğu düşünülmektedir. Alanyazındaki derleme çalışmalarının çoğunlukla tanılama alanında yapılması da bu önemi doğrulamaktadır (Cavus vd., 2021; Chaddad vd., 2021; Francese ve Yang, 2022). Çalışma kapsamında 4 ile 12 yaşları arasındaki OSB'li çocukların problem davranışlarını önlemek amaçlı nabız hareketlerinin kaydedildiği, bu sayede duyguların önceden tespitinin yapıldığı bir araştırmanın (Hameed vd., 2022) da bu bireylerin topluma uyumlarını kolaylaştırmak açısından önemli olduğu düşünülmektedir. Problem davranışların önlenmesi amaçlı yapay zekâ kullanımı son derece pratik bir kullanım olabilmektedir. Yapay zekâ algoritmaları ile bir uzmanın harcaması gereken zaman ve çabanın en aza indirgenerek daha kolay çalışılabilir olması ile problem davranış önleme amaçlı çalışmaların sıklığı arttırabilir. Problem davranışlar ne kadar erken önlenirse sosyal hayata uyum o kadar kolay olabilmektedir. OSB olan çocuklar söz konusu olduğunda ise bu işin önemi kat ve kat artmaktadır. Özellikle bu bireylerin sosyal ipuçlarını anlama, yorumlama, sosyal kuralları izlemekte zorlanmaları nedeniyle ağlama, vurma, kendine zarar verme ya da öfke nöbetleri yaşadıkları bilinmektedir (Boyd ve Shaw, 2010). Bu nedenle OSB olan bireylerde problem davranışların önlenmesi amacıyla yapay zekâ desteği kullanımının ileri çalışmalarda incelenmesi son derece önemlidir. İncelenen çalışmalarda OSB olan çocuklara yapay zekâ kullanılarak yapılan beceri öğretimi çalışmaların oldukça sınırlı olduğu görülmektedir. Beceri öğretimi uygulamaları ile ilgili 2 makale bulunmaktadır. Bunlardan biri duygu tanıma becerisini geliştirmeye yönelik müdahaledir (Wan vd., 2022). Diğer uygulamalı makale (Griffen vd., 2023) ise el yıkama becerisi ile ilgilidir. El yıkamanın sağlık ve hijyen açısından hayati bir beceri olduğu düşünüldüğünde, OSB gibi zihinsel ve gelişimsel engellere sahip bireyler için, teknoloji destekli stratejiler, bu becerilerin uygulanmasının öğretiminde etkili olabilir. Derleme çalışmaları incelendiğinde çoğunlukla tanılama alanında çalışmaların olduğu beceri öğretimi gibi uygulamalı alanın eksik olduğu görülmüştür (Cavus vd., 2021; Chaddad vd., 2021; Francese ve Yang, 2022; Hopcan vd., 2022). Yapay zekâ teknolojisinin OSB alanında kullanımı, sadece tanı sürecini değil, aynı zamanda bireylerin günlük yaşam becerilerinin öğretilmesi ve geliştirilmesi gibi alanlarda da potansiyel sağlamaktadır. Ancak, OSB alanında beceri öğretimine yönelik yapay zekâ çalışmalarının sınırlı olduğu ve daha fazla çalışmaya ihtiyaç olduğu görülmektedir. Gelecek çalışmalarda OSB olan bireylere beceri öğretimi yapılırken yapay zekâ teknolojisinin etkililiğini görmek için daha fazla uygulamalı çalışmaların yapılması önerilebilir. OSB olan bireyler için bağımsız yaşam becerilerinin öğretiminin önemi düşünüldüğünde bu tür özbakım ya da diğer gelişim alanlarındaki beceri öğretimine odaklanan uygulamalı çalışmaların yapılması bir gerekliliktir. OSB olan bireyler söz konusu olduğunda özellikle tanı ölçütleri düşünüldüğünde en önemli beceri alanlarından birisi sosyal becerilerdir (APA, 2013). Özellikle sosyal becerilerin pek çok teknoloji desteği sunularak öğretildiği çalışmalar olduğu bilinmektedir (Fachantidis vd., 2020; Marino vd., 2020; Sani-Bozkurt vd., 2017). Bununla birlikte teknoloji destekli öğretim ile yapılan çalışmaların sonuçlarını derleyen sistematik alanyazın çalışmalarında (Kizir ve Yıkmış, 2016; Kouroupa vd., 2022; Odluyurt ve Çattık, 2018) teknoloji destekli öğretim ile yapılan çalışmaların etkili olduğu görülmektedir. Teknoloji destekli uygulamalardan biri olan yapay zekâ ile de sunulan beceri öğretimlerinin etkili olabileceği düşünülmektedir. Dolayısıyla günümüzde teknolojik gelişmelerle birlikte yapay zekâ desteği ile sunulan uygulamalardan yararlanmak OSB olan bireyler içinde ilgi çekici motivasyon artırıcı olabileceği düşünülmektedir. Bu nedenle de OSB'de yapay zekâ destekli uygulama çalışmalarının artırılması gerekmektedir.

Kullanılan yapay zeka

Çalışmamızda ulaştığımız 51 makalenin 22'sinde makine öğrenimi algoritmaları (örn., Küpper vd., 2020; Paolucci vd., 2023; Scott vd., 2021) kullanılmıştır. Bunların 9'unda makine öğrenimi algoritması OSB'nin tespitine yönelik kullanılırken 13'nde ise makine öğrenimi algoritmalarının performanslarını sınıflandırmaya yönelik çalışmalar yapıldığı görülmektedir. İncelediğimiz makalelerin 22'sinde ise derin öğrenme algoritmalarının (örn., Alsaidi vd., 2024; Torres vd., 2023; Wawer ve Chojnicka, 2022) kullanıldığı görülmektedir. İncelediğimiz makalelerin 4'ünde (Mellema vd., 2022; Raj ve Masood, 2020; Shahamiri ve Thabtah, 2020; Shahamiri vd., 2022) makine ve derin öğrenme algoritmalarının performanslarının karşılaştırıldığı görülmektedir. Bu çalışmalarda derin öğrenme algoritmalarının makine öğrenmesi algoritmalarına göre daha iyi performans gösterdiği belirtilmiştir. Çalışmaların çoğunda, OSB olan ve olmayan bireyler arasında karşılaştırmalar yapılmış, OSB olan ve olmayan bireyler arasındaki farklılıklar belirlenip yapay zekâ yöntemlerinin bu farklılıkları ayırt etme etkinliği belirlenmeye çalışılmıştır. Makine öğrenimi algoritmalarının, OSB'nin tespiti ve sınıflandırılması için yaygın bir şekilde kullanıldığı görülmektedir. SVM, LR, DT, gibi çeşitli sınıflandırıcılar, OSB göstergelerini sınıflandırmak için tercih edilen algoritmalar arasındadır. İncelenen çalışmalarda bu algoritmaların doğruluk oranlarının yüksek olduğu ve OSB'yi etkili bir şekilde tespit edebildikleri gözlemlenmiştir. Derin öğrenme algoritmaları da OSB tespiti ve sınıflandırması için kullanılmaktadır. Özellikle T-CNN-ASD gibi özel derin öğrenme modelleri, insan müdahalesi olmaksızın OSB olan çocukları tipik gelişen çocuklardan doğru bir şekilde ayırt edebildiği görülmektedir. Ayrıca, derin öğrenme algoritmalarının, klasik makine öğrenimi yöntemlerinden daha yüksek doğruluk oranlarına sahip olduğu da çalışmalarda vurgulanmıştır. OSB tanısı için makine öğrenmesi ve derin

öğrenme algoritmalarının performansını değerlendirmeye yönelik çalışmalara devam edilmesi ve OSB tanısı için hangi algoritmaların daha başarılı olduğunun tespit edilmesi önerilebilir. Araştırmacılar, yapay zekâ algoritmalarının doğruluğunu ve güvenilirliğini sürekli olarak değerlendirmelidir. OSB, her bireyde farklılık gösterebileceği için yapay zekâ modellerinin bireysel farklılıkları tanıyabilecek kadar hassas ve özelleştirilebilir olarak tasarlanması önerilebilir. İncelediğimiz makalelerin 2'sinde ise hibrit teknoloji (Ahmed vd., 2022; Awaji vd., 2023) kullanılmaktadır. Hibrit teknoloji farklı özelliklere sahip olan derin öğrenme (CNN gibi) ve geleneksel makine öğrenimi algoritmalarının (XGBoost ve RF gibi) bir araya getirilmesini içermektedir. Awaji vd. (2023)'nin çalışmasında, VGG16-MobileNet modellerinden gelen özellikleri kullanan hibrit RF algoritması, üstün performans gösterdiği ve %98,8 doğruluk, %98.9 hassasiyet, %99 duyarlılık ve %99.1 özgüllük elde ettiği belirtilmiştir. Ahmed vd. (2022)'nin çalışmasında ise hibrit tekniklerin sinir ağlarının gerisinde kaldığı bulgusuna ulaşılmıştır. Moridian vd. (2022) derleme çalışmasında geleneksel makine öğrenimi (ML) ve derin öğrenme (DL)'nin OSB teşhisi için kullanılan en 622opular yapay zekâ yöntemleri olduğunu ifade etmiştir. İncelediğimiz çalışmalarda da bu iki yöntemin sıklıkla kullanıldığını görmekteyiz fakat hibrit teknolojilerin kullanımına yönelik sınırlı sayıda araştırma bulunmaktadır. İleride yapılacak araştırmalarda derin öğrenme ve makine öğrenmesi algoritmalarının bir araya getirildiği ve performanslarının ölçüldüğü çalışmalar yapılabilir. Kalan 1 çalışmada (Griffen vd., 2023) ise kullanılan yapay zekâ yöntemi hakkında bilgi verilmemiştir.

Araştırmaların Sonuçları

OSB ve yapay zekâ teknolojisinin kullanımına yönelik çalışmalar daha çok OSB olan bireylerin tanılanmasına yönelik sonuçları içermektedir. Bu tanılama çalışmalarının sonuçlarını incelediğimizde ise yapay zekânın, OSB olan bireyleri tanılamada başarılı ve/veya umut verici olduğu görülmektedir. Örneğin; Kim vd. (2022)'nin çalışmasında MRI verilerine dayalı makine öğrenme analizinin, OSB olan okul öncesi çocukları tipik gelişim gösteren akranlarından ayırt etmede başarılı olduğu bulgusuna ulaşılmıştır. Erden vd. (2021) tarafından yapılan çalışmada makine öğrenme teknikleriyle MRI görüntülerini değerlendirmek için kullanılan bazı umut verici bilgisayar destekli araçların bulunduğu fakat aynı zamanda bu araçların sınırlılıklarının olduğu vurgulanmıştır. Yapay zekâ algoritmalarının gerçekten etkili olabilmesi için çok büyük miktarda veriye ihtiyaç olduğu belirtilmiştir. Yine Cavus vd. (2021) tarafından yapılan sistematik alanyazın taramasında, makine öğrenimi çalışmaları için standartlaştırılmış OSB veri depolarına ihtiyaç olduğu ifade edilmiştir. İncelediğimiz çalışmaların sonuçları ve alanyazındaki bu bilgilerden hareketle MRI görüntülerinin OSB teşhisinde kullanılmasının umut vadedici olduğunu fakat standart veri depolarına ihtiyacın olduğunu söyleyebiliriz. Zhao vd. (2021) tarafından yapılan çalışmada baş hareketi dinamiklerinin, OSB'yi tanımlayabileceği ifade edilmiştir. Shahamiri vd. (2022)'nin çalışmasında, derin öğrenme teknolojilerinin mevcut OSB taramasına entegre edilebileceği ve paydaşlara OSB özelliklerinin erken tanısında yardımcı olabileceği belirtilmiştir. Wawer ve Chojnicka, (2020) tarafından yapılan çalışmada OSB olan çocukların anlatılarından hareketle OSB tanısında bulunan bir yapay zekâ modeli geliştirilmiş ve anlatı transkripsiyonlarına dayalı otomatik OSB sınıflandırmasının uygulanabilir olduğu ve doğruluğunun yüksek olduğu ortaya koyulmuştur. ud Din vd. (2022)'nin çalışmasında ise (EEG) sinyallerinin, OSB sınıflandırmasında biyobelirteç olarak kullanılabileceği ifade edilmiştir. Hameed vd. (2022) tarafından yapılan çalışmada kalp atış hızının, OSB olan çocukların duygularını tespit etmek için güçlü bir gösterge olduğu ifade edilmiştir. OSB olan çocuğa sahip ebeveynlerin geliştirdikleri yapay zekâ destekli mobil uygulamayı kullanarak çocukları ile etkili bir şekilde etkileşime girebilecekleri ifade edilmiştir. Alvari vd. (2021)'nin göz teması ve yaşa dayalı bir OSB sınıflandırması yapılan çalışmada klinik uzmanların, nicel verilere dayalı olarak, sosyal etkileşimde yer alan insanlar tarafından gerçekleştirilemeyen ince detaylı analizlere dayalı müdahalelere odaklanmalarına yardımcı olabilir sonucuna ulaşılmıştır. Liao vd. (2022) tarafından yapılan çalışmada makine öğretimi yöntemini kullanarak OSB tanısı koymak için hibrit veri birleştirme yaklaşımı önerilmiştir. Bu verilerin birbirini tamamlayıcı özelliğe sahip olduğu belirlenmiştir. Chi vd. (2022)'nin konuşma seslerindeki ekolali, tipik olmayan ya da monoton tonlama verileri kullanılarak OSB tespiti yapılan çalışmasının sonuçlarında otizmi otomatik olarak tespit etmede makine öğrenimi yöntemlerinin umut verici olduğu belirtilmiştir. Siddiqui vd. (2021) tarafından yapılan çalışmada, giyilebilir sensörlerin OSB olan çocukların hareketlerini tanıma konusunda başarılı olduğu sonucuna ulaşılmıştır. Cavus vd. (2021) tarafından yapılan sistematik alanyazın taramasında fonksiyonel manyetik rezonans görüntüleme, göz izleme ve genetik veriler de dahil olmak üzere çeşitli yöntemlerle yapılan makine öğrenmesi tabanlı OSB teşhislerine rağmen, davranışsal verilere dayalı umut verici sonuçların olduğu ve davranışsal verilerle daha fazla araştırma yapılması gerektiği vurgulanmıştır. Bununla birlikte Plitt vd. (2015)'nin çalışmasındaki davranışsal ölçümler aracılığıyla yapılan OSB sınıflandırmasının rs-fMRI sınıflandırıcılarını geride bıraktığı bulgusu paylaşılmıştır. Bizim incelediğimiz çalışmalarda da kendini yaralayıcı davranışı tespit etme, postür kontrolü, vokal stereotip, konuşma seslerindeki tonlama, jest tanıma gibi davranışsal verilerin tanılama sürecinde kullanıldığını görmekteyiz. Alanyazında OSB tanısında davranışsal verilerin kullanımına yönelik artışın olduğu görülmektedir. Yapay zekâ teknolojisinin OSB alanında tanı dışında beceri öğretimine yönelik kullanımına iki makalede rastlamaktayız. Bu çalışmaların sonuçları şu şekildedir: Li vd. (2020)'nin derin öğrenme algoritmalarının kullanıldığı çalışmasında duygu (mutluluk, üzüntü, korku, öfke) tanıma becerisini geliştirmeye yönelik müdahale uygulanmış ve 5 yaşın altındaki çocukların sistemi etkili bir şekilde

kullanamadıkları ifade edilmekle birlikte dört OSB olan çocuğun üç günlük "Duygu Taklidi Eğitimi" boyunca geçerli ifadelerinin dikkate değer şekilde arttığı ve geçersiz ifadelerinin azaldığı bulgusuna ulaşılmıştır. Griffen vd. (2023) tarafından yapılan OSB olan dört çocuğa el yıkama becerisi öğretiminde yapay zekâ destekli tablet tabanlı uygulamanın kullanıldığı çalışmada ise uzman personel eksikliği sebebiyle OSB olan bireylerle çalışan uygulamacıların öğretim stratejilerini kullanırken uygulama güvenirliğine dair sınırlılıklarının olabileceği, bu problem durumuna yönelik geliştirilen tablet tabanlı uygulama ile uygulamacıların uygulama güvenirliklerini artırdıkları ve ölçütleri karşıladıkları bilgisi verilmiştir. Öğretmen eğitimi söz konusu olduğunda etkili yöntemleri kullanmak önemlidir. Özellikle davranış değişikliğine dayalı yöntemlerden olumlu sonuçlar alabilmek için uygulama güvenirliğinin yüksek olması kritik bir öneme sahiptir (Andzik ve Cannella-Malone, 2017). İncelediğimiz çalışmada yapay zekâ desteği ile uygulamacıların uygulama güvenirliklerini artırabileceği görülmektedir. Uzman personel eksikliği olan OSB alanında, yapay zekâ teknolojisinin uygulamacılara destek sağlaması OSB olan bireylerin nitelikli eğitim almasını sağlayabilir. Bu bakımdan benzer çalışmaların yapılması ve geliştirilen uygulamaların kullanımının yaygınlaşması önemlidir. İncelediğimiz çalışmada el yıkama becerisinin öğrenimine dair bulgular ise katılımcılar arasında değişkenlik göstermektedir. Çalışmada bir çocuk katılımcının ölçütleri karşıladığı, ikisinin bazı kazanımlar gösterdiği ve bir tanesinin oturumlarda yüksek derecede değişkenlik gösterdiği ifade edilmiştir.

Sonuç

OSB alanında yapay zekâ teknolojisinin kullanımı üzerine hazırlanmış makalelerin incelendiği bu çalışmada sıklıkla erken tanının önemi vurgulanmış ve bu doğrultuda yapay zekâ teknolojilerinin OSB tanısına erken müdahale ve tedavi için potansiyel bir araç olarak kullanımı üzerinde durulmuştur. OSB tanısında yapay zekânın olumlu ve umut vadedici sonuçlar gösterdiği düşünülmektedir. Genel olarak, bu çalışmaların, yapay zekâ teknolojisinin OSB tanısı ve sınıflandırması alanında gelecekte daha etkili ve güvenilir araçlar geliştirmek için önemli bir temel oluşturabileceği söylenebilir. Makine öğrenimi ve derin öğrenme algoritmalarının OSB tespiti ve sınıflandırmasında önemli bir potansiyele sahip olduğu görülmektedir. Ancak, daha fazla araştırma yapılması ve farklı algoritmaların ve yöntemlerin karşılaştırılması gerekmektedir. Gelecek çalışmalar, yapay zekâ tabanlı OSB tespit ve sınıflandırma yöntemlerinin klinik uygulamalara entegrasyonunu daha fazla araştırmalıdır. Bu entegrasyon, klinik kararları desteklemek ve müdahale planlarını kişiselleştirmek için yapay zekânın kullanılmasını içerebilir. Yapay zeka ile bir çok farklı yöntem ve tekniğin eklektik bir biçimde kullanılıyor olması, esnek, dinamik ve güncellenebilir yapıda olması gibi pek çok özellik OSB olan bireylerde yapay zeka sistemlerinin kullanımının avantajlı olduğunu düşündürmektedir. OSB olan bireylerin özellikleri düşünüldüğünde yapay zeka sistemleri ile bireyselleştirme ve gerektiğinde özel durumlar için uyarlamalar yapma OSB olan bireylerde pek çok farklı konunun çalışılmasında oldukça kolaylaştırıcı bir yol olarak düşünülebilir. Bununla birlikte yapay zekâ tabanlı OSB tanısı için kullanılacak verilerin toplanması ve standartlaştırılması da bir gereklilik olarak karşımıza çıkmaktadır. Böylece farklı kaynaklardan gelen verilerin uyumlu hale getirilmesini sağlayacak ve yapay zekâ algoritmalarının daha güvenilir sonuçlar üretmesine yardımcı olacaktır. Ayrıca yapay zekanın OSB tespitinde, otizmli bireylerde görülen stereotipik davranışlar, ses anormalliği, göz teması kurmama gibi göstergeler ile de tanılama yapıldığı çalışmalar vardır. Ancak bu çalışmalarda yapay zekâ tek bir OSB göstergesi ile bireyleri değerlendirmiştir. Gelecek çalışmalarda yapay zekâ teknolojisinin OSB göstergelerini bütüncül bir şekilde değerlendirmesi önerilebilir. Yapay zekâ teknolojisinin OSB alanında kullanımı, sadece tanı sürecini değil, aynı zamanda bireylerin günlük yaşam becerilerinin öğretilmesi ve geliştirilmesi gibi alanlarda da potansiyel sağlamaktadır. Ancak, OSB alanında beceri öğretimine yönelik yapay zekâ çalışmalarının sınırlı olduğu ve daha fazla çalışmaya ihtiyaç olduğu görülmektedir. Yapay zekâ destekli mobil uygulamalar ile pek çok beceri çalışılabilir. Örneğin, OSB olan çocuklarla etkileşim kurma ve duygusal ihtiyaçlarına yanıt verme, duygu tanıma becerilerini geliştirme konusunda ebeveynlere yardımcı olabilir. Gelecek çalışmalarda OSB olan bireylere beceri öğretimi yapılırken yapay zekâ teknolojisinin etkililiğini görmek için daha fazla uygulamalı çalışmaların yapılması önerilebilir. Yapay zekâ, bireyselleştirilmiş müdahale ve destek planları oluşturmak için kullanılabilir. Örneğin, giyilebilir sensörler veya konuşma analizi gibi teknolojiler, bireylerin özel ihtiyaçlarını daha iyi anlamak ve onlara uygun müdahale yaklaşımları geliştirmek için kullanılabilir. Yapay zekâ uygulamalarını geliştiren şirketler yazılım üzerinde yoğunlaşmış kurumlardır. Bundan dolayı otizmli bireylerin ihtiyaç duyduğu unsurları tam olarak bilemedikleri için temel ihtiyaç ve isteklerini karşılayacak yapay zekâ uygulamalarının geliştirilmesi onlar adına zor olacaktır. OSB alanındaki uzmanlar ve yapay zekâ uygulamaları geliştiren kurumlar arasında geliştirilebilecek iş birlikleri, bu eksikliğin giderilmesini sağlayabilir. Bundan dolayı OSB alanındaki uzmanlar ile yazılım şirketleri arasında iş birliğinin artırılması önerilmektedir. Böylece OSB olan bireylerin, özel eğitim öğretmenlerinin ve OSB olan bireylerin ebeveynlerinin ihtiyaçlarını tam olarak karşılayabilecek yapay zekâ destekli programların geliştirilmesi sağlanabilir.

Kaynakça

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Türkçe Öğretmenliği Lisans Programlarında Teknoloji Entegrasyonunun Ulusal ve Uluslararası Yeterlilikler Çerçevesinde İncelenmesi: 21. Yüzyıl Öğretmen Profili

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Özet

Yirmi birinci yüzyılın getirdiği yenilikler; eğitim alanında teknoloji entegrasyonu olarak adlandırılan ve teknolojinin yöntem, ortam ve sistem gibi çeşitli boyutlarda etkin kullanılmasını öngören bir kavramın önem kazanmasını sağlamıştır. Bu entegrasyonun öğretmen yetiştirme programlarında etkili şekilde gerçekleştirilebilmesinin ön koşullarından biri, söz konusu kavramın Türkiye Yükseköğretim Yeterlilikler Çerçevesi (TYYÇ) ile ilişkili olarak ele alınmasıdır. Öğrenci ve öğretmen adaylarından beklenen bilgi, beceri ve yetkinliklerin tanımlandığı bu çerçeve; Türkçe öğretmenliği lisans programlarındaki teknoloji temelli dönüşüm açısından da kritik öneme sahiptir. Bu kabulden hareketle çalışma; Türkçe öğretmenliği lisans programlarında teknoloji entegrasyonunun, TYYÇ ve uluslararası standartlar çerçevesinde 21. yüzyıl öğretmen profili açısından değerlendirilmesini amaçlamaktadır. Sanal gerçeklik (VR), genişletilmiş gerçeklik (XR) ve Metaverse gibi yenilikçi teknolojilere odaklanan bu değerlendirme, bu teknolojilerin öğretim programlarına farklı düzeylerde entegrasyonunun Türkçe öğretmeni adaylarının bilgi, beceri ve yetkinlikleri üzerindeki olası rolünü incelemektedir. Bu kapsamda TYYÇ 6. düzeyde tanımlanan yeterliliklerin ve bunlarla ilişki olarak ele alınan Türkçe öğretmenliği program çıktılarının geliştirilmesinde söz konusu teknolojilerin oynayacağı rolün alan yazında yer alan çalışmalardan elde edilen kanıt temelli verilerle de desteklenmesi amaçlamaktadır. Türkçe Öğretmenliği lisans programlarında güncel teknoloji kullanımını teşvik eden, öğretmen adaylarının çeşitli beceri ve yetkinliklerini geliştirmelerine katkı sağlayacak etkili entegrasyon çalışmalarına ihtiyaç duyulması çalışmanın en önemli gerekçesini oluşturmaktadır. Özellikle VR, XR ve Metaverse gibi yenilikçi teknolojilerin Türkçe öğretmenliğinin program çıktıları ile bütünleştirilmesinin ve ulusal/uluslararası yeterlilik çerçeveleri ile uyumlu bir şekilde ele alınmasının Türkçe öğretmeni adaylarının çok yönlü gelişimleri açısından önemli bir işleve sahip olacağı düşünülmektedir.

Anahtar Kelimeler: Türkçe öğretmenliği, teknoloji entegrasyonu, TYYÇ, 21. yüzyıl becerileri.

An Examination of Technology Integration in Turkish Language Teaching Undergraduate Programs within the Framework of National and International Competencies: The 21st Century Teacher Profile

Abstract

The advancements of the 21st century have highlighted the critical importance of technology integration in education, encompassing the effective utilization of technology across various dimensions such as methods, environments, and systems. A fundamental prerequisite for the successful implementation of this integration in teacher education programs is its alignment with the National Qualifications Framework for Higher Education in Türkiye. This framework outlines the knowledge, skills, and competencies expected of students and teacher candidates and is essential for the technology-driven transformation of Turkish language teaching undergraduate programs. This study aims to evaluate the integration of technology in Turkish language teaching undergraduate programs within the context of NQF-HETR and international standards, focusing on the profile of the 21st-century teacher. By examining innovative technologies such as VR, XR, and the Metaverse, the study explores the potential impact of integrating these technologies at various levels into the curriculum on the knowledge, skills, and competencies of Turkish teacher candidates. Furthermore, the study seeks to substantiate the role of these technologies in enhancing the program outcomes defined by the NQF-HETR Level 6 qualifications with evidence-based data from the literature. The primary rationale for this study is the necessity for effective integration strategies that not only promote the use of contemporary technology in Turkish language teaching undergraduate programs but also contribute to the development of diverse skills and competencies among teacher candidates.

Integrating innovative technologies such as VR, XR, and the Metaverse into the program outcomes of Turkish language teaching and aligning them with national and international competency frameworks are considered pivotal for the comprehensive development of Turkish teacher candidates.

Keywords: Turkish language teaching, technology integration, NQF-HETR, 21st-century skills.

Giriş

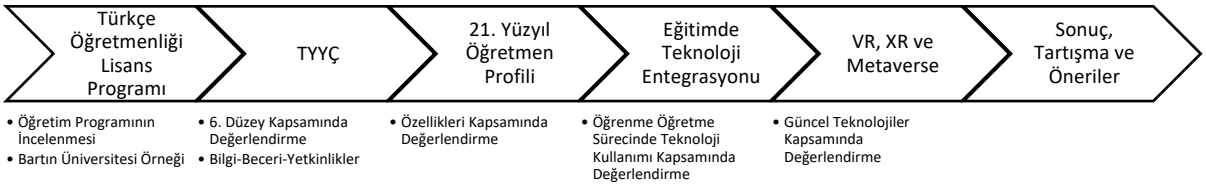
Yirmi birinci yüzyılda hızla gelişen teknoloji, eğitim alanında köklü değişikliklere neden olmuştur. Bu değişimle birlikte teknolojinin öğretmen eğitim programlarına etkin bir şekilde entegre edilmesi gerekliliği ortaya çıkmıştır. Böylece tüm öğretmen yetiştirme programlarında olduğu gibi Türkçe öğretmenliği lisans programlarının da öğretmen adaylarına gerekli bilgi, beceri ve yetkinlikleri kazandırmak amacıyla Türkiye Yükseköğretim Yeterlilikler Çerçevesi (TYYÇ) ve uluslararası standartlar ile uyumlu bir şekilde teknoloji entegrasyonunu sağlamaları önem kazanmıştır. Özellikle VR, XR ve Metaverse gibi güncel teknolojilerin kullanımının öğretmen adaylarının eğitsel süreçlerdeki rollerini yeniden tanımlaması ve onların 21. yüzyılın gerektirdiği yetkinlikleri kazanmalarına yardımcı olmaları (Edannur & Marie, 2017) bu teknolojilere atfedilen değeri daha da önemli hâle getirmiştir. Bu doğrultuda teknolojinin eğitim programlarına entegrasyonu, öğretmen adaylarının teknolojiyi derslerinde nasıl kullanacaklarını öğrenmelerinin kritik bir aşamasını oluşturmaktadır. Öğretmen adaylarının teknoloji entegrasyonu konusundaki algılarının ve bilgi düzeylerinin, eğitim programlarındaki teknolojik uygulamalar sayesinde olumlu yönde değiştiği bulgusu bu önemi desteklemektedir (Toledo, 2005).

Yirmi birinci yüzyıl öğretmen profili, öğretmenlerin yalnızca geleneksel bilgi ve pedagojik becerilere sahip olmasını değil aynı zamanda çağın gerektirdiği evrensel yetkinliklere de sahip olmasını gerektirmektedir. Bu beceriler; iletişim, iş birliği, liderlik, eleştirel düşünme, yaratıcılık ve dijital okuryazarlık ve benzeri alanları kapsamaktadır (Belyaeva vd., 2022). Bu bağlamda öğretmen eğitimi programları, öğretmen adaylarına bu becerileri uygulama fırsatları sunarak onların eğitim süreçlerinde daha etkili olmalarını sağlamalıdır (Orhan Göksün & Kurt, 2017). Bu becerilerden özellikle dijital okuryazarlık, günümüz eğitim sisteminde öğretmenlerin ve öğrencilerin başarısında önemli bir rol oynamaktadır. Bu beceriler, bilişim teknolojilerini etkin bir şekilde kullanma yeteneğini de içermektedir (Silva, 2009). Öğretmen adaylarının bu alanlarda yetkinlik kazanmaları, onların teknoloji entegrasyonunu daha etkin bir şekilde gerçekleştirmelerine olanak sağlamaktadır (Cobbinah & Adjei-Boateng, 2019).

TYYÇ, yükseköğretimde verilen eğitimin kalitesini ve standartlarını belirlemek amacıyla oluşturulmuş bir çerçevedir. Bu çerçeve; öğrencilerin mezuniyetlerinde sahip olmaları gereken bilgi, beceri ve yetkinlikleri tanımlamakta ve bu doğrultuda öğretim programlarının yapılandırılmasını sağlamaktadır (TYYÇ, 2010). Türkçe Öğretmenliği Lisans Programı, bu çerçevenin 6. düzeyinde yer almakta olup öğretmen adaylarının teorik bilgiye ek olarak pratik beceriler ve pedagojik yetkinlikler kazanmasını hedeflemektedir. Bu noktada Türkçe öğretmenliği lisans programlarının, TYYÇ ve 21. yüzyıl öğretmen profili gereksinimlerini karşılayacak şekilde sürekli olarak güncellenmesi ve pratik deneyimlerin artırılması, öğretmen adaylarının mesleki gelişimlerine olumlu etki etme potansiyelini ortaya çıkaracaktır. Ayrıca güncel eğitim teknolojilerinin entegrasyonu, öğretmen adaylarının 21. yüzyıl becerilerini geliştirmeleri açısından kritik bir rol oynamaktadır (Alver & Aydin, 2019). Araştırmanın odak noktasını oluşturan VR, XR ve Metaverse teknolojilerinin dil eğitimi ve öğretmen eğitimindeki etkilerinin araştırıldığı çeşitli çalışmalar bu öngörüyü desteklemektedir. Bunlardan birinde Yuan ve diğerleri (2023), VR ile tasarlanmış bir Metaverse ortamında İngilizce öğretiminin, öğrencilerin dil becerilerini geliştirici ve öğrenme süreçlerini uyarıcı rol oynadığını ve bu teknolojilerin sağladığı gerçekçi deneyimlerin öğretim ve öğrenimin etkisini artırdığını ortaya koymuşlardır. Başka bir çalışmada Yu (2022), VR tabanlı uzaktan öğretmen eğitimi sistemlerinin, öğretmenlerin eğitim alabilme olanaklarını genişleterek zaman ve mekân sınırlamalarını ortadan kaldırdığını göstermiştir. Hedrick ve arkadaşları (2022a) VR sınıf ortamlarının öğrenci katılımını ve akademik performansı artırabileceğini ayrıca eğitimde kullanılan yöntemlerin sınırlarını genişletebileceğini belirtmişlerdir. Lee ve Hwang (2022) ise VR içerik tasarımının öğretmen adaylarının teknolojik hazırlığını artırdığını ve bu platformların öğretmen eğitimini sürdürülebilir ve uyarlanabilir kılmada etkili olduğunu tespit etmişlerdir. Diğer bir çalışmada Ktoridou ve diğerleri (2023) Metaverse teknolojisinin eğitimde kullanım potansiyelini değerlendirmiş ve hem öğrenciler hem de öğretmenler arasında bu teknolojinin kullanımına yönelik olumlu tutumlar sergilendiğini belirlemişlerdir. Sonuç olarak alan yazındaki birçok araştırma; VR, XR ve Metaverse teknolojilerinin eğitimdeki potansiyelini açık şekilde ortaya koymaktadır. Bu teknolojilerin eğitime entegrasyonu, öğretmen adaylarının dijital okuryazarlık ve pedagojik becerilerini geliştirerek onların 21. yüzyıl eğitim ihtiyaçlarına daha iyi cevap vermelerine katkı sağlayacaktır. Bu bağlamda çalışma; Türkçe öğretmenliği lisans programlarında teknoloji entegrasyonunun, TYYÇ ve uluslararası standartlar çerçevesinde 21. yüzyıl öğretmen profili açısından değerlendirilmesini amaçlamaktadır. Türkçe öğretmenliği lisans programında teknoloji entegrasyonu bağlamında güncel bilişim teknolojilerinden VR, XR ve Metaverse'in ne şekilde kullanılabileceğine yönelik bir çalışmanın yapılmaması bu araştırmanın önemini ortaya koymaktadır.

Yöntem

Bu araştırma, literatüre dayalı bir değerlendirme içermektedir. Araştırmada öncelikle örnek bir Türkçe Öğretmenliği Lisans Programı incelenmiştir. Bu bağlamda 2019 yılından bu yana akredite edilen ve 01.05.2027 tarihine kadar da akreditasyonu devam edecek olan Bartın Üniversitesi Eğitim Fakültesi Türkçe Öğretmenliği Lisans Programı öğretim programı örnek olarak incelenmiştir. İkinci olarak öğretim programı TYYÇ kapsamında değerlendirilmiştir. Üçüncü olarak program TYYÇ ve 21. yüzyıl öğretmen profili bağlamında incelenmiştir. Son aşamada ise ortaya koyulan durum, örnek dersler temelinde ve eğitimde teknoloji entegrasyonu bağlamında incelenmiş, VR, XR ve Metaverse teknolojileri kapsamında değerlendirilmiştir. Bu süreç Şekil 1'de verilmiştir.



Şekil 1. Araştırma Süreci

Bugün ve Yarın: Bir Değerlendirme

Türkçe öğretmenliği lisans programlarının amacı; Türkçe öğretmenliği mesleğini icra edebilecek bilgi, beceri, tutum ve deneyime sahip öğretmenler yetiştirmektir. Programın öğretim planında; meslek bilgisi, genel kültür ve alan eğitimi olmak üzere üç temel kategoride dersler yer almaktadır. Program mezunları "Türkçe öğretmeni" ünvanı ile Millî Eğitim Bakanlığına bağlı resmî ve özel eğitim kurumlarına Türkçe öğretmeni olarak görev yapabilmektedir. Teknolojinin öğrenme süreçlerindeki kanıtlanmış katkıları; hem lisans programlarındaki derslere teknolojinin entegre edilmesini hem de Türkçe öğretmeni adaylarının teknolojiyi kullanma becerilerinin geliştirilmesini öncelikli amaçlar hâline getirmektedir. Teknolojinin gelişim seyrine bakıldığında VR, XR ve Metaverse gibi yenilikçi teknolojilerin Türkçe öğretmenliği lisans programlarının geleceğinde oldukça geniş yer tutması kaçınılmazdır.

Bu teknolojilerin etkin kullanımı, öğretmen adaylarının teknolojiyi pedagojik amaçlarla nasıl kullanabileceklerini anlamalarına ve uygulamalarına yardımcı olma potansiyeli taşımaktadır. Örneğin VR tabanlı uzaktan öğretmen eğitimi sistemleri, Türkçe öğretmen adaylarının farklı coğrafi koşullardan bağımsız olarak kaliteli eğitim alabilmelerine katkı ve ulusal yeterlilik çerçevesinde eşit eğitim fırsatları sunmaktadır. Metaverse teknolojisi, sınıf içi etkileşimleri ve öğrenme yöntemlerini zenginleştirerek öğrenci katılımını artırabilmektedir (Hedrick vd., 2022b). Öğretmen adayları için simüle edilmiş sınıf deneyimleri, gerçek sınıf ortamlarında karşılaşacakları durumları daha iyi anlamalarını sağlayabilmektedir. VR ve Metaverse teknolojilerinin kullanımı, öğretmen eğitimi programlarını yenilikçi ve uyarlanabilir hale getirerek öğretmen adaylarının teknolojik becerilerini ve pedagojik stratejilerini geliştirebilmektedir (Lee & Hwang, 2022). Bunların tamamı, öğretmen adaylarının uluslararası yeterlilik standartlarına uyum sağlamalarına ve küresel eğitime uyum sağlayan öğretmenler olabilmelerine olanak tanımaktadır. Bu bağlamda Türkçe öğretmenliği lisans programlarında bu teknolojilerin entegrasyonu, öğretmen adaylarının yeni eğitim teknolojilerini benimsemelerini ve bu teknolojiler aracılığıyla daha etkili öğrenme süreçleri tasarlamalarını teşvik edecektir. Ek olarak bu teknolojiler, öğretmen adaylarına karmaşık kavramları öğrenmede derinlemesine bir anlayış kazandıracaktır.

VR, XR ve Metaverse teknolojileri, soyut kavramların somutlaştırılmasına olanak tanıyarak öğretmen adaylarının bilgi yapısını güçlendirmektedir. Örneğin Yılmaz ve Coşkun Şimşek (2023) tarafından yapılan çalışma, bu teknolojilerin görsel materyallerin önemli olduğu derslerde öğrenme kalitesini artırdığını ortaya koymuştur. Ayrıca bu teknolojiler; öğretmen adaylarının problem çözme, eleştirel düşünme ve yaratıcı düşünme gibi 21. yüzyıl becerilerini geliştirmede önemli fırsatlar sunmaktadır. VR, XR ve Metaverse öğretmen adaylarının pedagojik yetkinliklerini artırarak onların dijital araçları eğitim süreçlerine entegre etme kapasitesini geliştirmektedir. Mustafa (2023) tarafından yapılan bir araştırmada, Metaverse teknolojisinin öğrenci katılımını ve akademik performansı iyileştirdiği belirtilmiştir. Bu bulgular bir bütün hâlinde değerlendirildiğinde söz konusu teknolojilerin Türkçe öğretmeni adaylarının eğitim süreçlerine entegre edilmesinin gerekli olduğu ve bu entegrasyonun gerçekleşmesi hâlinde onların bilgi, beceri ve yetkinliklerini artırabileceği anlaşılmaktadır.

TYYÇ bağlamında incelendiğinde Türkçe öğretmenliği lisans programlarının TYYÇ'nin bilgi ve beceri boyutları ile ilişkili olduğu ancak yetkinlik boyutunun genel olarak göz ardı edildiği görülmektedir. TYYÇ'de yetkinlikler;

"bağımsız çalışabilme ve sorumluluk alabilme yetkinliği, öğrenme yetkinliği, iletişim ve sosyal yetkinlik ve alana özgü yetkinlik" olmak üzere dört basamakta ele alınmaktadır (TYYÇ, 2010). Ne var ki mevcut öğretim programlarında bu yetkinliklerin geliştirilmesine yönelik alanlar yeterince tanınmamakta ve teknoloji bilgisi oldukça düşük düzeyde kalmaktadır (Kuş & Mert, 2024). Bu noktada yapılması gereken, öğretmen adaylarının dijital araçları eğitim süreçlerine entegre etme kapasitesini geliştirmek ve 21. yüzyılın gerektirdiği becerilere uyum sağlamaları için bu çerçeveyi öğretim programlarının yetkinlik boyutunu da kapsayacak şekilde güncellemektir (Ayrancı & Baskan, 2021). Araştırma kapsamında ele alınan TYYÇ, 21. yy. öğretmen profili, eğitimde teknoloji entegrasyonu ilişkisi ve VR, XR ve Metaverse bağlamında karşılaştırmalı değerlendirme Tablo 1'de verilmiştir:

Tablo 1. Karşılaştırmalı Değerlendirme Tablosu

TYYÇ Kategorisi	21. YY. Öğretmen Profili	Teknoloji Entegrasyonu İlişkisi	VR, XR ve Metaverse Teknolojileri İlişkisi
Bilgi, Beceri	Eleştirel düşünme	Öğretmenlerin veri analiz araçlarını kullanarak bilgiyi derinlemesine incelemelerine ve daha bilinçli kararlar almalarına olanak tanır.	Öğretmen adaylarının eleştirel düşünme becerilerini geliştirmek için karmaşık problemleri çözme ve analiz yapma ortamları sunar.
Bilgi, Beceri	İş birliği	Çevrimiçi iş birliği platformları (örneğin, Microsoft Teams) kullanılarak öğretmen ve öğrenci arasında sürekli bir iletişim ve geri bildirim döngüsü kurulmasını sağlar.	Öğretmen adaylarının iş birliği becerilerini geliştirmek için uzaktan ortak projelerde çalışmalarını sağlar.
Bilgi, Beceri	İletişim becerileri	Çevrimiçi forumlar ve mesajlaşma uygulamaları aracılığıyla güçlendirilir. Öğretmenler, bu araçları kullanarak öğrencilerle etkili bir şekilde iletişim kurabilir, açıklamalar yapabilir ve öğrenci sorularını zamanında yanıtlayabilir.	Öğretmen adaylarının iletişim becerilerini geliştirmek için çeşitli dil pratiği senaryoları sunar. Bu sanal ortamlar, adayların farklı senaryolarda etkileşim kurmalarını ve dil becerilerini doğal diyaloglar yoluyla güçlendirmelerini sağlar.
Bilgi, Beceri	Yaratıcılık	Teknoloji sayesinde öğretim materyallerini zenginleştirme ve ders içeriğini çeşitlendirme fırsatı sunar.	Öğretmen adaylarının yaratıcılığını teşvik etmek amacıyla sanat ve tasarım projelerinde kullanılabilir.
Bilgi, Beceri	Liderlik	Dijital araçları/kaynakları keşfetme ve bunların entegrasyonu konusunda öğretmenlere öncülük etme fırsatı sunar.	Öğretmen adaylarının liderlik becerilerini geliştirmek için kriz yönetimi ve sınıf içi etkinlik koordinasyonu gibi senaryolar sunar. Simülasyonlar, adayların liderlik ve takım yönetimi becerilerini gerçek zamanlı olarak test etmelerine olanak tanır.
Bilgi, Beceri	Dijital okuryazarlık	Eğitim teknolojilerinin sınıf içi ve dışı faaliyetlerde kullanılmasını sağlar.	Öğretmen adaylarının dijital araçları kullanmada konusundaki yetkinliklerini artırmak için interaktif eğitimler sunar.
Bilgi, Beceri	Öz yeterlilik	Öğretmenlerin yeni teknolojileri keşfetme ve bunları ders planlarına dâhil etme konusunda öz güvenlerini artırır.	Öğretmen adaylarının öz yeterliliklerini artırmak için zorlayıcı görevler ve oyunlaştırılmış öğrenme aktiviteleri sunar.
Bilgi, Beceri	Küresel bağlantılar	Dijital iletişim platformları ve sosyal medya aracılığıyla uluslararası iş birlikleri kurarak kültürel farkındalığı artırır.	Küresel eğitim topluluklarıyla etkileşim kurmalarını sağlayarak uluslararası iş birliği fırsatları sunar.
Bilgi, Beceri	Pedagojik bilgi	Teknolojinin eğitimde nasıl etkili bir şekilde kullanılacağını anlamak ve uygulamak için temel bir unsurdur.	Öğretmen adaylarına pedagojik stratejiler ve sınıf yönetimi teknikleri konusunda pratik yapma imkanı tanır. Özellikle sanal sınıf simülasyonları, adayların öğretim metodolojilerini deneyimlemelerine ve uygulamalarına olanak tanır.
Bilgi, Beceri	Uygulamalı öğrenme	Teorik bilgilerin somut örneklerle pekiştirilmesine yardımcı olur.	Teorik bilgilerin pratiğe dökülmesini sağlayarak uygulamalı öğrenme deneyimlerini zenginleştirir.

Türkçe Öğretmenliği lisans programı, TYYÇ, 21. yy. öğretmen profili, VR, XR ve Metaverse teknolojilerinin entegrasyonu bağlamında değerlendirildiğinde uygulamaya dönük olarak araştırmacılara, politika yapıcılara ve eğitimcilere yönelik farklı kategorilerden seçilen derslere ilişkin teknoloji entegrasyonu örnekleri Tablo 2'de verilmiştir:

Tablo 2. Türkçe Öğretmenliği Lisans Programı Teknoloji Entegrasyonu Örnekleri

Ders	Konu	VR, XR ve Metaverse Entegrasyonu Örneği
Dünya Edebiyatı (2 Saat, 4 AKTS) Alan Dersi / Edebiyat	1. Hafta – Antik Yunan Edebiyatı	**Kapsam:** Dünya Edebiyatı dersi kapsamında ilk olarak batı edebiyatına temel oluşturan Antik Yunan edebiyatı çok yönlü olarak işlenmektedir. Bu kapsamda edebi türler, sanatçılar, edebiyatçılar ve akımlar; dönemin tarihi, sosyolojik, dini, kültürel ve iktisadi yapısıyla ilişkilendirilerek verildiğinde çok daha anlamlı ve kalıcı öğrenmeler gerçekleşmektedir. Bu bağlamda Antik Yunan edebiyatını anlatırken bu edebiyatı oluşturan sanatçıların yaşadığı toplumun özelliklerini sunmak önem arz etmektedir. **VR, XR ve Metaverse Entegrasyonu Örneği:** Öğrencilerin Antik Yunan coğrafyasını ve önemli tarihi yerleri sanal gerçeklik turu ile keşfetmeleri sağlanabilir. Bu şekilde öğretmen adayları, Homeros'un eserlerinde betimlenen yerleri ve tarihi olayları daha iyi kavrayabilir. Öğretmen adayları, Antik Yunan şehir devletlerinin 3D modellenmiş sanal bir rekreasyonunda gezinebilir. Böylece Platon ve Aristoteles gibi filozofların yaşam alanlarını ve sosyal yapıları deneyimleyebilirler. Platon'un mağara alegorisi AR teknolojisi kullanılarak canlandırılabilir. Bu şekilde öğretmen adayları mobil cihazlarını kullanarak mağara içindeki gölgelerin ve ışık oyunlarının nasıl bir yanılsama yarattığını gözlemleyebilir. Öğretmen adayları, Sophokles veya Aristophanes gibi yazarların oyunlarının sahnelendiği antik tiyatrolarda sanal izleyici olarak yer alabilir. Böylece öğretmen adayları; eserlerin sahnelenme biçimi, bunun toplumdaki etkileşimi gibi birçok konuda fikir sahibi olur
	3. Hafta: İtalyan Edebiyatı ve Rönesans	**Kapsam:** Dante, İtalyan edebiyatının babasıdır. Yazdığı İlahi Komedya adlı eseri de dünya edebiyatının en değerli eserleri arasında yer almaktadır. Bu eserde Dante bedenen yaptığını söylediği ahiret yolculuğunu anlatır. Şair, otuz beş yaşında iken kutsal bir gecede sabaha karşı kendini, uyku sersemi olduğu için nasıl gittiğini bilemediği Kudüs yakınlarındaki karanlık bir ormanda bulur. Buradan önce cehenneme, sonra Araf'a, en son da Cennet'e gider ve buralarda gördüklerini anlatır. **VR, XR ve Metaverse Entegrasyonu Örneği:** Dante'nin "İlahi Komedya" eserindeki cehennem, araf ve cennet tasvirleri, XR kullanılarak üç boyutlu olarak tasarlanabilir. Öğretmen adayları bu üç alem arasında gezinerek eserin detaylarını ve temalarını derinlemesine anlayabilir. Bu simülasyonda deneyim yaşayan öğretmen adayları; çeşitli sorularla kitabın olay örgüsünü, karakterlerini, farklı katmanlarını, alt metnini öğrenir.
	4. Hafta: İspanyol Edebiyatı ve Don Quijote	**Kapsam:** Don Kişot, Dünya edebiyatının ilk romanıdır. Meşhur yel değirmenleri sahnesiyle tanınmaktadır. Don Kişot, okuduğu şövalye romanlarından etkilenerek gerçeklikle bağını kaybetmiş olan ve olmayacak hayaller peşinde koşan bir maceraperesttir. Kendisini insanlığın iyiliğine adayan bir şövalye gibi görür. Aslında yaşlı ve çelimsiz biridir. Asalet, güçlü bir at, güzel bir sevgili ve üstün savaş aletlerinden (kılıç, kalkan, miğfer vb) mahrumdur. Yel değirmenlerini ve koyun sürüsünü düşman zannettiği için onlarla savaşır. Yaveri Sançe Panza onu sürekli gerçeklerle yüzleştirmeye çalışır ama bu konuda başarılı olamaz. **VR, XR ve Metaverse Entegrasyonu Örneği:** Don Quijote'nin maceralarını içeren bir Metaverse ortamı yaratılabilir. Konuya ilgi çekebilmek için meşhur koyun sürüsüne savaş açma olayı canlandırılabilir. Öğretmen adayları, yazar Miguel de Cervantes'in eserindeki karakterlerle etkileşimde bulunarak olay örgüsünü ve karakter gelişimini keşfedebilir.
Medya Okuryazarlığı (2 Saat, 4 AKTS) Seçmeli Alan Dersi	4. Hafta – Reklamlar ve Çözümlenmesi	**Kapsam:** Reklam, reklamla ilgili temel kavramlar, reklam alanları, reklamların işlevleri, reklam türleri, reklamların çözümlenmesi, reklamlar tasarımlarındaki yapısal ve biçimsel özellikler gibi konularda anlatım gerçekleştirilir. **VR, XR ve Metaverse Entegrasyonu Örneği:** Öğretmen adayları çeşitli reklam alanlarında (gazete, dergi, hareketli ortamlar) sanal bir tura çıkararak farklı reklam türlerini ve yerleşim ögelerini inceleyebilir. Öğretmen adayları, propagandanın yer aldığı sanal ortamlara yerleştirilebilir ve propaganda tekniklerini deneyimlemeleri sağlanabilir. Öğretmen adaylarının reklamların tarihi ve evrimi hakkında bilgi edinmelerine imkân veren sanal bir müze oluşturulabilir. Öğretmen adaylarının reklamların farklı kültürlerde nasıl algılandığını inceleyebilecekleri sanal bir panel düzenlenebilir.
	7. Hafta – Önyargılar ve Stereotiplerin Medya Okuryazarlığı Bağlamında İncelenmesi	**Kapsam:** Ön yargı, ön yargı biçimleri, stereotip, ön yargıları anlama ve bunlarla başa çıkma stratejileri ele alınır. **VR, XR ve Metaverse Entegrasyonu Örneği:** Öğretmen adayları, ön yargılı haber içeriklerine maruz bırakılmış sanal ortamlarda önyargıların medya içeriğinde nasıl kullanıldığını deneyimleyebilir. Öğretmen adaylarının farklı bakış açılarını temsil eden sanal karakterlerle etkileşime girebilecekleri sanal bir ortam tasarlanabilir. Öğretmen adaylarının ön yargılar ve stereotipler hakkında bilgi edinebilecekleri ve farklı örnekler inceleyebilecekleri etkileşimli bir kütüphane oluşturulabilir. Sanal rehberler, öğrencilere kütüphanenin bölümlerini tanıtabilir, önemli noktalara dikkat çekebilir ve soruları yanıtlayabilir.
Yazma Eğitimi (3 Saat, 5 AKTS)	4. Hafta – Yazma Araçları ve Ortamları	**Kapsam:** Yazmanın keşfinden bu yana nasıl bir gelişim seyri izlediği ve yazmada hangi araçların kullanıldığı gibi konular yazmanın dinamik yapısı ile ilişkilendirilerek ele alınır. **VR, XR ve Metaverse Entegrasyonu Örneği:** Öğretmen adayları tarih boyunca kullanılan farklı yazma araç ve ortamlarını sanal ortamda deneyimlemelerine imkân veren bir zaman tüneli oluşturulabilir. Öğretmen adayları VR ortamında farklı yazma araçlarını kullanarak hikayeler, şiirler, senaryolar veya diğer yaratıcı metinler yazabilecekleri sanal bir atölyeye

	katılabilir. Öğretmen adaylarının farklı yazma araç ve geliştiricilerinin ürünlerini tanıtabilecekleri ve öğrencilerle etkileşime girebilecekleri sanal bir fuar düzenlenebilir.
6. Hafta – Yazmada Geri Bildirim	**Kapsam:** Yazma eğitiminde geri bildirimin rolü ve işlevi, farklı geri bildirim türlerinin etkin kullanımı gibi konular ele alınır. **VR, XR ve Metaverse Entegrasyonu Örneği:** Öğretmen adaylarının farklı geri bildirim türlerini (yapıcı eleştiri, övgü, düzeltme önerileri) VR ortamında deneyimleyebilecekleri bir simülasyon tasarlanabilir. Bu sayede öğretmen adayları, geri bildirimin nasıl daha etkili bir şekilde alınıp verilebileceğini öğrenebilirler.

Sonuç ve Öneriler

Türkçe öğretmenliği lisans programında teknoloji entegrasyonu, öğretmen adaylarının eğitim süreçlerini zenginleştirmek ve onların mesleki becerilerini geliştirme noktasında büyük bir potansiyele sahiptir. Özellikle VR, XR ve Metaverse gibi güncel teknolojiler, öğretmen adaylarına daha etkili öğretim yöntemleri sunmada önemli fırsatlar yaratmaktadır. Bu teknolojilerin pedagojik açıdan nasıl kullanılacağını anlamak ve uygulamak, Türkçe öğretmeni adaylarının dijital araçları etkin bir şekilde derslerinde kullanabilmelerinin ilk ve en önemli adımı olacaktır. Mevcut araştırmalar (Moshinski vd., 2021; Mystakidis vd., 2021) bu teknolojilerin eğitimde nasıl uygulanabileceğine dair önemli bulgular sunmakta ve bu konuda çeşitli stratejiler önermektedir Aşağıda, Türkçe öğretmenliği lisans programlarında teknolojinin etkin kullanımını artırmak ve araştırmanın amacı doğrultusunda 21. yy. öğretmen profiline uygun olacak şekilde öğretmen adaylarının dijital yetkinliklerini geliştirmek için öneriler sunulmuştur:

- Dijital araçların kullanılması konusunda rehberlik edilmelidir.
- Öğretmen adaylarının teknolojiyi entegre etme yeteneklerini artırmak üzere örnek çalışmalar yapılmalıdır.
- VR, XR ve yapay zekâ gibi ileri düzey teknolojilerin Türkçe öğretmenliği lisans programında yer alan tüm dersler özelinde nasıl kullanılabileceğini anlatan kaynakların sayısı artırılmalıdır.
- VR'ın pedagojik kullanımı için eğiticilere yönelik eğitimler düzenlenmeli ve teknik destek sağlanmalıdır.
- AR teknolojilerini ders planlarına entegre etmekte eğitimcilere rehberlik edilmelidir.
- XR teknolojilerinin pedagojik açıdan etkin kullanımı için atölye çalışmaları yapılmalıdır.
- Metaverse'in eğitimdeki potansiyelini en üst düzeye çıkarabilmek için teknolojik ve pedagojik destek sağlanmalıdır.

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Matematiksel Mantık Bağlaçlarının Işık Renkleri (RGB) ile Modellenmesi Yoluyla Ders içi Etkinlik Materyali Tasarımı

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Özet

Bu araştırmanın hedefi matematiksel bağlaçların işlevlerini renkler yoluyla açıklayan bir matematiksel model ve bu modele dayalı bir dijital ve dinamik öğretim materyali geliştirmektir. Bu bağlamda geliştirilecek model için hem bir adet dijital deney düzeneği hem de bir adet dijital model hesap makinesi tasarlama yoluyla araştırma ve geliştirme boyutu ele alınmıştır. Ayrıca etkinliğin değerlendirilmesi için de yapay zeka dil modeli olan "Gemini" yazılımı yardımı ile bir değerlendirme rubriği de hazırlanmıştır. Dijital deney düzeneği dinamik matematik yazılımlarından GeoGebra dinamik matematik yazılımı kullanılmıştır ve dijital hesap makinesi için de Microsoft Excel programı kullanılmıştır. Araştırmada nitel araştırma yöntemlerinden olgu bilim (fenomenoloji) deseni kullanılmıştır. Model geliştirilirken p olarak tanımlanan önerme kırmızı ışık ile, q olarak tanımlanan önerme yeşil ışık ile modellenmiş ve bağlacın kendisini ifade eden perdeye bu ışık tutulunca beyaz dışında bir renk oluşuyorsa sonucun 1, oluşmuyorsa sonucun 0 olduğu sanal ortamda ışıklar birer daire olacak şekilde bir düzenek geliştirilmiştir. Örneğin "ve" bağlacı için beyaz bir perde oluşturulmuştur ve sadece iki önermenin de 1 olduğu (hem yeşil hem de kırmızı dairenin kullanıldığı) durumda sarı ortaya çıkar yani sonuç 1'e eşit olmuştur. Bu şekilde tüm durumlar da hazırlanan dinamik Excel tablosunda kısaca gösterilmiştir. Çalışmanın sonunda eğitimciler, eğitim programı yapıcılar ve araştırmacılar için öneriler yer almaktadır.

Anahtar kelimeler: STEAM, Matematiksel Mantık, Işık Renkleri (RGB), Matematiksel Model

Abstract

The aim of this research is to develop a model that explains the functions of conjunctions through colors and to develop a digital and dynamic teaching material based on this model. In this context, both a digital experiment setup and a digital model calculator were designed for the model to be developed. In addition, an evaluation rubric was prepared for the evaluation of the activity with the help of "Gemini" software, an artificial intelligence language model. GeoGebra dynamic mathematics software was used for the digital experiment setup and Microsoft Excel program was used for the digital calculator. Phenomenology design which is one of the qualitative research methods was used in the study. While developing the model, the proposition defined as p was modeled with a red light, the proposition defined as q was modeled with a green light, and when this light was shone on the curtain expressing the conjunction itself, a device was developed so that the lights were a circle in a virtual environment where the result was 1 if a color other than white was formed and 0 if not. For example, a white screen was created for the conjunction "and" and only in the case where both propositions are 1 (both green and red circles are used), yellow appears, that is, the result is equal to 1. In this way, all cases were briefly shown in the dynamic Excel spreadsheet. At the end of the study, there are recommendations for educators, curriculum makers and researchers.

Keywords: STEAM, Logic Conjunctions , Colors of Light (RGB), Mathematical Model

Giriş

Matematiksel ilkeler sadece insan yaratımının veya manipülasyonunun bir ürünü değildir; daha ziyade, insan düşüncesi ve eyleminden ayrı bağımsız varlıklar olarak varlar. Bu fikir, matematiğin doğasını tanıyan ünlü sanatçı M. C. Escher (1898-1972) tarafından etkili bir şekilde ifade edildi. Matematik, doğal dünya ile insan zihni arasında olduğu kadar somut ve soyut arasında bağlantılar kurma yeteneği birbirine bağlanmak için derin bir kapasiteye sahiptir.

Karabey, B. ve ark. (2018) tarafından yürütülen bir çalışma, gerçek dünyada somut ve gözlemlenebilir bir fenomen olan ışık ve renkleri arasındaki ilişkiyi ve matematiğin soyut alanında var olan kümeler kavramını araştırdı. Araştırmacılar, kırmızı (R) ve yeşil (G) renkler arasındaki etkileşimi modellemeye çalıştılar ve bu da sarı oluşumuyla sonuçlandı. Bu, ışığın RGB renkleriyle birlikte bir arada bulunmalarını örneklenerek, bu kümelerin kesişen özelliklerinden yararlanılarak elde edildi.

Benzer şekilde, Bora U. (2002) ses ve müzik arasındaki karmaşık bağlantıyı, duygusal tepkileri uyandıran doğal bir durum ve doğası gereği soyut olan matematik alanını araştırdı. Bu keşif yoluyla, yazar bu görünüşte farklı alanlar arasındaki derin ilişkiye ışık tutmayı amaçladı.

Bu fikri genişleten Mercin, L. (2019) sanat, matematik ve bilimlerin kesişimine odaklandı ve bu multidisipliner yaklaşımı STEAM (Bilim, Teknoloji, Mühendislik, Sanat, Matematik) kısaltması altında özetledi. STEAM ilkelerinin uygulanması matematik eğitimi alanında yaygın olarak gözlemlenirken, bilimin, daha geniş

anlamıyla, gerçek dünya fenomenlerini anlamak ve ele almak için matematiksel modeller kullanarak geliştiğini belirtmek önemlidir. Sonuç olarak, bu matematiksel mercekten üretilen çözümler daha sonra pratik durumlara uygulanır ve teori ile uygulama arasındaki boşluğu kapatır (Gülhan, F. 2022; Erbaş, E., et al., 2014).

Matematik alanında ve matematik eğitimi, mühendislik, fizik, kimya ve fen eğitimi gibi ilgili disiplinler içinde, matematik ve diğer çeşitli alanlar arasında simbiyotik bir ilişki vardır. Bu ilişki genellikle mevcut kavramları yeni yollarla yeniden tanımlamaya veya kavramsal anlayışı geliştirmek için alternatif öğretim yöntemleri geliştirmeye hizmet eder.

Bu disiplinler arası bağlantıların kapsamlı araştırılmasına rağmen, daha önce hiçbir araştırmanın matematiksel mantığın ışık ve renkleri aracılığıyla modellenmesini araştırmamış olması dikkat çekicidir. Bu, mevcut literatürdeki ilgi çekici bir boşluğu temsil eder ve gelecekteki çalışmaların bu keşfedilmemiş bölgeyi araştırma ve matematiksel mantık ile görsel spektrum arasındaki derin ilişkiye ışık tutma potansiyelini vurgulamaktadır.

Yöntem

Araştırmada nitel araştırma yöntemlerinden olgu bilim(fenomenoloji) deseni kullanılmıştır. Matematiksel mantık bağlaçlarının sonuç bağıntıları ile RGB ışık renklerinin ikili ve üçlü bağıntılarına benzerlikleri yoluyla modellenmesi olgusu araştırılmıştır. Olgu bilim deseni bir olguya ait özellikleri araştırırken kullanılan nitel araştırma desenidir (A. Yıldırım, H. Şimşek, 2011).

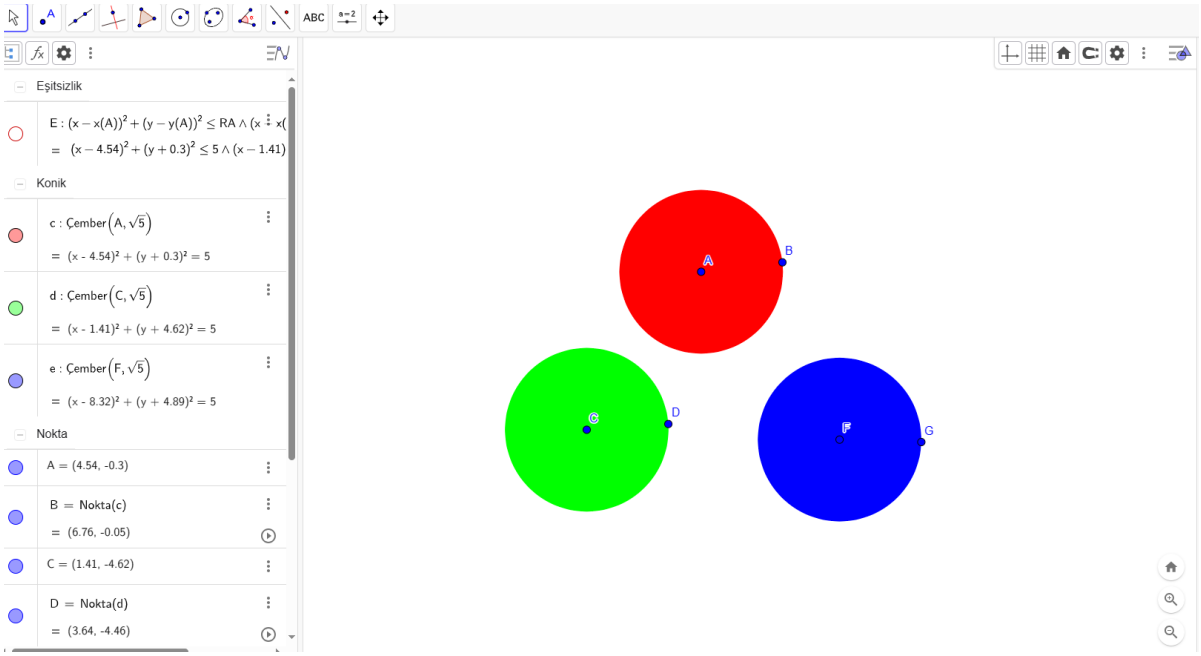
Bu araştırma hipotezi şu şekilde oluşturulmuştur: Matematiksel mantık operasyonları ışık renkleri olan RBG ile modellenebilir mi?

Bu hipotezi test etmek amacı ile dinamik matematik yazılımı olan GeoGebra Klasik "https://www.geogebra.org/classic" hesap makinesi deney düzeneği olarak kullanılmıştır ve Microsoft Excel yazılımı kullanılarak oluşturulan modelin dinamik tablo gösterimi yapılmıştır. Bu gösterim yoluyla deney düzeneğinden elde edilen veriler betimsel analiz yoluyla analiz edilmiştir.

Bu bağlamda GeoGebra programı kullanılarak deney inşa süreci aşağıda aşamalar halinde (şekilleriyle birlikte) verilmiştir:

1. Aşama:

Bu aşamada serbest(hareket ettirilebilen) bir A noktası belirlenmiş, A noktası merkez olacak şekilde √5 yarıçaplı kırmızı bir çember merkez ve yarıçap aletinin yardımıyla oluşturulmuştur. A merkezli çember üstünde bir B noktası nesne üzerinde nokta aleti aracılığıyla belirlenmiştir. Aynı zamanda serbest bir C noktası belirlenmiş, √5 yarıçaplı C merkezli yeşil renkte bir çember merkez ve yarıçap aletiyle oluşturulmuştur. C merkezli çember üstünde bir D noktası nesne üzerinde nokta ile belirlenmiştir. Bir de serbest bir F noktası belirlenmiş, F merkezli √5 yarıçaplı mavi renkli bir çember merkez ve yarıçap aletinin yardımıyla oluşturulmuştur. F merkezli çember üzerinde bir G noktası nesne üzerinde nokta aleti ile belirlenmiştir.



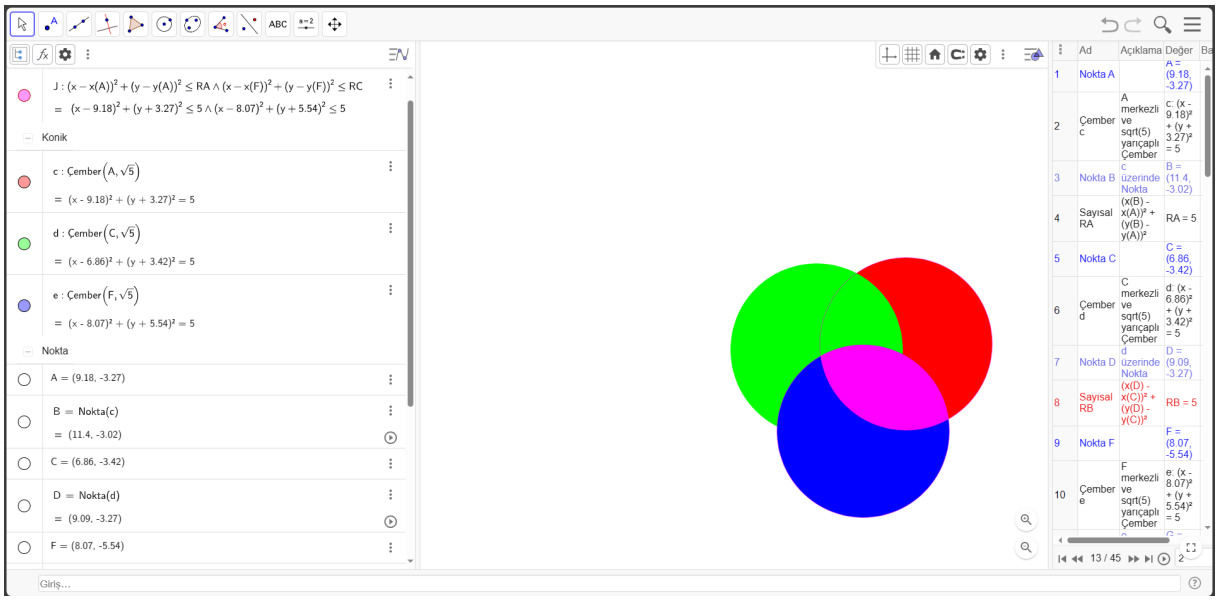
Şekil 1. Dairelerin oluşturulması.

2. Aşama:

Bu aşamada A merkezli çemberin denklemi yardımı ile çemberin iç bölgesi $(x(B) – x(A))^2 + (y(B) – y(A))^2 = 5$ denklemi ile belirlenmiştir. Bu denklem çemberi daire (iç bölgesi de dahil) formatına çevirmek için yazılmıştır. RA diye tanımlanmıştır. Aynı zamanda C merkezli çemberin denklemi yardımı ile çemberin iç bölgesi $(x(D) – x(C))^2 + (y(D) – y(C))^2 = 5$ denklemi ile belirlenmiştir. Bu denklem çemberi daire formatına çevirmek için yazılmıştır. RB diye tanımlanmıştır. Son olarak F merkezli çemberin denklemi yardımı ile çemberin iç bölgesi $(x(F) - x(G))^2 + (y(F) - y(G))^2 = 5$ denklemi ile belirlenmiştir. Bu denklem çemberi daire formatına çevirmek için yazılmıştır. RC diye tanımlanmıştır.

3. Aşama:

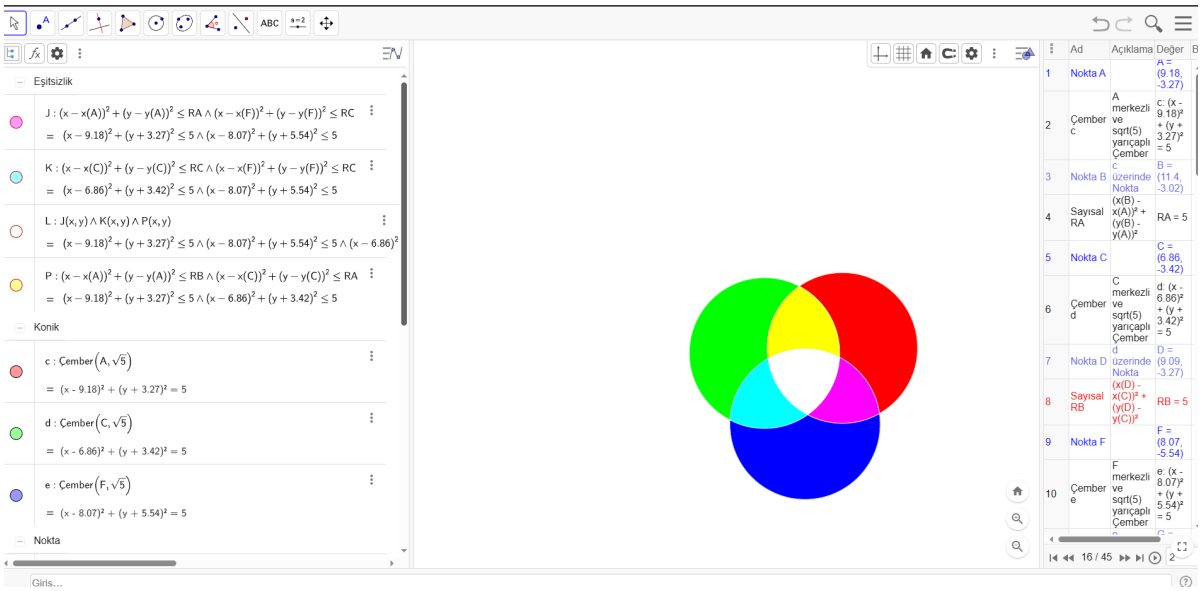
Bu aşamada P: $(x - x(A))^2 + (y - y(A))^2 \leq RA \wedge (x-x(C))^2 + (y-y(C))^2 \leq RB$ eşitsizliği yazılmıştır. Bu eşitsizlik A merkezli çemberin ifade ettiği dairenin iç bölgesi ile C merkezli çemberinin ifade ettiği dairenin iç bölgesinin kesişimini ifade eder. Bu eşitsizliğin rengi Kırmızı=1, Yeşil=1, Mavi=0, Donukluk=1 ve Katman=1 olarak ayarlamıştır. Burada Katman=1 olması çemberlerin ışığı perdenin boya renklerini temsil etmesi yani ışığın ekran renginden etkilenmeden üstünde durduğunu temsil eder. Aynı şekilde mavi+kırmızı için J: (x-x(A))^(2)+(y-y(A))^(2)≤RA ∧ (x-x(F))^(2)+(y-y(F))^(2)≤RC eşitsizliği Mavi=1, Kırmızı=1, Yşil=0 ve Donukluk=Katman=1 ayarlanmıştır.



Şekil 2.Kesişimlerin belirlenmesi.

Devamında mavi+yeşil için K: (x-x(C))^(2)+(y-y(C))^(2)≤RC ∧ (x-x(F))^(2)+(y-y(F))^(2)≤RC denklemi Mavi=Yeşil=Donukluk=Katman=1 ve Kırmızı=0 olarak ayarlanmıştır.

Son olarak Mavi+Yeşil+Kırmızı=Beyaz (ışık renklerinde geçerlidir) kesişimizi oluşturmak için önceki üç önerme tek önerme şeklinde L: J(x,y) ∧ K(x,y) ∧ P(x,y) yani P, J ve K kesişiminin bölgesi tanımlanmış Mavi=Yeşil=Kırmızı=Donukluk=Katman=1 şeklinde ayarlanmıştır.



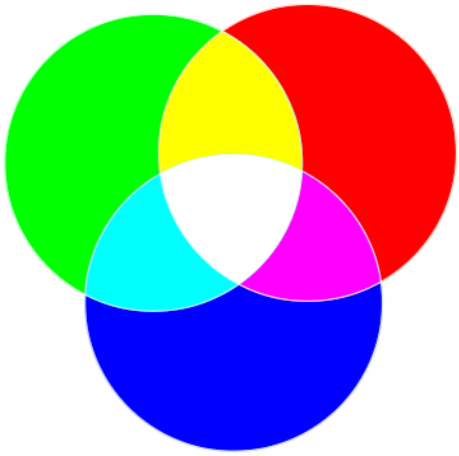
Şekil 3.Kesişimlerin renklerinin belirlenmesi.

4. Aşama

Bu aşamada perdeler ayarlanıştır. Tüm perdeler x≤n(sayı) veya x≥n eşitsizliği şeklinde gösterilmiş ve Katman=0 ve Donukluk=1 olacak şekilde ayarlanmıştır. Bu sayede ekran gerçek hayattaki bir perde gibi davranması sağlanmıştır. Son olarak tüm perde seçenekleri

birer işaret kutusuna bağlanmış ve deney düzeneği tamamlanmıştır.

Girdi													
p	q	p (renk	q(renk)	çıktı s.	çıktı rei	çıktı	çıktı rei	çıktı s.	çıktı renk	çıktı s.	çıktı rei	çıktı s.	çıktı rei
1	1	Kırmızı	Yeşil	1	Sarı	1	Sarı	0	yok veya Beyaz	1	Sarı	1	Sarı
1	0	Kırmızı	Yok	0	Yok	1	Sarı	1	Cyan veya Magenta	0	yok	0	yok
0	1	Yok	Yeşil	0	Yok	1	Sarı	1	Cyan veya Magenta	1	Sarı	0	yok
0	0	Yok	Yok	0	Yok	0	yok	0	yok veya Beyaz	1	Sarı	1	Sarı
1	1	Kırmızı	Yeşil	1	Sarı	1	Sarı	0	yok veya Beyaz	1	Sarı	1	Sarı
1	0	Kırmızı	Yok	0	Yok	1	Sarı	1	Cyan veya Magenta	0	yok	0	yok



Şekil 4. Materyal son hali.

GeoGebra deney düzeneği bağlantısı: renkler orj – GeoGebra

Exel Tablosu Yapım Aşaması:

Exel Tablosunda girdiler bölümünde kırmızı ren için ; =EĞER(A:A=1;"Kırmızı";"Yok"), yeşil renk için =EĞER(B:B=1;"Yeşil";"Yok") formülü hazırlanmıştır.

Tablo 1. Girdiler tablosu.

Girdi			
p	q	p (renk)	q(renk)
1	1	Kırmızı	Yeşil
1	0	Kırmızı	Yok
0	1	Yok	Yeşil
0	0	Yok	Yok
1	1	Kırmızı	Yeşil
1	0	Kırmızı	Yok

Çıktılar bölümleri ise her bir bağlaç için perde renkleri ve çıktı renklerine göre ayarlanmıştır. Örneğin; Ve bağlacı için perde rengi siyah p=1 kırmızı, q=1 yeşil ve kesişimleri de sarı olmalıdır örnekte sayısal çıktı için =EĞER(VE(A:A=1;B:B=1);1;0) formülü renk çıktısı için =EĞER(H:H=1;"Sarı";"Yok") formülü kullanılmıştır.

Tablo 2. Ve bağlacı sonuç tablosu.

VE(ekran renk= siyah)	
çıktı s.	çıktı renk
1	Sarı
0	Yok
0	Yok
0	Yok
1	Sarı
0	Yok

Aşağıda tüm bağlaçlar için sayısal çıktı formülü, renk çıktısı formülü ve ekran rengi verilmiştir.

Tablo 3.Bağlaç- Formül Tablosu.

Bağlaç	Perde Rengi	Sayı Çıktısı	Renk Çıktısı
Ve	Siyah	=EĞER(VE(A:A=1;B:B=1);1;0)	=EĞER(H:H=1;"Sarı";"Yok")
Veya	Kırmızı/Yeşil	=EĞER(YADA(A:A=1;B:B=1);1;0)	=EĞER(O:O=1;"Sarı";"yok")
Ya da	Işık Mavi	=EĞER(A:A =B:B;0;1)	=EĞER(V:V=1;"Cyan veya Magenta";"yok veya Beyaz")
İse	Kırmızı/Sarı	=EĞER(VE(A:A=1;B:B=0);0;1)	=EĞER(AC:AC=1;"Sarı";"yok")
Ancak ve Ancak	Sarı/Beyaz	=EĞER(A:A=B:B;1;0)	=EĞER(AJ:AJ=1;"Sarı";"yok")

Excel dosyası bağlantısı; renkler.xlsx

Değerlendirme rubriği:

Yapay zeka dil modeli "Gemini" yardımı ile oluşturulmuş ders içi etkinlik değerlendirme rubriği aşağıda verilmiştir.

Tablo 4. Değerlendirme rubriği.

Kriter	Seviye 4 (Mükemmel)	Seviye 3 (İyi)	Seviye 2 (Orta)	Seviye 1 (Yetersiz)
Katılım	Etkinliğe aktif olarak katılır, tüm sorulara ve görevlere istekli şekilde cevap verir.	Etkinliğe katılır, ancak bazı sorularda veya görevlerde pasif kalabilir.	Etkinliğe katılımı sınırlıdır, bazı sorularda veya görevlerde isteksiz davranabilir.	Etkinliğe yeterince katılmaz, pasif kalır ve isteksizlik gösterir.
Anlayış	Kavramları ve problemleri açıkça anlar, karmaşık problemleri de çözüme kavuşturur.	Kavramları ve problemleri genel olarak anlar, basit ve orta düzey problemleri çözebilir.	Kavramları ve problemleri tam olarak anlamayabilir, basit problemleri çözmekte zorlanabilir.	Kavramları ve problemleri anlamaz, problemleri çözmede yetersiz kalır.
Problem Çözme Becerisi	Problemleri doğru ve hızlı bir şekilde çözer, farklı yöntemler kullanabilir ve çözümlerini açıklayabilir.	Problemleri doğru bir şekilde çözer, ancak çözüm süresi uzun olabilir veya farklı yöntemler kullanmakta zorlanabilir.	Problemleri çözmekte zorlanır, hatalar yapabilir ve çözümlerini açıklayamayabilir.	Problemleri çözmekte çok zorlanır, hatalar yapar ve çözümlerini açıklayamaz.
Ekip Çalışması	Ekip arkadaşlarıyla uyumlu bir şekilde çalışır, fikirlerini paylaşır ve ortak bir çözüme katkıda bulunur.	Ekip arkadaşlarıyla çalışmaya isteklidir, ancak fikirlerini paylaşmakta veya ortak bir çözüme katkıda bulunmakta zorlanabilir.	Ekip arkadaşlarıyla çalışmaya isteksiz davranabilir veya uyum sağlayamayabilir.	Ekip arkadaşlarıyla çalışmayı reddeder veya uyum sağlayamaz.

İletişim Becerileri	Düşüncelerini açık ve net bir şekilde ifade eder, matematiksel terimleri doğru kullanır ve diğer öğrencileri dinler.	Düşüncelerini genel olarak açık bir şekilde ifade eder, ancak matematiksel terimleri kullanmakta veya diğer öğrencileri dinlemekte zorlanabilir.	Düşüncelerini tam olarak ifade edemeyebilir, matematiksel terimleri hatalı kullanabilir ve diğer öğrencileri dinlemeyebilir.	Düşüncelerini ifade etmekte zorlanır, matematiksel terimleri kullanmaz ve diğer öğrencileri dinlemez.

Bulgular

Araştırma deney düzeneği yardımı ile araştırmacılar tarafından aşağıda tablolar halinde verilen tabloda verilen birebir eşleştirmede "p" 1. önermeyi, "q" 2. önermeyi temsil etmektedir. Tablolarda "p" ve "q" lar RGB ışık renklerinden kırmızı(R), yeşil(G) ile birebir eşlenmiştir, bu eşleşmede 1=kırmızı ve 0=yeşil şeklindedir. Sahneler ise bağlaçların (ve, veya, ise, ancak ve ancak vs.) özelliklerine göre bir sonuç rengi halinde ilgili tabloda belirtilmiştir. Sahneler bazen iki renk örneğin sarı + kırmızı gibi modellenmiştir. Mavi hariç tüm sahneler boya renkleri özellikleri göstermektedir sadece mavi sahne ışıktan sahne olacak şekilde modellenmiştir. Örneğin "ve" bağlacı için p ve q önermelerini yani kırmızı ve yeşil ışığı üst üste getirip sahne siyah ve eğer çıktı 1 ise sarı olmasını, 0 ise değişmemesini bekliyoruz.

Ve bağlacı için perde rengi sayısal sonuç ve renk sonucu tablosu aşağıda verilmiştir;

Tablo 5. ve bağlacı tablosu.

Girdi				**VE(ekran renk= siyah)**	
p	q	p (renk)	q(renk)	çıktı s.	çıktı renk
1	1	Kırmızı	Yeşil	1	Sarı
1	0	Kırmızı	Yok	0	Yok
0	1	Yok	Yeşil	0	Yok
0	0	Yok	Yok	0	Yok
1	1	Kırmızı	Yeşil	1	Sarı
1	0	Kırmızı	Yok	0	Yok

Veya bağlacı için perde rengi sayısal sonuç ve renk sonucu tablosu aşağıda verilmiştir;

Tablo 6. veya bağlacı tablosu.

Girdi				**VEYA(ekran renk = kırmızı/yeşil)**	
p	q	p (renk)	q(renk)	çıktı	çıktı renk
1	1	Kırmızı	Yeşil	1	Sarı
1	0	Kırmızı	Yok	1	Sarı
0	1	Yok	Yeşil	1	Sarı
0	0	Yok	Yok	0	yok
1	1	Kırmızı	Yeşil	1	Sarı
1	0	Kırmızı	Yok	1	Sarı

Ya da bağlacınca ekran boya rengi olarak modellenmemiş, ekran ışık olarak modellemiştir. Ya da bağlacı için perde rengi sayısal sonuç ve renk sonucu tablosu aşağıda verilmiştir;

Tablo 7.Yada bağlacı tablosu.

Girdi				**YA DA(ekran renk= mavi)**	
p	q	p (renk)	q(renk)	çıktı s.	çıktı renk
1	1	Kırmızı	Yeşil	0	yok veya Beyaz
1	0	Kırmızı	Yok	1	Cyan veya Magenta
0	1	Yok	Yeşil	1	Cyan veya Magenta
0	0	Yok	Yok	0	yok veya Beyaz
1	1	Kırmızı	Yeşil	0	yok veya Beyaz
1	0	Kırmızı	Yok	1	Cyan veya Magenta

İse bağlacı için perde rengi sayısal sonuç ve renk sonucu tablosu aşağıda verilmiştir;

Tablo 8. İse bağlacı *tabolsu.*

Girdi				**İse(ekran renk = kırmızı/sarı)**	
p	q	p (renk)	q(renk)	çıktı s.	çıktı renk
1	1	Kırmızı	Yeşil	1	Sarı
1	0	Kırmızı	Yok	0	yok
0	1	Yok	Yeşil	1	Sarı
0	0	Yok	Yok	1	Sarı
1	1	Kırmızı	Yeşil	1	Sarı
1	0	Kırmızı	Yok	0	yok

Ancak ve ancak bağlacı için perde rengi sayısal sonuç ve renk sonucu tablosu aşağıda verilmiştir;

Tablo 9. Ancak ve *Ancak* tablosu.

Girdi				**Ancak ve Ancak (ekran renk= sarı/beyaz)**	
p	q	p (renk)	q(renk)	çıktı s.	çıktı renk
1	1	Kırmızı	Yeşil	1	Sarı
1	0	Kırmızı	Yok	0	yok
0	1	Yok	Yeşil	0	yok
0	0	Yok	Yok	1	Sarı
1	1	Kırmızı	Yeşil	1	Sarı
1	0	Kırmızı	Yok	0	yok

Sonuç ve Tartışma

Bu çalışmada matematiksel mantık bağlaçları ışık renklerinin üst üste gelmeleri ile oluşan renklerin veya perdenin üzerinde görünüp görünmeme durumlarının benzerlikleri ele alınarak iki önermeli "p ve q" mantık cümlelerini birebir eşleme yoluyla bir benzerlik modeli oluşturulmuştur. Benzer bir model renkler ile kümeler arasındaki benzerlikten faydalanılarak Karabey, B. vd.,(2018) çalışmasında da yer almıştır. STEAM veya STEM+A uygulamaları özellikle kavramların öğretilmesinde yada bilim ve teknolojik gelişmelere öncülük etmesinde önemli bir rol üstelenmişlerdir (Gülhan, F. 2022, Erbaş, E., vd., 2014).

Bu çalışmada örneğin "ve" bağlacı kümelerde kesişme, "veya" bağlacı ayrık kümelere benzerlikleri ile modellenmiştir. Fakat "ya da" bağlacı modellenirken sadece ışık rengi olan maviyle etkileşmesi durumu görselleştirilmek zorunda kalınmıştır.

Öneriler

Bu çalışma eğitimciler, eğitim programı yapıcılar ve araştırmacılar için öneriler yer almaktadır.

- Fizik ve matematik alanlarında eğitim veren eğiticiler fizik ve matematiğin bu ve benzeri benzerliklerine dayalı eğitim içerikleri geliştirip uygulayabilirler.
- Eğitim programı planlayıcıları STEAM dallarına vurgu yapan benzer eğitim ortamları tasarlayabilirler.
- Araştırmacılar doğal fenomenlerin matematiksel hatta bilgi-işlemsel modellerini geliştirebilirler.

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Açık ve Uzaktan Öğrenmede Metaverse Teknolojisinin Geleceği: Bir Ufuk Taraması

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Özet

Teknoloji devi şirketlerin, fütüristlerin, eğitimcilerin ve bu kavramla yeni tanışan pek çok kişinin ilgisini çeken Metaverse teknolojisinin, henüz emekleme aşamasında olsa da gelecekte dijital medyanın yeni gelişmiş şekli olacağı aşikardır. İlk versiyonları göz önünde bulundurulduğunda aslında uzun bir geçmişe sahip olan Metaverse, bugün her alanda büyük dönüşümlere kapı aralamaktadır. Bu dönüşümlerin uzun vadede eğitim alanına da yansımaları olacaktır. Nitekim, gerçek ve sanal deneyimleri bir araya getiren etkileşimli yapısı ile, Metaverse teknolojisinin gelecekte açık ve uzaktan öğrenme uygulamalarına yönelik yeni, gerçekçi ve arzu edilen özelliklere sahip bir öğrenme ortamı sunacağı düşünülmektedir. Metaverse odağında gerçekleştirilen sayısız çalışma, bu fikri destekler niteliktedir. İlgili alanyazın, bu ortamların geleneksel ve özellikle uzaktan eğitim alanında güçlü yönleri ve zayıf yönlerinin, fırsat ve tehditlerinin neler olabileceğine, olumlu ve olumsuz ne tür etkilerinin gözlemlenebileceğine, bu ortamlarda hangi eğitim türlerine yer verileceğine ve öğreticinin rolünün ne olacağına kadar birçok öngörüye yer vermektedir. Bu öngörüler yakın gelecekteki Metaverse örneklerinin açık ve uzaktan öğrenme bağlamında kullanımına yönelik ipuçları sunmaktadır. Bu bağlamda araştırmada, Metaverse konulu çalışmalardaki ipuçlarından yola çıkarak öngörülerde bulunmak ve sunulacak olan öngörüler kapsamında, açık ve uzaktan öğrenmede Metaverse uygulamalarına yönelik bir gelecek senaryosu geliştirmek amaçlanmıştır. Bu amaç doğrultusunda, alanyazında Metaverse teknolojisinin geleceğine ilişkin ipuçları barındıran çalışmaların ufuk taraması yöntemiyle incelenmesi gerçekleştirilmiştir. Elde edilen bulgular ışığında, gelecek beş, on ve yirmi yıllık zaman dilimlerinde Metaverse teknolojisine ilişkin öngörülere ulaşılmış ve araştırma sonucunda hikayeleştirilmiş bir gelecek senaryosuna yer verilmiştir.

Anahtar Sözcükler: Metaverse, açık ve uzaktan öğrenme, ufuk taraması, senaryo

The Future of Metaverse Technology in Open and Distance Learning: A Horizon Scan

Abstract

Although the Metaverse technology, which attracts the attention of big tech companies, futurists, educators and many people who are new to this concept, is still in its infancy, it is obvious that it will be the new advanced form of digital media in the future. The Metaverse, which actually has a long history when its first versions are taken into consideration, today opens the door to major transformations in every field. In the long run, these transformations will also have reflections in the field of education. Indeed, with its interactive structure that combines real and virtual experiences, Metaverse technology is thought to offer a new, realistic, and desirable learning environment for open and distance learning applications in the future. Numerous studies focusing on Metaverse support this idea. The related literature includes many predictions about the strengths and weaknesses, opportunities and threats, positive and negative effects of these environments in traditional and especially distance education, which types of education will be included in these environments, and what the role of the instructor will be. These predictions provide clues for the use of Metaverse examples in the open and distance learning context in the near future. In this context, this study aims to make predictions based on the clues in the studies on Metaverse and to develop a future scenario for Metaverse applications in open and distance learning within the scope of the predictions to be presented. In line with this purpose, a horizon scanning method was used to examine the studies that contain clues about the future of Metaverse technology in the literature. In the light of the findings, predictions about Metaverse technology in the next five, ten and twenty years have been reached and a narrated future scenario has been included as a result of the research.

Keywords: Metaverse, open and distance learning, horizon scanning, scenario

Giriş

"Meta" ve "universe" kelimelerinin birleşimi ile türetilen Metaverse, sanal topluluklar tarafından oluşturulan üç boyutlu sanal bir evren olarak tanımlanmaktadır (Lee, 2021). Bu sanal evreni mümkün kılan teknolojinin gelişimi incelendiğinde, Metaverse kavramına ilk defa Neal Stephenson 1992 yılında kaleme aldığı Snow Crash romanında rastlanmaktadır. Öte yandan aynı dönemde gelişim gösteren metin tabanlı etkileşimli oyun ortamları ve bir süre sonra ortaya çıkan çok kullanıcılı çevrimiçi oyun platformları Metaverse teknolojisinin tarihinde önemli bir yer kaplamaktadır (Lee vd., 2021). İnternet kullanımının yaygınlaşmasıyla bu oyun ortamlarının yanı sıra 2000'li yılların başlarında Second Life gibi insanların avatarlar aracılığıyla etkileşim kurabileceği üç boyutlu sanal dünyalar ortaya çıkmıştır. Aynı özelliklere sahip ancak daha ilkel bir teknolojik altyapıya sahip olan sanal dünyaların, Metaverse teknolojisinin ilk versiyonları olduğu söylenebilir. Bununla birlikte, 2011 yılında piyasaya çıkan sanal dünya oyun platformu Minecraft ve 2016 yılında artırılmış gerçeklik tabanlı Pokemon Go oyunu Metaverse teknolojisinin tarihsel gelişimindeki mihenk taşları olarak görülmektedir (Lee vd., 2021). Söz konusu platformlara gösterilen yoğun ilgi sonucu kullanıcılar yakın geçmişte, Sandbox, Roblox ve Decentraland gibi oyun ve sosyalleşme tabanlı birçok etkileşimli sanal evrenle tanışmış; ancak Metaverse kavramının tam anlamıyla gündeme gelmesi Facebook'un kurucusu Mark Zuckerberg'in şirket adını Meta olarak değiştirmesi sonucunda gerçekleşmiştir. Zuckerberg, internetin "yeni nesli" olarak tanımladığı Metaverse ortamlarının, önümüzdeki 5 ila 10 yıl içinde ana akım bir teknoloji haline geleceğini ve fiziksel gerçekliğimizin dijital evrenle birleşeceğini belirtmiştir (The Verge, 2021).

Metaverse teknolojisinin gelişim sürecinde yukarıda bahsi geçen tarihsel gelişmelerin yanı sıra, bu fikri mümkün kılacak altyapı ve ilgili teknolojilerde kat edilen gelişmeler önem arz etmektedir. İlgili alanyazında, beşinci nesil (5G) ve altıncı nesil (6G) kablosuz ağ ortamlarının Metaverse teknolojisinin iletişim temelini mümkün kılacağı belirtilmektedir (Ning vd., 2022; Masaracchia vd., 2024). Öte yandan Metaverse ortamlarının oluşturulmasında ve kullanılmasında, sanal, artırılmış ve karma gerçeklik teknolojilerinden sıklıkla bahsedilmektedir (Anderson ve Rainie, 2022; Güler ve Savaş, 2022; Mystakidis, 2022). Örneğin, Metaverse ortamı geliştirme yarışına dahil olan Microsoft, karma gerçeklik gözlüğü HoloLens aracılığıyla erişilebilecek bir Metaverse tasarımı üzerinde çalışmaktadır (Sparkes, 2021). Nitekim fiziksel dünya ile sanal dünyanın yakınsanmasında söz konusu teknolojiler ile geliştirilmiş gözlük, başlık ve kıyafet gibi giyilebilir teknolojilerden faydalanılmaktadır (Savut, 2023). Bu teknolojilerin yanı sıra, Metaverse ortamlarına masaüstü ve akıllı telefon uygulamalarıyla erişim de mümkündür. Şu an sadece Amerika Birleşik Devletleri'nde beta sürümü kullanıma açık olan Meta'nın Horizon Worlds evrenine bilgisayar ve akıllı telefonlar üzerinden erişilebilmektedir. Bir yandan bu erişim seçeneklerinin tercih edilmesinde sanal, artırılmış ve karma gerçeklik donanımlarının maliyeti yüzünden henüz yaygın olarak kullanılmamasının etkili olduğu belirtilirken (Alkan ve Bolat, 2022); diğer yandan gelecekteki Metaverse ortamlarının bu teknolojilerin de yaygınlaşmasını sağlayacağı düşünülmektedir (Artsın ve Sezer, 2022). İlgili teknolojiler bağlamında ayrıca, yapay zeka, blokzincir, nesnelerin interneti (Güler ve Savaş, 2022) ve dijital ikiz teknolojilerinin (Ning vd., 2021) Metaverse ortamının bileşenlerini oluşturduğu belirtilmektedir. Ortam tasarımında kritik bir teknoloji olarak ifade edilen yapay zeka teknolojisinin, gerçek dünyayı sanal nesnelere bağlamaya (Pearlman vd., 2021) ve avatarların otonom hareket etmelerini sağlamaya imkan tanımada etkili olacağı ifade edilmektedir (Damar, 2021b). Bununla birlikte yapay zeka ve blokzincir teknolojilerinin entegrasyonu, daha güvenli ve sistematik bir Metaverse ortamı ekonomisi için gerekli görülmektedir (Koçak, 2023; Truong vd., 2023). Öte yandan gerçek dünyanın ayna görüntüsünün oluşturulmasında (Ning vd., 2021) ve kullanıcıların fiziksel görüntüsünün, davranışlarının ve hatta mimiklerinin kopyalanmasında dijital ikiz teknolojisine ihtiyaç vardır (Demir ve Değerli, 2022). Sonuç olarak, Metaverse teknolojisi yakın zamanda hızlı bir şekilde gelişim gösterecek olan bu ilgili teknolojileri birbirine bağlayabilen çekirdek bir teknoloji olarak düşünülmektedir (Mete, 2022).

Gerçekliğin siber alanla tamamen entegre olduğu yeni bir çağı temsil eden Metaverse fikri, ortaya atıldığı ilk günden bu yana teknoloji meraklıların, fütüristlerin ve bu kavramla yeni tanışan pek çok kişinin ilgisini çekmiştir. İlk versiyonları göz önünde bulundurulduğunda aslında uzun bir geçmişe sahip olan Metaverse, bugün teknolojik gelişmeler çerçevesinde güncel teknolojiler arasında yer almakta, ancak bu ortamların kullanımının yakın gelecekte yaygınlaşacağı düşünülmektedir. Metaverse, henüz emekleme aşamasında olmasına rağmen, sahip olduğu özellikler bağlamında hemen hemen her alanda büyük dönüşümlere kapı aralamaktadır (Mete, 2022). Bu alanlardan biri de hiç şüphesiz eğitim olacaktır (Damar, 2021a; Kye vd., 2022; Ning vd., 2022).

Fiziksel ve dijital deneyimleri bir araya getiren kesintisiz etkileşim olanağı ile Metaverse teknolojisi eğitim bağlamında yeni bir öğrenme ortamı sunmaktadır. Nitekim Metaverse bağlamında gerçekleştirilen mevcut çalışmalar, bu ortamların geleneksel ve özellikle uzaktan eğitim alanında güçlü yönleri ve zayıf yönlerinin, fırsat ve tehditlerinin neler olabileceğine (Artsın ve Sezer, 2022; Damar, 2021b), olumlu ve olumsuz ne tür etkilerinin gözlemlenebileceğine (Akpınar ve Akyıldız, 2022; Altundal, 2022; Göçen, 2022), bu ortamlarda hangi eğitim türlerine yer verileceğine ve öğreticinin rolünün ne olacağına (Yaldız ve Kurubacak, 2022) ilişkin birçok öngörüye yer vermektedir. Bu öngörüler yakın gelecekteki Metaverse örneklerinin açık ve uzaktan öğrenme bağlamında kullanımına yönelik ipuçları sunmaktadır. Öte yandan, gerçek dünyanın üç boyutlu sanal gerçeklikle taklit edildiği,

avatarlarla temsil edilen çok kullanıcılı ve etkileşimli ortamlar olarak tanımlanan (Demirbağ, 2020) ve Metaverse teknolojisinin ilk versiyonları olan üç boyutlu sanal dünyalar, 20 yılı aşkın bir süredir uzaktan eğitim alanında varlık göstermektedir. Tanımda yer alan özellikleri bağlamında, Second Life, OpenSim ve Active World gibi üç boyutlu sanal dünyalar üzerinde oluşturulan öğrenme ortamları üzerinde gerçekleştirilen çalışmalar, bu ortamların açık ve uzaktan öğrenmede etkili bir araç olduğunu göstermektedir (Dickey, 2003; Duncan, Miller ve Jiang, 2012; Ghanbarzadeh ve Ghapanchi, 2018; Inman, Wright ve Hartman, 2011). 2000'li yılların başlarında sahip olunan teknolojik imkanlar ile geliştirilen sanal dünyaların etkinliğine bakıldığında, günümüz teknolojik altyapısı ile geliştirilecek Metaverse ortamlarının yakın gelecekte açık ve uzaktan öğrenme uygulamalarını farklı bir boyuta taşıyacağı söylenebilir.

İlgili alanyazında her ne kadar Metaverse teknolojisinin uzaktan eğitim bağlamında kullanımına ilişkin ipuçları sunan güncel araştırmalara (Artsın ve Sezer, 2022; Damar, 2021b; Kye vd., 2022; Ning vd., 2022; Yaldız ve Kurubacak, 2022) ve bu teknolojinin ilk versiyonları olan üç boyutlu sanal dünyalara ilişkin geçmiş çalışmalara (Dickey, 2003; Duncan vd., 2012; Inman vd., 2011; Jarmon vd., 2009) rastlansa da, açık ve uzaktan öğrenmede Metaverse teknolojisinin potansiyel geleceğine yönelik büyük resmi görebilmek için kapsamlı ve bütüncül öngörülerin sunulmasına ihtiyaç olduğu görülmektedir. Bu noktada çalışmada, literatürde dağıtık bir şekilde yer alan Metaverse konulu çalışmalardaki ipuçlarından yola çıkarak öngörülerde bulunmak ve sunulacak olan öngörüler kapsamında, açık ve uzaktan öğrenmede Metaverse uygulamalarına yönelik bir gelecek senaryosu geliştirmek amaçlanmaktadır.

Yöntem

Çalışmanın amacı kapsamında, gelecekte metaverse ortamlarının açık ve uzaktan öğrenme bağlamında kullanımına ve olası uygulamalarına ilişkin öngörüler sağlama, erken sinyallerin keşfedilmesi ile mümkündür. Bu doğrultuda çalışmada, bir sinyal arayışı olarak görülen ve potansiyel olarak önemli gelişmelerin erken işaretlerini tespit etmek için sistematik bir bakış açısı olarak tanımlanan (Cuhls, 2020) ufuk taraması yöntemi kullanılmıştır. Bu yaklaşım genellikle teknolojilerin erken yaşam döngüsünü, yani pazara sunulmadan önceki benimsenme aşamasını hedefler, ancak daha geniş eğilimleri, zorlukları ve fırsatları da tarayabilir (Hines vd., 2019). "Gelecek şeylerin" önemini değerlendirmeye hizmet eden ufuk taraması; ileriye dönük, prospektif veya öngörücü faaliyetlerde önemli bir role sahiptir (Cuhls, 2020). Aynı zamanda, senaryo geliştirme sürecini beslemek için gelecekle ilgili varsayımları belirlemenin ve değerlendirmenin bir yolu olarak görülmektedir (Cuhls, 2020; Tunalı ve Kiraz, 2017).

Ufuk taraması, gelecekteki ilgili gelişmelerin detaylandırılması ve karar alma süreçleri için eyleme geçirilebilir çıkarımların türetilmesi için potansiyel taşıyan gözlemlerin toplanması ve sentezlenmesi yoluyla yaratıcı bir kolektif anlam oluşturma süreci olarak değerlendirilmektedir (Könnölä vd., 2012). Brown ve diğerlerine (2005) göre, ufuk taraması yöntemi; literatür taraması, yayın tarama ve literatürün değerlendirilmesi aşamalarından oluşur. Bu doğrultuda çalışmada, Metaverse teknolojisine ilişkin ilgili alanyazındaki kaynaklar taranmış ve elde edilen bulgular gelecekteki açık ve uzaktan öğrenme uygulamaları bağlamında değerlendirilerek öngörülerde bulunulmuştur. Ayrıca ortaya konulan öngörüler ışığında hikayeleştirilmiş bir gelecek senaryosuna yer verilmiştir.

Bulgular ve Yorumlar

Lee'ye (2021) göre, bilgi ve iletişim teknolojilerinde her on yılda bir paradigma değişimi yaşanmaktadır. Bilgisayar ile iletişim paradigması 1990'larda ortaya çıkmış; bunu, 2000'lerde web, 2010'larda mobil cihazlar ve 2020'lerde Metaverse izlemiştir. Bu yeni paradigmaya ilişkin üç farklı senaryo ortaya atılmıştır. Buna göre, Metaverse insanların günlük yaşamlarında ara sıra ziyaret edecekleri basit bir sosyal medya ortamı olacağı, sadece eğlence ve bazı sıradan işler için kullanılabilecek birkaç Metaverse ortamı olacağı ya da insanların çoğu işini bu ortam üzerinden yürüttüğü tek ve büyük bir Metaverse platformu olacağı öngörülmektedir (Deloitte, 2022). Bireylerin bir yeniliği ne kadar zamanda benimseyeceği ve bu yeniliğin getireceği değişime istekli olup olmayacağı farklılık göstermektedir (Rogers, 1995). Bu sebeple Metaverse teknolojisinin yaygınlaşma sürecindeki farklı dönemlerde yukarıda bahsedilen senaryoların tümüne şahit olunabilir. Nitekim teknolojik gelişmelerin süreçlerine ilişkin öngörülerde bulunan kaynaklardan biri olan Gartner Şirketi, Metaverse teknolojisinin birbiriyle örtüşen üç evrede gelişeceğini ve 2030'dan önce tam olarak olgunlaşmayacağını belirtmektedir (Gartner, 2022). Bu noktada araştırma kapsamında Metaverse teknolojisine ve açık ve uzaktan öğrenme bağlamında kullanımına ilişkin elde edilen öngörüler, gelecek beş, on ve yirmi yıl şeklinde üç farklı zaman dilimine yönelik sunulmuştur.

Gelecek Beş Yıl İçerisinde Metaverse Teknolojisi

Şu anda Metaverse teknolojisinin ilk ortaya çıkış aşamasında olunduğundan çoğunlukla "premetaverse" çözümler geliştirilmektedir (Gartner, 2022). Bu çözümlerin genellikle altyapı çalışmaları ile ilişkili olduğu söylenebilir. Henüz emekleme aşamasında olan Metaverse teknolojisinin tam anlamıyla deneyimlenebilmesi için güçlü bilgisayarlara ve hızlı internet altyapısına ihtiyaç duyulmaktadır (Helou, 2021; Herath vd., 2024). Beş yIl içerisinde 5G ve 6G gibi yüksek internet hızının yaygınlaşması durumunda Metaverse teknolojisinin altyapı problemleri çözülebilir. Nitekim 2024 ve 2027 yılları arasında altyapıdan ziyade, Metaverse ortamlarının içeriğine odaklanılacağı öngörülmektedir (Gartner, 2022). Bu aynı zamanda sanal ortamların yaratılmasına ilişkin araç ve teknolojilerin ön plana çıkmasına ve nitelikli insan gücü ihtiyacının artmasına neden olacaktır. Mevcut durumda Metaverse teknolojisinin gelişim sürecinin yeni kariyer imkanlarını ve henüz deneyimlenmemiş yeni uzmanlık alanlarını beraberinde getirmesi beklenmektedir (Koçak, 2023; Kuş 2022). Örneğin, halihazırda bilişim alanındaki özel eğitim kurumları tarafından sunulan ve minimum iki yıllık eğitim sürecini kapsayan Metaverse mühendisliği eğitimi, ilerleyen yıllarda yükseköğretim kurumlarında yer alabilir.

Metaverse ortamlarının ilk örneklerine bilgisayar ve akıllı cihazlar aracılığıyla erişilebilmektedir. Sanal gerçeklik, artırılmış gerçeklik ve karma gerçeklik teknolojileri ile ilişkilendirilen Metaverse teknolojisinin, söz konusu teknolojilerle geliştirilen donanımların maliyetleri ve uzun süreli kullanımda yol açtıkları fiziksel problemler nedeniyle henüz yaygın olarak kullanılmadığından, gelecek beş yıl içerisindeki Metaverse ortamlarının çoğunlukla masaüstü ve akıllı telefon uygulamaları üzerinde yer alacağı söylenebilir. Özellikle akıllı telefonların Metaverse ortamlarına erişmede ön planda olacağı, sanal gerçeklik ve artırılmış gerçeklik donanımlarının kullanımının zaman içerisinde artış göstereceği, ancak bu donanımların yaygınlaşmasının 10 yıldan önce beklenmediği belirtilmektedir (Raz-Fridman, 2022). Metaverse ortamlarının uygulama tabanlı olması beklenen bu ilk örneklerinin, 2027 yılına kadar erken ve geç çoğunluk tarafından benimseneceği; 2028 yılına kadar ise kalanlar tarafından da kullanımının yaygınlaşacağı öngörülmektedir (Gartner, 2022). Bununla birlikte, 2025 yılından sonra artırılmış ve karma gerçeklik donanımları ile daha gelişmiş Metaverse ortamlarının örneklerinin ortaya çıkması beklenmektedir (Gartner, 2022). Nitekim, yapay zeka, genişletilmiş gerçeklik, 6G ve blokzincirindeki son teknolojik adımlar, Metaverse'i gerçekleştirmeye daha da yaklaştırıyor ve yavaş yavaş bilim kurgudan yakın bir gerçekliğe dönüştürüyor (Otoum vd., 2024; Zawish vd., 2024).

Metaverse teknolojisi şu anda erken benimseyenler tarafından kullanılmakta ve bu kullanıcılar henüz düzenlenmemiş, standartlaştırılmamış veya yeterince gelişmemiş süreçler etrafında toplanmaktadır (Deloitte, 2022). Özellikle kişisel hak ve özgürlükler, kişisel verilerin gizliliği, mahremiyet gibi etik sorunlar ve paylaşım ekonomisinin güvenilir ve sistematik olmasına yönelik tartışmalar ön plana çıkmaktadır (Koçak, 2023; Todd vd., 2021; Yaldız ve Kurubacak, 2022). Henüz yasal bir düzenlemeye sahip olmayan Metaverse ortamlarının işleyişi ile ilgili politikalara ihtiyaç duyulmaktadır. Bu bağlamda birkaç yıl içerisinde Metaverse ortamlarına ilişkin hukuki bir düzen sağlanmaya çalışılabilir. Bununla birlikte, belirli şirketlerin Metaverse ortamlarının eşik bekçileri konumunda olması durumunda dijital bir yıkımla karşılaşılabileceğinden bahsedilmektedir (Tinworth, 2021). Benzer şekilde, gelişmiş ülkelerin teknolojik imkanları ile Metaverse dünyasında yer almaları, gelişmekte olan ülkeler ile aralarındaki dijital uçurumun boyutlarını artıracağı düşünülmektedir (Helou, 2021; Shen, 2021). Bu bağlamda gelecek beş yıl ve hatta daha uzun bir süreçte Metaverse teknolojisine erişimde fırsat eşitliğinin sağlanılamayacağı; yalnızca belli sosyo-ekonomik düzeye sahip ülke ve kullanıcılar tarafından kullanılabileceği öngörülmektedir (Yaldız ve Kurubacak, 2022). Söz konusu endişeler, açık ve uzaktan öğrenmenin temel unsularından olan açıklık, eşitlik ve erişilebilirlik kavramları çerçevesinde değerlendirildiğinde, Metaverse teknolojisinin açık ve uzaktan öğrenme bağlamında kullanımının gelecek beş yıl içerisinde her öğrenenin erişebileceği bir öğrenme ortamı vadetmediği söylenebilir.

Metaverse teknolojisinin gelişmesi ve çoğunluk tarafından erişilebilir olması zaman alacak olsa da, pazar liderleri bu teknolojinin olgunlaşmasını beklememektedir (Gartner, 2022). Bu teknolojiye yatırım yapan sektörler incelendiğinde, %17 ile bilişim şirketlerinin ve %12 ile eğitim kuruluşlarının ilk sıralarda yer aldığı görülmektedir (Statista, 2022). Buna göre eğitim kuruluşlarının Metaverse tabanlı bir eğitim sürecine uyum sağlamaya çalıştığı söylenebilir (Akkaya ve Şengül, 2022, Herath vd., 2024). Nitekim ABD'nin Florida eyaletinde bir okul, COVID-19 pandemisi sonrasında uzaktan eğitim ihtiyaçları için Ağustos 2022'den itibaren Metaverse ortamında sanal bir okul kuracaklarını açıklamış (Euronews, 2022) ve Stanford Üniversitesi gibi yükseköğretim kurumları yabancı dil ve tıp eğitimini Metaverse ortamlarındaki sanal kampüslere taşımıştır (Andrews vd., 2019; Ogles, 2021). Sanal okullar ve kampüslere en hızlı giriş yapacak eğitim kurumlarının yükseköğretim kurumları olduğu düşünülmektedir (Göçen, 2022). Bu durumda yükseköğretim kurumlarının gelecek beş yıl içerisinde bu alanda çalışmalar yaparak, Metaverse dünyasına adım atmaya hazır hale gelmeleri gerekmektedir (Inceoglu ve Ciloglugil, 2022). Metaverse altyapısına ilişkin gerekli teknolojiler ve mimariler henüz yeterince gelişmediğinden, açık ve uzaktan öğrenme bağlamında kitlesel boyutta öğrenenin, Metaverse teknolojisi ile geliştirilecek eğitim ortamlarından faydalanması için ciddi altyapı çalışmalarına ihtiyaç vardır (Yaldız ve Kurubacak, 2022). Gelecek beş yıl içerisinde Metaverse ortamlarının açık ve uzaktan öğrenme ekosisteminin bir parçası olan öğretim yönetim sistemlerine gömülmesine ilişkin çalışmalar yapılabilir. Bununla birlikte, Metaverse ortamında açık ve uzaktan öğrenme uygulamaları yürütecek olan kurumların hem öğretenlere hem de öğrenenlere yönelik bir yol haritası

hazırlaması; ihtiyaç duyulacak olan her türlü desteğe yönelik kanallar ve hatta insan gücüne sahip olması gerekmektedir. Gelecek beş yıllık süreç içerisinde Metaverse ortamında açık ve uzaktan öğrenme uygulamalarının kitlesel olarak deneyimlenmesi beklenmemekte; ancak söz konusu planlamaların yapılmasının açık ve uzaktan öğrenme uygulamaları gerçekleştiren kurumların Metaverse ortamına geçiş sürecini kolaylaştıracağı düşünülmektedir.

Gelecek On Yıl İçerisinde Metaverse Teknolojisi

Citigroup (2022) tarafından yayınlanan rapora göre, Metaverse pazarının 2030'a kadar 8 ila 13 trilyon dolar arasında bir büyüme göstereceği ve 5 milyar kullanıcının aktif olarak bu ortamları kullanacağı öngörülmektedir. Benzer şekilde Gartner (2022), 2028-2029 yıllarında gelişmiş Metaverse ortamlarının erken ve geç çoğunluk tarafından benimseneceğini, ancak kalanların 2030 ve sonrasında bu ortamda yer alacağını öngörmektedir. Gelecek on yıl içerisinde giyilebilir teknolojiler, yapay zeka ve blokzincir gibi teknolojilerdeki gelişmelerin gelişmiş Metaverse ortamlarının tasarımına yansıyacağı düşünülmektedir. Bu gelişmelerin eğitim süreçlerine de yansıması söz konusudur. Metaverse ve sunduğu genişletilmiş gerçeklik ve yapay zeka gibi teknolojilerin öğrenmeyi kolaylaştırması beklenmektedir. Nitekim sanal gerçeklik ve artırılmış gerçeklik teknolojileri ile desteklenen Metaverse ortamları, uzaktan öğrenenlerin buradalık algısını artıracak (Georgiou, vd., 2021; Hite vd., 2019); içerik, çevre ve diğer öğrenenlerle etkileşimini artırarak gerçekçi bir öğrenme deneyimi yaşamalarını sağlayacaktır (Jovanović & Milosavljević, 2022). Bu bağlamda gelecek on yıl içerisinde Metaverse ortamlarındaki açık ve uzaktan öğrenme uygulamalarında giyilebilir teknolojilerin yer alacağı öngörülmektedir. Teknolojik araçların çeşitliliği ve etkinliği öğrenen motivasyonunu artırarak açık ve uzaktan öğrenme ortamlarında çığır açabilir.

Gelecek beş yıl içerisinde Metaverse teknolojisinin altyapı ve içerik bağlamında gelişim süreçlerine odaklanan eğitimlerin ve mesleklerin ortaya çıkması beklenirken, gelecek on yıl içerisinde Metaverse ortamlarına uyarlanacak veya ortaya çıkacak yeni mesleklerden bahsedilebilir (Hollensen vd., 2023). Örneğin; avatar stilistleri, sanal yatırım uzmanları, sanal tur rehberleri, Metaverse avukatları veya Metaverse pazarlama uzmanları gibi meslekler ortaya çıkabilir (Ma, 2021). Benzer şekilde eğitim alanındaki rollerin de değişime uğraması beklenmektedir. Buna göre öğretenlerin rolü içerik üreticisine dönüşebilir (Yaldız ve Kurubacak, 2022) ve içerikle kendi kendine etkileşim kuran öğrenenlerin formal öğrenme sürecine olan ihtiyacı azalabilir. Bu durum, sadece Metaverse ortamlarında varlık gösteren eğitim kurumlarının ortaya çıkmasına ön ayak olabilir; diploma ve sertifikalar yerini, rozetler gibi dijital göstergelere bırakabilir. Böylece gelecek on yıl içerisinde Metaverse ortamında açık ve uzaktan öğrenme uygulamalarında ilerleme katedileceği öngörülmektedir. Metaverse ortamında daha çok uzaktan öğrenenin yer alması beklenmektedir; ki bu da Anderson'un (2003) öğrenen-öğrenen, öğrenen-içerik, öğrenen-öğreten ve öğrenen-yapı etkileşim türlerini dönüşüme uğratabilir (Artsın ve Sezer, 2022). Örneğin, öğrenen-içerik etkileşiminin, Metaverse ortamında öğrenen-avatar-dijital içerik etkileşimine dönüşmesi mümkündür (Akpınar ve Akyıldız, 2022).

Meta'nın kurucusu Mark Zuckerberg, Metaverse ortamın önümüzdeki 5 ila 10 yıl içinde ana akım bir teknoloji haline geleceğini ve fiziksel gerçekliğimizin dijital evrenle birleşeceğini belirtmiştir (The Verge, 2021). Bu dijital evren günlük işlerin çoğunun gerçekleştirilebileceği bir ayna dünya vadetmektedir. Güney Kore hükümeti başkent Seul'u Metaverse ortamına taşıyan ilk ülkelerden biridir. Belediyeler gibi kamu hizmet binalarının dijital ikizlerine yer verilen projede, vatandaşların resmi işlemleri Metaverse ortamında gerçekleştirebileceği belirtilmektedir. Bununla birlikte, şehrin tahrip olmuş tarihi mekanlarının sanal ortamda yeniden inşası sağlanarak, turistik geziler ve festivaller gibi birçok etkinliğin bu ortamda gerçekleştirilmesi planlanmaktadır (Smart Citites Connect, 2021). Öte yandan kullanıcıların dijital ikizlerinin bir dijital kimliğe sahip olması söz konusu olabilir. Geçtiğimiz yıllarda MP Jordan Metaverse ortamında sanal bir mağaza açan ilk banka olmuştur (Tayal vd., 2022). Gelecek on yıl içerisinde alışveriş, konser, kamu işlemleri, banka işlemleri gibi gündelik faaliyetlerin tamamen Metaverse ortamına taşınması beklenmektedir. Bu durum, tüketimi dijital ve sanal formlara kaydıracak ve para, eşya ve mülkiyet algısını büyük ölçüde değiştirecektir. Kripto para birimleri ve NFT teknolojisi sayesinde yeni bir ekonomik anlayışın geliştiği Metaverse ortamları, yeni mülkiyet türleri sunacak (David ve Won, 2022) ve kullanıcıların avatarları için tasarım kıyafetler veya özgün bir tablo satın alması gibi yeni sosyal statü göstergeleri ortaya çıkacaktır (Kuş, 2022). Burada, geçtiğimiz yıllarda Roblox sanal platformunda Gucci marka bir çantanın gerçek hayattakinden daha fazla bir fiyata satılması örnek verilebilir (Howcroft, 2021). Bu bağlamda Metaverse teknolojisinin gelecek on yıl içerisinde toplumsal dinamikleri büyük ölçüde dönüşüme uğratması beklenmektedir. Öte yandan Metaverse ortamlarının yaygınlaşmasıyla dijital şiddet ve siber zorbalık bağlamında olumsuz durumlarla daha fazla karşılaşılabilir. Hatta avatarlar üzerinden taciz, hile ve dolandırıcılık faaliyetleri görülebilir. Bu sebeple açık ve uzaktan öğrenme ortamlarında özellikle küçük yaştaki uzaktan öğrenenlere yönelik düzenlemelere ihtiyaç olacağı söylenebilir. Gelecek on yıl içerisinde yaygınlaşması beklenen Metaverse teknolojisinin beraberinde getireceği diğer bir endişe ise sağlık problemleri ile ilişkilidir. Metaverse

ortamlarında geçirilen süre artıkça hareketsiz kalan bireylerde obeziteden, kas ve iskelet sistemleri hastalıklarına kadar çeşitli sağlık problemlerinde artış görülebilir.

Gelecek Yirmi Yıl ve Ötesi Metaverse Teknolojisi

Teknoloji yenilikçileri, geliştiriciler, iş ve politika liderleri ve araştırmacılardan oluşan toplam 624 kişiyle gerçekleştirilen bir araştırmada katılımcıların %54'üne göre, Metaverse 2040 yılına kadar dünya çapında yarım milyar veya daha fazla insan için çok daha gelişmiş, sürükleyici ve iyi işleyen bir yapıya sahip olacaktır (Anderson ve Rainie, 2022). Bununla birlikte katılımcılar 2040 yılına kadar bireylerin günlük yaşamlarında artırılmış ve karma gerçeklik araçlarını tamamen benimseyeceklerini belirtmektedirler (Anderson ve Rainie, 2022). Öte yandan, uzak gelecekte Metaverse teknolojisinin üçüncü evresi olan cihazlardan bağımsız, akıllı ve gelişmiş sanal asistan katmanlarıyla geliştirilecek olgunlaşmış Metaverse ortamlarının ortaya çıkacağı öngörülmektedir (Gartner, 2022). Bu doğrultuda gelecek yirmi yıl ve ötesinde Metaverse teknolojisinde ileri düzey gelişmeler görüleceği, fiziksel ve sanal dünya arasındaki sınırların fazlasıyla belirsizleşeceği söylenebilir (Ortega-Rodriguez, 2022). Bu durum, Metaverse teknolojisinin yaygınlaşmasıyla ortaya çıkması beklenen insanların kendi benliklerini unutması, kültürel yozlaşma ve ütopik bir kültür anlayışı (distopya) endişelerini (Ocak vd., 2022) gündeme getirebilir. Diğer yandan Metaverse ortamında uzun süre bulunmanın sonucunda ancak gelecekte tanımı yapılabilecek yeni ruh hastalıklarının ortaya çıkması beklenmektedir (Usmani vd., 2022).

Eğitim bağlamında Metaverse teknolojisinin, gerçek dünyanın her yerinden gelen verileri kullanarak tüm dünyayı bir sınıf haline getirme potansiyeline sahip olduğu düşünülmektedir (Ocak vd., 2022). Bu potansiyelden yola çıkarak gelecek yirmi yıl ve ötesinde öğrenmenin tanımının değişebileceği öngörülmektedir. Formal öğrenme süreçlerinin komple bırakılması söz konusu olabilir. Bu durum, henüz öngörülemeyen öğrenme yaklaşımlarıyla sadece informal düzeyde kesintisiz açık ve uzaktan öğrenmenin gerçekleştiği bir geleceğe işaret edebilir. Nitekim düşünce aşamasındaki teknolojilerle birlikte teknolojik tekilliğe ulaşılması durumunda, Metaverse teknolojisinin gelecek yirmi yıl içerisinde yerini elektronik cihazlardan bağımsız yeni ileri düzey teknolojilere bırakabileceği öngörüldüğünden, açık ve uzaktan öğrenme uygulamalarının farklı teknolojilere taşınması ve hatta her zaman her yerde öğrenmenin (ubiquitous learning) tam anlamıyla gerçekleştirilebileceği söylenebilir.

Sonuç

Yeni nesil İnternet için bir paradigma olan Metaverse şu anda geliştirilme aşamasındadır. Metaverse teknolojisi beklenen evreler gerçekleştiğinde, zaman ve mekandan bağımsız sahip olduğu avantajlar ile açık ve uzaktan öğrenmede önemli bir kilometre taşı olacağı düşünülmektedir (Yaldız ve Kurubacak, 2022). Bu bağlamda çalışmada, ilgili alanyazındaki kaynaklar taranarak, Metaverse teknolojisi ve açık ve uzaktan öğrenme uygulamalarındaki varlığına ilişkin gelecek beş, on ve yirmi yıllık dönemlere ilişkin öngörülerde bulunmak amaçlanmıştır. Bu bölümde söz konusu öngörüler ışığında geliştirilen hikayeleştirilmiş bir gelecek senaryosuna yer verilmiştir.

Geçmişi Ölümsüz Kılan Yarınlar

29 Ekim 2044

Deniz altüst ettiği odasında PM-5'ini ararken, dışarıdan korna sesi bir kez daha yükseliyordu. *"Her neyse anneminkinden bakarım"* diye geçirdi içinden ve koşar adımlarla dış kapıya yöneldi. Arabaya biner binmez *"Tamam geldim geldim, PM-5'imi bulamadım ne yapayım, bugün arkadaşlarla tarih meta evreninde eş zamanlı buluşma ayarlamıştık, ama saatini hatırlamıyorum"* dedi. Neyse ki yapay zeka destekli taşınabilir hafızaların son sürümünde ebeveynler için çocuklarının PM'lerine ulaşabilme özelliği getirilmişti. Pelin hanım bir yandan yola koyulurken, diğer yandan bileğindeki hafızasına seslendi: "*Pelo Deniz'in hafizasından saat kaçta tarih meta evreninde olması gerektiğine bakar mısın lütfen?"* PM-5 Pelin hanımın sesiyle tıpa tıp aynı tonda *"Merhaba Pelin, Deniz'in bugün saat 11.00'de tarih meta evreninde eş zamanlı buluşması var"* dedi. Deniz unutmamak için saati içinden birkaç kere tekrar etti. Taşınabilir hafızalar piyasaya sürüldüğünden beri kitapların, defterlerin hatta kalemlerin bile üretimi durdurulmuştu. İnsanların randevuları, doğum günleri veya yıldönümleri gibi önemli şeyleri not etmesine gerek yoktu artık. PM-5 gibi yapay zeka teknolojisi ile geliştirilen akıllı hafızalar bunu sizin yerinize hallediyordu. Üstelik kağıt üretimine gerek kalmadığından dünya yeniden yemyeşil oluyordu.

Pelin hanım eski, bakımsız ancak sıcacık bir havası olan evin önünde durdu. Bahçede oturan yaşlı adam sallanan sandalyesinde doğrulup arabaya doğru el salladı. Deniz "*İşte dedem! Beni bekliyor"* diyerek arabadan hızla indi ve yaşlı adama doğru koşmaya başladı. Pelin hanım camını aralayıp *"İşten çıkar çıkmaz gelirim, selam baba! Size iyi eğlenceler"* diye seslendi. Kemal amca arabaya doğru el sallarken bir yandan Deniz'le kucaklaşıyordu. "Yavaş oğlum, görüşmeyeli sadece iki gün oldu, amma özlemişsin beni" dedi hırıltılı ama neşeli bir sesle. Deniz *"Geçen hafta senin için bulduğum o eski kitabı dinlemeye devam edelim mi dede?"* diye sorarak çantasını karıştırmaya

başladı. Eskilerin e-kitap okuyucu tabletlerine benzeyen ama daha küçük, ince ve saydam olan OER-Player'ını çantasından çıkardı. Açık eğitim kaynaklarına geçildiğinden beri hem dinleme hem okuma özelliği olan bu cihazlar devlet tarafından öğrencilere ücretsiz temin ediliyordu. Böylece herkes istediği zaman, istediği yerden, üstelik maliyetsiz ve hiçbir kısıtlamaya maruz kalmadan kitaplara, araştırmalara, etkileşimli videolara veya genişletilmiş gerçeklikle tasarlanan eğitici oyunlara ulaşabiliyordu. Kemal amca bu gelişmelere ayak uydurmaya hala inat ediyordu. İlaç saatlerini hatırlatması için zar zor bir PM-3 kullanmaya ikna olmuştu. O evinde raflar dolusu eski kitapları, defterleri, laptopu ve hatta bir televizyonu olan nadir insanlardan biriydi. Artık kullanımda olmasa da televizyonunu odasının bir köşesinde süs olarak sergiliyor, sık sık Deniz'e eski televizyonlu günleri anlatıyordu.

Kemal amca ve Deniz her zaman yaptıkları gibi sıcak çikolata içip OER-Player'dan buldukları kitabı dinlerken saatler geçmişti. Akıllı ev sistemi saatin 11'e geldiğini söylediğinde Deniz hızla uzandığı koltuktan kalktı ve çantasına koştu. *"Dede benim tarih meta evrenine girmem lazım, bugüne özel çok merak ettiğim bir olayı yakından izleyeceğiz"* dedi. Kemal amca merakla sordu: *"Tarih meta evreni de ne? Daha neler çıkaracaklar?"* Elindeki aparatı tişörtüne yapıştıran Deniz bir yandan yeni kullanmaya başladıkları Metaverse sistemini dedesine anlatmaya koyuldu. Bu dijital evren tarihteki büyük olayların canlandırıldığı platforma öğrencilerin genişletilmiş gerçeklikle bağlanmalarını sağlayan, ancak eskisi kadar popüler olmayan bir Metaverse teknolojisiydi. Kemal amca her zamanki gibi burun kıvırsa da tarihe olan ilgisinden içten içe meraklanmıştı. *"İşte bugün 29 Ekim olduğu için Cumhuriyetin ilanını sanki ordaymış gibi izleyeceğiz dede. Ne dersin, çok heyecanlı değil mi? İstersen sen de katılabilirsin"* dedi Deniz elindeki fazladan avatar kopyalama aparatı ile şakaklara yapıştırılan ve üzerine iki kere tıkladığında hologramlı bir gözlük formunu alan ufak Metaverse çipini göstererek. Kemal amca sandalyesinde doğruldu ve şaşkınlıkla *"Atatürk'ü görebilecek miyiz?"* diye sordu. *"Evet, heyecanlandın değil mi dede? Haydi birlikte girelim. Hem arkadaşlarım da orada olacak, onlara senden çok bahsettim. Seni görünce çok şaşıracaklar"* dedi Deniz kıkırdayarak. Kemal amca ne olduğunu anlamadan Deniz dedesinin gömleğine yapıştırdığı aparatı çalıştırdı. Bir anda mavi bir ışık Kemal amcanın bütün vücudunu taradı ve kayboldu. *"Dur oğlum dur, şimdi nasıl olacak bu? Tekrar nasıl buraya geleceğiz? O ışık da neydi?"* dedi korkuyla. Deniz bir yandan kıkırdamaya devam ederken diğer yandan kendi aparatını çalıştırdı "*Bak dede ben de yaptım, korkmana gerek yok vücudumuzun avatarını sisteme aktaran bir şey bu. İstediğimiz zaman şimdi şakaklarımıza yapıştıracağım bu düğmeye basıp meta evrenden çıkabiliriz. Şimdi düğmeye iki kere dokun ve platforma girelim, haydi dede!"*

Kulaklarında yalnızca durmadan alıp verdiği nefesinin ve hızla çarpan kalbinin sesini duyan Kemal amca sımsıkı kapattığı gözlerini açtığında karşısında Deniz'i görünce rahat bir nefes aldı. Deniz ve iki çocuk etrafı inceliyordu. *"Dede bunlar arkadaşlarım Aslı ve Ali. Çocuklar işte dedem! Yani dedemin avatarı"*. Kemal amca çocuklara gülümserken vücuduna şöyle bir baktı. Eksik bir şey olup olmadığından emin olmalıydı. *"Dede bak neredeyiz!"* dedi Deniz, eliyle az ilerideki eski bir binayı gösterirken. Kemal amca şaşkınlıkla *"Türkiye Büyük Millet Meclisi"* diye fısıldadı. Çocuklar binaya doğru koşarken Kemal amca bir yandan kocaman gözleriyle etrafı inceliyor, bir yandan da peşlerinden gidiyordu. İçeri girdiklerinde tam karşılarındaki salondan gelen o tanıdık sesi duydu: *"Efendiler teklifim şudur: Hakimiyet kayıtsız şartsız milletindir. Türkiye Devletinin yönetim şekli Cumhuriyettir."* Büyük bir alkış koptu. Çocuklar Atatürk'e bakarken birbirlerini dürtüyor, aralarında fısıldaşıyorlardı. Kemal amca ise donup kalmış, yaşlı gözlerle kürsüye bakıyor adeta nefes dahi almıyordu. *"Dede, iyi misin?"* Deniz kürsüyle Kemal amcanın arasına geçmiş el sallıyor, dedesinin dikkatini çekmeye çalışıyordu. *"Atam"* dedi Kemal amca titrek bir sesle, gözlerini Deniz'e doğru kaydırırken. *"Bu ne güzel bir şey!"*

Meclisin atmosferini, Atatürk'ün zeybek oynayışını, halkın coşkuyla gerçekleştirdiği kutlamaları ve o güne dair daha nice güzel anları sanki oradaymış gibi izleyen Kemal amca ve çocuklar oldukça keyifli zaman geçirmişlerdi. İnsanların akın ettiği sokakların bir köşesinde hep beraber toplanmış, Kemal amcaya peşi sıra hep bir ağızdan sorular sıralıyorlardı. *"Yani şimdi eskiden her 29 Ekim'de insanlar kendileri mi gösteri yapıyordu?"*, *"Yürüyüşler mi? Sen de katıldın mı Kemal amca?"*, *"Bize de zeybek öğretir misin?"*... Artık kutlamaların dijital gösterilerden oluştuğu 29 Ekim'de Kemal amcanın anlattıkları çocukları çok şaşırtmıştı. Günümüzde caddeleri kaplayan dev ekranlar, sağdan soldan çıkan hologramlı projeksiyonlar Türk Bayraklarıyla, havai fişeklerle, çoşkulu marşlarla donatılıyordu. Kemal amca yıllar sonra ilk kez sokaklara dökülen kalabalığa, bando takımının neşeli gürültüsüne, çocukların bayrak sallayışına, valslere, zeybeklere şahit olmuştu. Kırışmış yüzüne kondurduğu kocaman gülümsemesiyle *"İşte bayram!"* deyip durdu.

Pelin hanım döndüğünde Deniz koltukta uyuyakalmış, Kemal amca çalışma odasında kitaplara dalmıştı. *"Ben geldim! Neler yaptınız bakalım?"* Kemal amca elinde tuttuğu Nutuk'tan başını kaldırıp parıldayan gözlerle kızına baktı. *"Bugün, uzun zamandır geçirdiğim en güzel 29 Ekim"* dedi.

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Web Teknolojilerinin Yazmanın Duyuşsal, Güdüsel ve Öz İnançlarla İlişkili Değişkenleri Üzerindeki Etkisi: Bir Meta-Analiz Çalışması

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Özet

Duygular, güdüler ve öz inançlar yazma eylemini etkileyen önemli değişkenlerdir. Bu etkiye rağmen söz konusu değişkenlerin araştırma nesnesi olduğu bilimsel çalışmalar, beceri geliştirme odaklı yazma araştırmalarının niceliksel olarak gerisindedir. Birden fazla araştırmanın birlikte ele alındığı sistematik derleme çalışmalarında da benzer bir durum söz konusudur. Alan yazındaki meta-analiz ve meta-sentez gibi çalışmalarda ele alınan değişkenler çoğunlukla yazının niteliği, başarı ve beceri gibi değişkenlere odaklanmış durumdadır. Bununla birlikte web teknolojilerinin yazma süreç ve çıktılarına etkisinin incelendiği kapsamlı araştırmalarda da duyuşsal ve güdüsel değişkenlere ilişkin veriler oldukça sınırlıdır. Bu eksiklikten hareketle çalışmada; web teknolojilerinin duyuşsal, güdüsel ve öz inançlarla ilgili çeşitli değişkenler üzerindeki genel etkisinin tespit edilmesi amaçlanmıştır. Meta-analiz yönteminin kullanıldığı bu araştırmaya Türkiye'deki okullarda Türkçe dersi kapsamında yapılan yarı deneysel/deneysel çalışmalar dâhil edilmiştir. Bu çalışmaların etki büyüklüğüne ilişkin hesaplamalar, heterojenlik testleri, yayın yanlılığı ve moderatör analizleri Comprehensive Meta Analysis v3.0 (CMA) istatistik yazılımı kullanılarak gerçekleştirilmiştir. Çalışma sonucunda web teknolojilerinin yazmanın duyuş, güdü ve inanç değişkenlerini olumlu yönde ve orta düzeyde (g = .59) etkilediği belirlenmiştir. Moderatör analizinin sonuçları; bu etkinin yazma tutumu, kaygısı ve öz yeterliği çıktıları üzerinde benzer etkilere sahip olduğunu göstermiştir. Çalışma teknoloji-yazma psikolojisi bağlamında yorumlanabilecek ve uygulamaya dönük çıkarımlar yapmaya imkân verecek bulgular içermektedir.

Keywords: Web teknolojileri, yazma eğitimi, yazma güdüsü, duyuş, meta-analiz.

The Impact of Web Technologies on Affective, Motivational, and Self-Efficacy Variables in Writing: A Meta-Analysis Study

Abstract

Emotions, motives and self-beliefs are important variables affecting the act of writing. Despite this effect, scientific studies in which these variables are the object of research are quantitatively behind writing research focused on skill development. There is a similar situation in systematic review studies in which more than one study is considered together. The variables addressed in studies such as meta-analysis and meta-synthesis in the literature are mostly focused on variables such as quality of writing, achievement and skill. However, in comprehensive studies examining the effects of web technologies on writing processes and outcomes, data on affective and motivational variables are quite limited. Based on this deficiency, this study aims to determine the overall effect of web technologies on various variables related to affective, motivational and self-beliefs. Quasi-experimental/experimental studies conducted in Turkish schools in Turkey within the scope of Turkish course were included in this study in which meta-analysis method was used. The effect size calculations, heterogeneity tests, publication bias and moderator analyses of these studies were performed using Comprehensive Meta Analysis v3.0 (CMA) statistical software. As a result of the study, it was determined that Web technologies positively and moderately (g = .59) affected the affective, motivational and belief variables of writing. The results of the moderator analysis showed that this effect had similar effects on the outcomes of writing attitude, anxiety, and self-efficacy. The study contains findings that can be interpreted in the context of technology-writing psychology and allow for practical implications.

Keywords: Web technologies, writing instruction, writing motivation, affect, meta-analysis.

Giriş

Teknolojinin gelişmesi ve bu gelişmenin insan hayatını etkilemesi, eğitimde de yenilikçi yaklaşım ve uygulamaları beraberinde getirerek önemli bir değişimin önünü açmıştır. Akademik başarının önemli gerekliliklerinden biri olan

ve günlük iletişim, bilgi edinme, kendini ifade etme ve eleştirel düşünme gibi birçok alanda ihtiyaç duyulan temel beceriler arasında yer alan yazma da bu köklü değişimin gerçekleştiği alanlar arasında yer almaktadır. Bu değişimle birlikte öğrencilerin öğrenme eğilimlerine, alışkanlıklarına ve kültürlerine uygun; ilgi ve beklentilerini karşılayan ve nihayetinde yazma öğretiminde çok yönlü kazanımların elde edilmesini sağlayacak öğretim uygulamalarının belirlenmesi ve bu uygulamaların farklı öğretim ortamlarıyla bütünleştirilmesi çabası da belirli bir ivme kazanmıştır. Bunun bir sonucu olarak yazma eğitiminde teknolojinin kullanılmasını temel alan öğretim uygulamalarının repertuvarı genişlemiştir. Web teknolojilerinin öğrencilerin yazmaya yönelik farklı yetkinliklerinin geliştirilmesi amacıyla kullanılmasını öngören bu uygulamaların etkililiğinin belirlenmesi de çeşitli birincil araştırmaların ve sistematik incelemelerin konusu olagelmiştir.

Yaklaşık otuz yıldır teknoloji ve yazma üzerine yapılan incelemeler; ilköğretim yazma sınıflarında kelime işlemci, çevrimiçi araçlar veya programlar, mobil teknoloji ve yardımcı teknoloji olmak üzere temelde dört tür teknoloji entegrasyonu hakkında fikir vermektedir. Ne var ki bu incelemelerde yaygın olarak bildirilen hususlar öğrencilerin yazma performansları ile ilişkili olarak ele alınan yazma kalitesi ve miktarı olmuştur (Wen & Walters, 2022). Öğrenmenin çok boyutlu bir yapıya sahip olduğu ve tek başına bilişsel süreçlerle açıklanamayacağı gerçeği göz önünde bulundurulduğunda bu durum, yazma eğitimi açısından bir eksikliktir. Zira yazma; "çeşitli bilişsel bileşenlerin (yetenek, beceri, bilgi, strateji vb.) yanında bilişsel olmayan yapıları da içeren, belirli bir yer ve zamanla sınırlı olmayan ve teknolojik araçlar da dâhil olmak üzere tüm araçlar kullanılarak gerçekleştirilen bir etkinlik" (Lee & Stankov, 2012, s. 373) olarak tanımlanmaktadır. Bu bilişsel olmayan ya da tamamıyla bilişsel kavramlarla açıklanamayacak kavramların başında "güdü", "öz yeterlik", "kaygı" ve "tutum" gelmektedir.

Yazma güdüsü; kişilerin yazma durumlarını ve görevlerini sevip sevmemelerini, yazarken yaşanan duyguları, kişinin genel yazma yeteneği ve göreve özgü becerileri hakkındaki inançlarını, yazmanın algılanan değerini ve yazma hedeflerini kapsayan şemsiye bir terimdir (Abdel Latif, 2019). Yazma öz yeterliği ise öğrencilerin yazma görevlerini tamamlama becerilerine dair kendilerine duydukları güvenle ilgilidir (Zhang & Zhang, 2024). Bu güven duygusunun yakından ilişkili olduğu yapıların başında "kaygı" gelmektedir. Yapılan araştırmalar; yazma öz yeterliği yüksek olmayan kişilerin yüksek kaygı yaşama olasılıklarının daha fazla olduğunu, bu kişilerin yazma öz yeterlik inançları konusunda yalıtılmışlık hissine kapıldıklarını ve öğretmene bağımlı bir profil ortaya koyduklarını göstermektedir (Wachholz & Etheridge, 1996). Diğer bir yapı olan yazma tutumu ise yazma eyleminin yazara nasıl hissettirdiğini içeren, mutluluktan mutsuzluğa kadar değişen duygusal bir eğilimdir ve bu eğilim yazmaya atfedilen önem, yazma çabası ve performansı gibi kritik değişkenler üzerinde önemli bir etkiye sahiptir (Graham, Berninger, & Fan, 2007). Bu öneme rağmen alan yazında biliş dışındaki bu yapıların yazma süreçlerindeki önemini ve etkisini ortaya koyan çalışmaların yeteri kadar yer almadığı bilinmektedir. Bu durumun olası nedenleri arasında müfredatlarda duyuşsal alandaki gelişimin arka plana atılması ve merkezî sınavların bilgi ölçme odaklı bir anlayışla gerçekleştirilmesi gibi hususlar sayılabilir. Bu anlayışın bir uzantısı olarak da kapsamlı yazma meta-analizlerinde ve teknolojinin etkisinin araştırıldığı daha spesifik incelemelerde duyuşsal, güdüsel ve öz inançlarla ilişkili kaygı, öz yeterlik ve tutum gibi yapılar yeterince araştırılmamıştır. Örneğin Bertiz ve Baltacı (2023) tarafından web 2.0 araçlarının kullanımına yönelik olarak yapılan içerik analizinde çalışmaların %80'i akademik başarı değişkenini içerirken elde edilen bulguların yalnızca %4,5'lik bölümü öz yeterlikle ilgilidir. İncelenen 25 çalışma içinde yalnızca iki çalışmanın Türkçe öğretimi alanına ait olması da genel anlamda Türkçe öğretiminde web teknolojileriyle ilişkili çalışmaların gerekli ivmeyi yakalayamadığını ortaya koyması açısından dikkate değerdir. Bu noktada teknolojinin öğrencilerin yazma güdüleri, öz yeterlikleri, kaygıları ve tutumları üzerindeki genel etkisinin ortaya konulmasının alan yazına ve okullardaki yazma eğitimi yaklaşımlarına katkı sağlayacağı düşünülmektedir. Nitekim Muijs, Reynolds ve Kyriakides (2016) teknoloji uygulamalarının tüm çıktılar üzerindeki etkisinin dikkatle değerlendirildiği etkinlik odaklı bir yaklaşımın önemine dikkat çekmekte ve bunun hem alanın süregelen geçerliliği hem de eğitimcilerin eğitim teknolojisinin kullanımına ilişkin bilinçli seçimler yapabilmeleri için gerekli olduğunu vurgulamaktadır. Mevcut çalışmanın mevcut yazma meta-analizi literatüründe göz ardı edilen çıktılar konusunda farkındalık geliştirme ve yazma sorunlarına kanıt odaklı bir bakış açısıyla yaklaşma konusunda işlevsel olacağına inanılmaktadır.

Bu bağlamda araştırmanın amacı ve alt amacı şu şekildedir:

- Web teknolojilerinin yazmanın duyuşsal, güdüsel ve öz inançlarla ilgili çeşitli değişkenleri üzerindeki genel etkisi nedir?
- Web teknolojilerinin etkisi yazma öz yeterliği, tutumu ve kaygısı değişkenlerine göre anlamlı şekilde farklılaşmakta mıdır?

Yöntem

Bu araştırmada meta-analiz yöntemi kullanılmıştır. Meta-analizin genel olarak üç temel amacı bulunmaktadır. Bunlar çalışma sonuçlarının homojen olup olmadığını test etmek, incelenen ilişkinin etki büyüklüğüne ait güven aralığına ve istatistiksel anlamlılığına ek olarak genel bir indeks elde etmek ve çalışmalar arasında bir heterojenlik varsa heterojenlik sonucunu doğuran olası değişkenleri ve karakteristikleri belirlemektir (Huedo-Medina, Sánchez-Meca, Marín-Martínez ve Botella, 2006). Söz konusu amaçlar doğrultusunda bu meta-analiz çalışmasında izlenen uygulama adımları ve yapılan işlemler şu şekildedir:

Araştırma Stratejisi

Lisansüstü tez çalışmalarını tespit etmek için Yükseköğretim Kurulu Ulusal Tez Merkezi veri tabanında bir arama yapılmıştır. Yazarlar, açık erişim ve kurumsal arşiv bölümlerinde de konu ile ilgili tüm tezlerin başlıklarını, anahtar kelimelerini ve özetlerini aramışlardır. Makaleler için ise Google Akademik kullanılmıştır. Aramada «yaz-, teknoloji, web, çevrim, bilgisayar, dijital, motivasyon, güdü, öz yeterlik, kaygı, tutum» gibi anahtar kelimeler ve bunların çeşitli kombinasyonları kullanılmıştır.

Uygunluk Kriterleri

Meta-analize dâhil edilen çalışmalarda aranan uygunluk ölçütleri şu şekildedir: (i) Çalışmanın yazma öğretiminde teknoloji kullanımı kapsamında değerlendirilebilecek bir müdahale içermesi (farklı strateji, yöntem, teknik ve yaklaşımların öğrencilerin yazma çıktıları üzerindeki etkilerinin değerlendirildiği çalışmalar), (ii) belirli bir yazma müdahalesi alan bir grup öğrenciyi bu müdahaleye maruz kalmayan bir referans grubuyla karşılaştırması veya yazma müdahalesi alan bir grubun yazma öncesi ve sonrası çıktıları arasındaki farkı istatistiksel olarak raporlaması, (iii) meta-analiz için istatistiksel verileri (ortalama, standart sapma, örneklem büyüklüğü vb. raporlaması, (iv) müdahalenin Türkçe dersi ve yazma öğrenme alanı kapsamında olması, (v) müdahalenin normal bir okul/sınıf ortamında gerçekleşmesi, (vi) çalışmanın yüksek lisans/doktora tezi veya makale olarak raporlanması. Eğitim bilimleri dışındaki disiplinlerde yapılan, yabancı dil olarak İngilizce öğretimi alanına ait olan ve duyuş, güdü ve öz inançlar dışındaki bağımlı değişkenleri içeren çalışmalar araştırmanın dışında bırakılmıştır. Mükerrer çalışmalar (makale olarak yayımlanan tezler) tek bir çalışma olarak analize dâhil edilmiştir.

Kodlama Prosedürü ve Kodlayıcı Güvenirliği

Meta-analize dâhil edilen çalışmalar; çalışma özellikleri, sonuçlar ve çalışmaların ana bulguları/etki büyüklükleri temel kategorilerini içeren bir kodlama protokolü kullanılarak kodlanmıştır. Bu protokolde çalışmanın yazarı, yayım yılı ve türü gibi tanımlayıcı özellikler; örneklem büyüklüğü ve sınıf düzeyi gibi katılımcı özellikleri ve çalışmadaki müdahale (teknoloji yaklaşımı, stratejisi, yöntem, teknik) gibi bağlamsal özellikler yer almıştır. Lipsey ve Wilson (2001) kodlayıcı güvenilirliğini sağlamak için tek bir kodlayıcının "durumdan duruma" tutarlılığını ve farklı kodlayıcılar arasındaki tutarlılığı belirlemenin önemini vurgulamıştır. Bu bağlamda, değerlendiriciler arası güvenilirlik için tüm çalışmalar iki araştırmacı tarafından bağımsız olarak kodlanmıştır. Bunun ardından çift kodlama karşılaştırılmıştır. Fikir birliğine varılamayan maddeler için gerekli uzlaşı sağlanmıştır.

Etki Büyüklüklerinin Hesaplanması ve Veri Analizi

Bu meta-analizde, 20'den az örnekleme sahip çalışmalar da bulunduğundan Cohen d indeksi yerine Hedge g indeksi kullanılmıştır. Hedge g, ortalamalardaki farkı standardize ederek Cohen d'deki yanlılığı düzeltmektedir (Borenstein ve ark., 2009). Ayrıca etki büyüklüklerini yorumlamak için Cohen'in (1988) sınıflandırması tercih edilmiştir. Bu sınıflandırmada 0.20-0.50, 0.50-0.80 ve 0.80'in üzerindeki etki büyüklükleri sırasıyla küçük, orta ve büyük etkiler olarak yorumlanmaktadır. Etki büyüklükleri örneklem büyüklüğü, ortalama ve standart sapma kullanılarak hesaplanmıştır. Parametrik olmayan testler içeren çalışmalarda etki büyüklüklerini hesaplamak ve dönüşümleri gerçekleştirmek için çeşitli çevrimiçi hesaplama araçları kullanılmıştır. Meta-analizde Hedge g'nin yanında güven aralıkları, %95 güven aralığında etki büyüklüklerinin üst ve alt sınırları, standart hatalar, z ve p değerleri gibi istatistikler hesaplanmıştır. Çalışmaların etki büyüklüğüne ilişkin hesaplamalar, heterojenlik testleri, yayın yanlılığı ve moderatör analizleri Comprehensive Meta Analysis v3.0 (CMA) istatistik yazılımı kullanılarak gerçekleştirilmiştir.

Heterojenlik Testi

Bu meta-analizde, farklı örneklemlere ve müdahale değişkenlerine sahip bireysel çalışmalar bulunduğundan sabit etkiler modeli yerine rastgele etkiler modeli tercih edilmiştir. Ayrıca sabit etkiler modelinin evren hakkında belirli çıkarımlar yapmak için uygun olmadığı ve örnekleme hatasını hafife aldığı için yanlış çıkarımlar yapma potansiyeline sahip olduğu varsayımı (Üstün ve Eryılmaz, 2014) doğrultusunda rastgele etkiler modelini kullanmanın daha iyi bir seçim olacağı düşünülmüştür. Yapılan heterojenlik testinin sonucunda Q değeri 50,78 olarak hesaplanmıştır. Bu değer ki-kare ($\chi 2$) tablosunda %95 anlamlılık düzeyinde 14 serbestlik derecesi için öngörülen 23,68 kritik değerinin üzerindedir. Bununla birlikte I^2 değeri de %72,43 olarak hesaplanmıştır. Bu değer

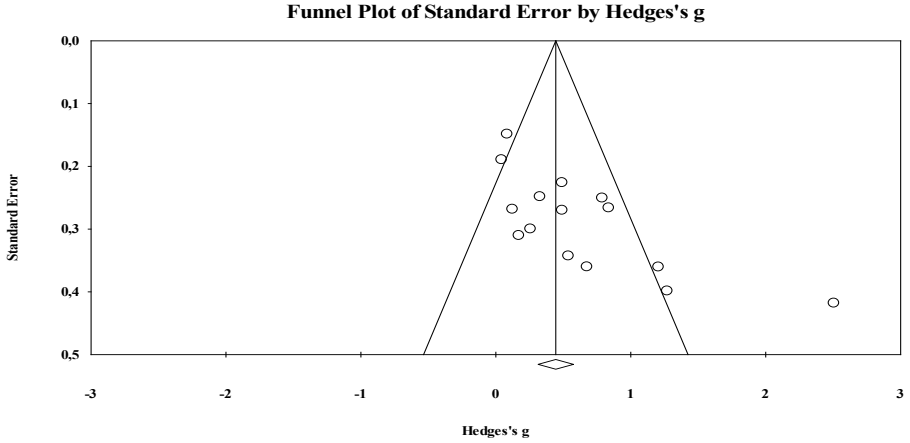
çok önemli heterojenlik olarak kabul edilen %75-%100 aralığına (Deeks vd., 2008) oldukça yakındır. Ayrıca *p* değeri .00 ile anlamlılık değeri olan *p* =. 05'ten küçüktür. Tüm bu değerler etki büyüklükleri arasında heterojen bir dağılım olduğunu göstermektedir.

Moderatör Analizi

Çalışmada heterojenliğin nedenini araştırmak için moderatör analizi yapılmıştır. Ortak değişkenler, araştırma protokolünün geliştirilmesi sırasında belirlense de çalışma sayısının az olması nedeniyle moderatör analizleri yalnızca web teknolojisi türüne dayalı olarak yapılamamıştır. Analog Anova kullanılarak yapılan analizde; etki büyüklüklerinin yazma kaygısı, tutumu ve öz yeterliği değişkenlerine göre anlamlı şekilde farklılaşıp farklılaşmadığı incelenmiştir.

Yayın Yanlılığı

Potansiyel yayın yanlılığını tespit etmek amacıyla Rosenthal'ın güvenli olmayan N, Orwin'in güvenli olmayan N, ve Duval & Tweedie'nin kırpma ve doldurma yöntemi analizleri kullanılmıştır. Ayrıca huni grafiğinden yararlanılmıştır. Rosenthal'ın güvenli olmayan N-testi ve Orwin'in güvenli olmayan N-testi testleri, araştırma sonuçlarının yayın yanlılığına karşı sağlam olduğunu göstermiştir. Rosenthal'ın güvenli olmayan N-testi sonuçları, *p* değerini .05'e getirmek için gereken eksik çalışma sayısının 225 (z = 7,83) olduğunu ortaya koymuştur. Orwin'in Fail-Safe N testi ise hesaplanan etki büyüklüğünü önemsiz Hedge's g kriteri olarak belirlenen 0.01 değerinin altına çekmek için etki büyüklüğü değeri 0 olan 652 çalışmaya ihtiyaç olduğunu göstermiştir. Duval & Tweedie'nin kırp ve doldur yöntemi de rastgele etkiler modelinde asimetrik için yeni bir çalışma ekleme önerisi getirmemiştir. Dolayısıyla incelenen çalışmalarda yayın yanlılığı tespit edilmemiştir. Grafik 1'de yer alan huni grafiği de bu verileri doğrulamaktadır:



Grafik 1. Etki Büyüklüklerinin Dağılımını Gösteren Huni Grafiği

Grafik 1 incelediğinde etki büyüklüklerinin simetrik dağıldığı görülmektedir. Dolayısıyla meta-analize dâhil edilen çalışmalarda yanlılık bulunmamaktadır.

Uç Değer Analizi

Bu meta-analiz çalışmasında uç değerleri tespit etmek için her bir çalışma için standardize edilmiş artık değerlere ve bu değerlerin anlamlılığına bakılmıştır. Ayrıca mutlak değeri 3'ten büyük olan, çalışmaların üst sınırının ortalama etki büyüklüğünün güven aralığının alt sınırından düşük olduğu ve %95 güven aralığının alt sınırının ortalama etki büyüklüğünün güven aralığının üst sınırından yüksek olduğu çalışmalar uç değer olarak alınmıştır. Sonuç olarak bir çalışmanın (Aktaş, 2019) güven aralığının üst sınırının (g = -1.96), ortalama etki büyüklüğünün güven aralığının alt sınırından (g = 0.208) daha düşük, standardize edilmiş artık değerlerinin de (-4,16) referans değerin (± 3) uzağında (-4,16) olduğu görülmüştür. Bu nedenle çalışma analiz dışında bırakılmıştır. Buna ek olarak Tetik (2020) tarafından yapılan çalışmadaki güven aralıkları referans değerler içinde yer alsa da standardize edilmiş artık değerlerin yine 3'ün uzağında (3.31) olması nedeniyle bu çalışma da analize dâhil edilmemiştir. Öte yandan aykırı değerlerin çıkarılması meta-analizin yorumlarını etkilememiştir. Nihayetinde iki çalışmanın çıkartılmasıyla meta-analiz 15 çalışma ile gerçekleştirilmiştir.

Bulgular ve Yorum

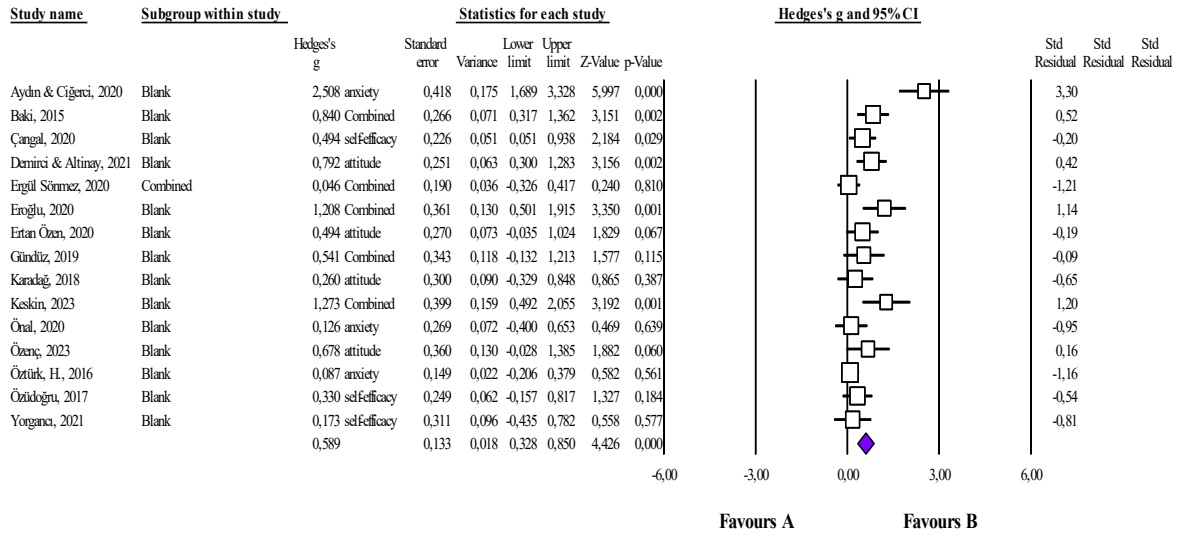
Web Teknolojilerinin Yazmanın Duyuşsal, Güdüsel ve Öz İnançlarla İlgili Değişkenleri Üzerindeki Genel Etkisi

Bu çalışmada Türkçe dersi kapsamında gerçekleştirilen yazma uygulamalarında kullanılan dijital hikâye, ağ günlüğü (blog), çevrim içi iş birlikli yazarlık (viki), sosyal ağ ve elektronik dinleti (podcast) teknolojilerinin öğrencilerin yazmaya yönelik duyuşsal, güdüsel ve öz inançsal çıktıları üzerinde nasıl bir etkiye sahip olduğunu belirlemek amaçlanmıştır. Tablo 1'de bu genel etkiye ve etkinin anlamlılığına ilişkin bulguya yer verilmektedir:

Tablo 1. Web Teknolojilerin Yazmanın Duyuşsal, Güdüsel ve Öz İnançlarla İlgili Değişkenleri Üzerindeki Genel Etkisi

Model	k	EB	SH	Z	95% GA	p
Rastgele etkiler modeli	15	0.59	0.13	4.43	[0.33-0.95]	.00

Tablo 1'de görüldüğü üzere web teknolojileri yazmanın duyuşsal, güdüsel ve öz inançlarla ilgili değişkenleri üzerinde orta düzeyde olumlu bir etkiye sahiptir (g = 0.59, 95% CI [0.33, 0.95], $p < .05$). Etki büyüklüğü hesaplanan çalışmalar, bu çalışmaların her birine yönelik etki büyüklüğü değeri ve diğer istatistiki bilgiler, bu bireysel çalışmaların ilişkili olduğu bağımlı değişkenler ve meta-analizdeki ağırlıkları Grafik 2'de sunulmaktadır:



Grafik 2. Meta-Analize Dâhil Edilen Çalışmalara İlişkin Etki Büyüklükleri ve Diğer İstatistikler

Grafikte yer alan çalışmalara bakıldığında beş çalışmanın birden yazma bağımlı değişken içerdiği, diğer çalışmaların ise yazma öz yeterliği, tutumu ve kaygısı değişkenlerinden biriyle ilgili olduğu görülmektedir. Web teknolojilerinin bu bağımlı değişkenler üzerindeki etkisinin anlamlı düzeyde farklılaşıp farklılaşmadığını belirlememek amacıyla Analog Anova yapılmıştır.

Web Teknolojisinin Farklı Yazma Çıktıları Üzerindeki Etkisi

Tablo 2'de web teknolojilerinin farklı yazma çıktıları üzerindeki etkilerini ve bu etkilerin farklılaşma durumunu belirlemeye yönelik olarak yapılan testin sonuçlarına yer verilmektedir:

Tablo 2. Web Teknolojilerinin Yazma Kaygısı, Tutumu ve Öz Yeterliğine Etkisine İlişkin Moderatör Analizi

Moderatör (Bağımlı değişken)	k	g	SH	95 % GA	p	Q_b
Yazma kaygısı	6	0.79	0.32	[0.17, 1.41]	.012	0.45 (sd =2) $p = .79$
Yazma tutumu	7	0.61	0.16	[0.29, 0.92]	.00	
Yazma öz yeterliği	6	0.56	0.13	[0.3, 0.82]	.00	
Genel	19	0.59	0.09	[0.41, 0.79]	.00	

Tablo 2'de görüldüğü üzere Web teknojilerinin yazmanın duyuşsal, güdüsel ve öz inançlarla ilişki değişkenleri olan yazma kaygısı, tutumu ve öz yeterliği üzerindeki etkileri orta düzeydedir. Her bir kategorideki çalışma sayılarının dengeli şekilde dağıldığı analiz sonucunda etki büyüklükleri yazma kaygısı (g = 0.79, %95 GA [0.17, 1.41], $p < .05$), yazma tutumu (g = 0.61, %95 GA [0.29, 0.92], $p < .05$) ve yazma öz yeterliği (g = 0.56, %95 GA [0.3, 0.82], $p < .05$) şeklinde sıralanmaktadır. Yalnızca iki çalışma içerdiği için analize dâhil edilmeyen "yazma motivasyonu" değişkeni de benzer bir etki büyüklüğü değerine (g = 0.59) sahiptir. En geniş etki büyüklüğü yazma kaygısı değişkenine ait olsa da analiz sonuçları bağımlı değişkenler arasındaki etki büyüklüğü farklarının

istatistiksel olarak anlamlı olmadığını ortaya koymaktadır ($Q_{(2)} = 0.45 < 5.99$, $p > .05$). Çalışmalarda etkisi araştırılan web teknolojilerinin sayısal dağılımı moderator analizi için her bir kategoride gereken en az çalışma sayısı koşulunu sağlamadığı için bu teknolojilerin etkisine yönelik moderator analizleri yapılamamıştır. Çalışmada dijital hikâyeler 9, ağ günlüğü (blog) ve iş birlikli yazarlık uygulamaları (viki) 3, sosyal ağlar ve elektronik dinletiler (podcast) birer çalışmayla temsil edilmiştir.

Sonuç

Bu çalışmanın sonuçları, web teknolojilerinin öğrencilerin yazma öz yeterlikleri ile yazmaya yönelik tutumlarını geliştirmede ve kaygılarını düşürmede orta düzeyde etkili olduğunu ve bu etkinin yazma çıktısının türüne (öz yeterlik, kaygı, tutum) göre anlamlı şekilde farklılaşmadığını göstermiştir. Alan yazında teknoloji bağlamında bu üç değişkenin tamamının yer aldığı bir sistematik inceleme veya meta-analize rastlanmasa da web ya da dijital teknolojilerin bu değişkenlerden bazılarını ne yönde etkilediğinin araştırıldığı çeşitli araştırmalar, mevcut çalışmanın bulgularıyla örtüşmektedir. Bunlardan birinde Hitchcock, Rao, Chang ve Yuen (2016) çalışmalarında dijital araçların yazma öğretimiyle bütünleştirilmesinin öğrencilerin yazma güdüleri ve öz yeterlikleri üzerinde etkili olduğunu ortaya koymuşlardır. Ekholm, Zumbrunn, & DeBusk-Lane (2018) yazma tutumunu konu alan çalışmaları sistematik olarak inceledikleri araştırmalarında da yazma tutumu ile teknoloji kullanımı arasında olumlu bir ilişki olduğunu rapor etmişlerdir. Bu teknolojiler, kelime işlemci yazılımı gibi iş birlikçi olmayan dijital yazma platformlarından viki ve bloglar gibi iş birlikçi platformlara kadar uzanmaktadır. Bu olumlu tutumun gelişmesinde söz konusu platformların kullanıcıların hedef kitle farkındalığı sağlamalarına ve yazılar üzerinde daha fazla sahiplik hissetmelerine katkı sağlamasının etkili olduğunu belirtmişlerdir. Yaşar Sağlık ve Yıldız (2021) dil öğretiminde Web 2.0 araçlarının kullanımına yönelik olarak yapılan çalışmaları sistematik incelemeye tâbi tuttukları araştırmalarında; bu araçların Türkçe ve yabancı dil öğretiminde dört temel dil becerisi, kelime hazinesi ve akademik başarı üzerinde olumlu etkilerinin olduğunu ve temel dil becerilerine yönelik duyuşsal özellikleri geliştirdiğini tespit etmişlerdir. Mevcut çalışmanın bulgularının burada yer verilen çalışmaların bulgularıyla çelişmediğini söylemek mümkün olsa da etkisi incelenen teknolojilerin ve teknolojilerin kullanılma şekillerinin farklılık göstermesi; tutum, kaygı ve öz yeterlik gibi kavramların çalışmalarda farklı başlıklar altında kategorize edilebilmesi, bazı bilişsel ve duyuşsal yapılar arasındaki ayrımın yeterince açık olmaması gibi hususlar tam bir karşılaştırma yapılmasını engellemektedir. Dahası alan yazında yer alan çalışmaların niceliksel olarak istenen düzeyde olmaması olası farklı etkilerin nedenlerinin anlaşılmasını da güçleştirmektedir. Bu çalışmada da çalışma sayısının az olması nedeniyle moderatör analizlerinin yalnızca yazma çıktıları üzerinden yapılmış olması çalışmanın en önemli sınırlılığını oluşturmaktadır. Bundan hareketle Türkçe öğretiminde web teknolojilerinin yazmayla ilişki değişkenlere etkisini belirlemeyi amaçlayan çalışmaların kapsamının çeşitli duyuşsal ve güdüsel değişkenleri içerecek şekilde genişletilmesi önem arz etmektedir. Bu değişkenler arasında yazma tutukluğu, mükemmeliyetçilik, ilgi, benlik algısı, öz güven, öz algılama, öz düzenleme), içsel güdü, özerklik, sebat, beklenti, değer gibi yapılar sayılabilir.

Bu meta-analizde etkisi incelenen teknolojiler, başta dijital öyküleme araçları olmak üzere Web 2.0 teknolojileri ile sınırlıdır. Alan yazında artırılmış (AR), sanal (VR) ve genişletilmiş gerçeklik (XR) gibi yenilikçi ve ileri düzey teknolojilerin çeşitli yazma çıktılarına etkisinin incelendiği birincil çalışmaların yapılması meta-analizlerin kapsamını genişletecek ve karşılaştırılabilir bulguların elde edilmesini sağlayacaktır. Bununla birlikte odak noktasında teknoloji entegrasyonu olan modellere (örneğin ters yüz edilmiş sınıf modeli) dayalı yazma uygulamalarının çeşitli değişkenler üzerindeki etkisinin büyük ölçekli araştırmalara konu edilmesi de teknolojinin yazma eğitimindeki rolünün daha iyi anlaşılmasına ve ortaya konulacak ampirik veri tabanının başta yazma öğretmenleri olmak üzere araştırmacı ve kuramcılar için kullanılabilir hâle gelmesine katkı sağlayacaktır.

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Üretken Yapay Zekâ Destekli Bir Matematik Dersi için Ders İçi Etkinlik Tasarımı Çalışması

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Özet

Dinamik yazılımlar denince matematik öğretmenleri ve akademisyenlerin aklına dinamik geometri yazılımları gelir. Oysa ki günümüzde "GeoGebra ve Desmos" gibi bu yazılımlar tablo oluşturma, seri oluşturma, fonksiyon oluşturma, bazı istatistik analizleri yapma gibi cebir ve olasılık konularında da işlev görmektedir. Bu çalışmada "Gemini" isimli üretken yapay zeka dil modeline ürettirilen tabloda yer alan sayı ikilileri (bir uçağın yükseklik-zaman değişkenleri) "Geogebra" yazılımda nokta listesine dönüştürmek, ardından noktaların oluşturduğu eğriyi ax^2+bx+c=y formatında(ikinci dereceden bir bilinmeyenli) bir denklem şeklinde tarif etmek, tabloda olmayan "t" zamanında ortalama yüksekliği grafik üzerinden ve tablo yaparak hesaplamaya çalışmak suretiyle lise müfredatında bulunan ve literatürde geçen "türevin belirli bir anda ortalama değişim hızı" şeklindeki türevin limit tanımına ulaştırmayı hedefleyen bir ders içi etkinlik tasarlanması amaçlanmıştır. Çalışmanın sonunda eğitimciler, eğitim programı tasarımcıları ve akademisyenler için önerilere yer verilmiştir.

Anahtar Kelimeler: Üretken yapay zeka, dinamik matematik yazılımları, türev, limit

Abstract

When it comes to dynamic software, mathematics teachers and academics think of dynamic geometry software. However, today, these software such as "GeoGebra and Desmos" also function in algebra and probability topics such as creating tables, creating series, creating functions, performing some statistical analyzes. In this study, we aim to convert the number pairs (height-time variables of an airplane) in the table generated by a generative artificial intelligence language model named "Gemini" into a list of points in "Geogebra" software, and then describe the curve formed by the points as an equation in the form of ax^2+bx+c=y (quadratic equation with one unknown), By trying to calculate the average height at time "t", which is not in the table, through graphing and tabulation, it is aimed to design an in-class activity that aims to reach the limit definition of the derivative in the form of "average rate of change of the derivative at a given moment" in the high school curriculum and mentioned in the literature. At the end of the study, suggestions for educators, curriculum designers and the experts are given.

Keywords: Generative artificial intelligence, dynamic mathematics software, derivative, limit

Giriş

Matematik eğitimi alanı da öteki tüm bilimsel alanlar gibi zaman içerisinde teknolojik gelişmelerle birlikte gelişim göstermektedir. Bu gelişimin bir ayağı da Dinamik Matematik Yazılımları (DMY)'dır. Dinamik Matematik Yazılımları; matematiksel kavramların görsel olarak keşfedilmesini, görselleştirme yoluyla ve matematiksel manipülasyonu mümkün kılan teknolojik araçlardır (Gökçe, 2017; Nicolaescu, 2014; Ülker, 2019). Bu yazılımlar, matematik eğitiminde öğrencilere somut örnekler ve görsel deneyimler sunarak soyut matematik kavramlarını anlamalarına ve yaparak-yaşayarak öğrenmelerine yardımcı olurlar. Öğrenciler, bu yazılımlar sayesinde matematiksel ilişkileri görmek ve deneyimlemek yoluyla keşfedebilir, deney yapabilir ve sonuçları görsel olarak gözlemleyebilir (Kılıç, 2016; Şahin, 2018).

Dinamik matematik yazılımları, matematik eğitimine çok önemli katkılar sağlar. Öğrenciler, bu yazılımlar aracılığıyla matematiksel kavramları etkileşimli olarak keşfedebilir ve görsel olarak gözlemleyebilir cebirsel ve geometrik manipülasyonlar yapabilirler. Grafiksel gösterimler ve animasyonlar kullanarak fonksiyonların davranışını inceleyebilir, geometrik şekilleri döndürebilir veya dönüştürebilir, denklemlerin kökleri ve grafiklerinin görüntüsü gibi durumları görsel olarak analiz edebilirler (Taha, 2019; Güler, 2019). Bu öğrencilerin aktif olduğu deneyimler, öğrencilerin matematiksel kavramları daha derinlemesine anlamalarına ve matematiksel düşünme becerilerini geliştirmelerine yardımcı olur.

Dinamik matematik yazılımları, matematik eğitimi dışında da geniş kullanım alanlarına sahiptir. Özellikle mühendislik, fizik, ekonomi ve diğer bilim alanlarında dinamik sistemlerin modellenmesi ve simülasyonu için

açık kaynaklı yazılımlar sıkça kullanılmaktadır (Estrada, 2018; Karimi, 2019). Bu yazılımlar, karmaşık matematiksel denklemlerin çözülmesini, sistemlerin davranışlarının simülasyonunu ve sonuçların görselleştirilmesini sağlar. Ayrıca istatistiksel analizlerde, veri görselleştirmede ve matematiksel modelleme çalışmalarında da dinamik matematik yazılımları etkili bir şekilde kullanılmaktadır (Tadeusiewicz, 2019; Estrada, 2018).

Yöntem

Bu araştırma matematik dersi için birden fazla kazanım ve konuyu aynı anda içeren bir ders içi etkinlik tasarlamayı amaçlamaktadır. Bu nedenle araştırmada nitel araştırma yöntemlerinden eylem araştırması deseni kullanılmıştır. (A. Yıldırım, H. Şimşek, 2011).

Aşağıda ilgili ders içi etkinliğin tasarım aşamaları verilmiştir.

1. Aşama:

Etkinlik temelde iki farklı dijital aracın kullanımına dayanmaktadır. Bunlar; GeoGebra ve Google Gemini (Bard)' dir. GeoGebra bir dinamik matemetik yazılımı ve Gemini ise bir üretken yapay zekâ dil modelidir. 1. Aşamada öğrencilerin yapay zeka dil modeline bir uçağın yükseklik-zaman tablosunu ürettirmeleri için yönlendirmektir.

2. Aşama:

Bu aşamada öğrenciler Gemini'nin ürettiği tabloyu GeoGebra tablosuna dönüştürmeli ve bu tabloyu sayı ikilileri yani noktalara dönüştürmeli.

3. Aşama:

Bu aşamada öğrenciler oluşturdukları noktalardan geçen ax^2+bx+c=y formunda bir ikinci dereceden bir bilinmeyenli denklemi a,b ve c sayılarına sürgü atayarak tahmin etmeli ve bu grafiği çizdirmelidirler

4. Aşama:

Öğrenciler bu aşamada oluşturdukları bu grafik üzerinde iki nokta belirlemeli ve belirledikleri noktaların –y bileşenlerinin farkının –x bileşenlerinin farkına oranı yani yükselmenin hızını ve yönünü belirlemelidirler.

5. Aşama

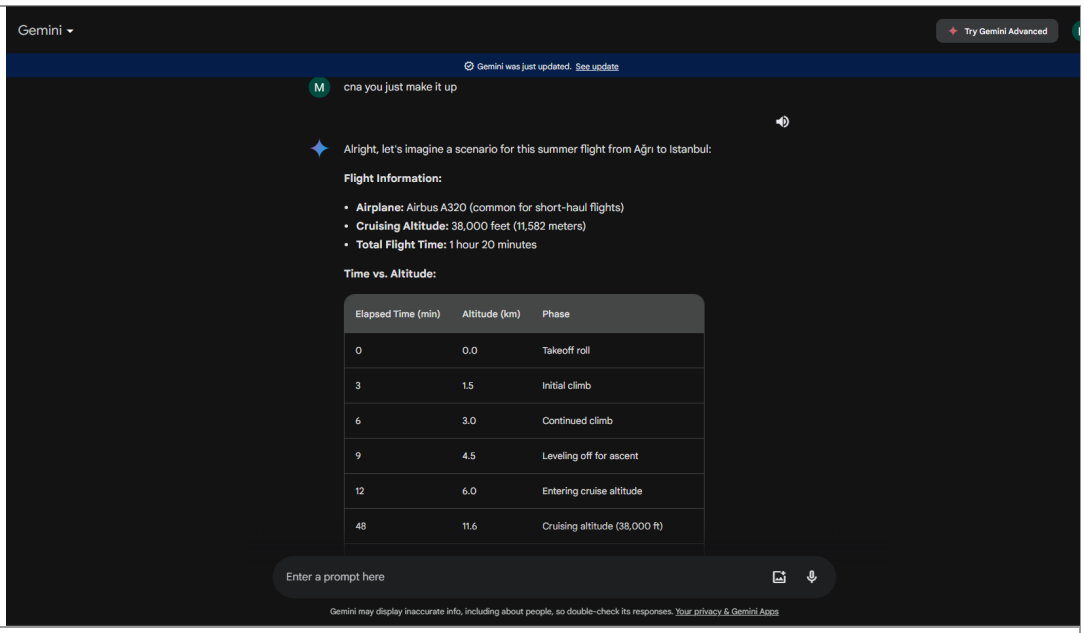
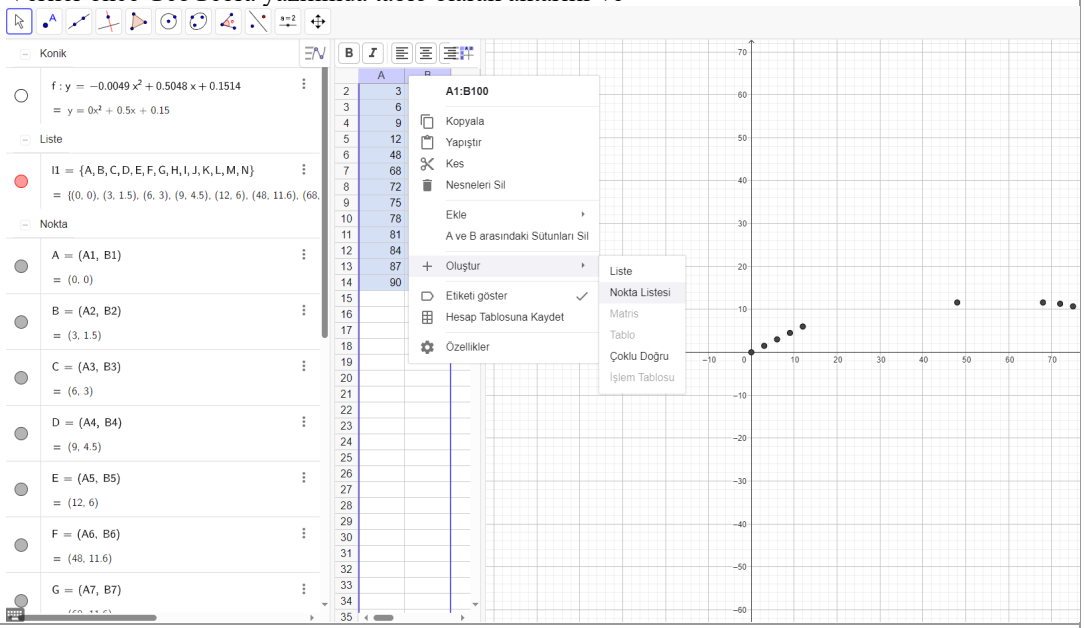
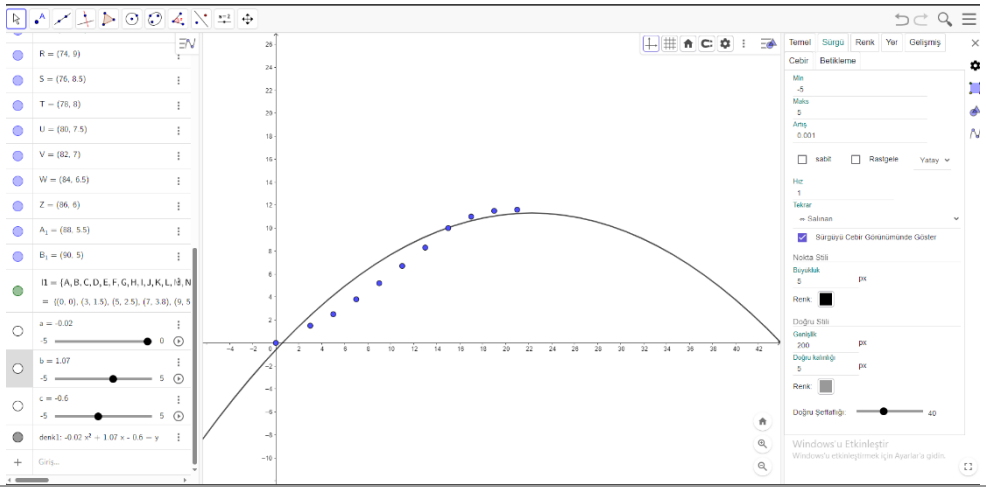
Bu noktaları birbirinin üstüne kadar getirince aslında 4. Aşamada elde ettikleri sayısal değerin o noktadaki teğetin eğimine yani türeve karşılık geldiğini yani türevin bir durumun o andaki hızını belirlemede kullanıldığını keşfetmelidirler.

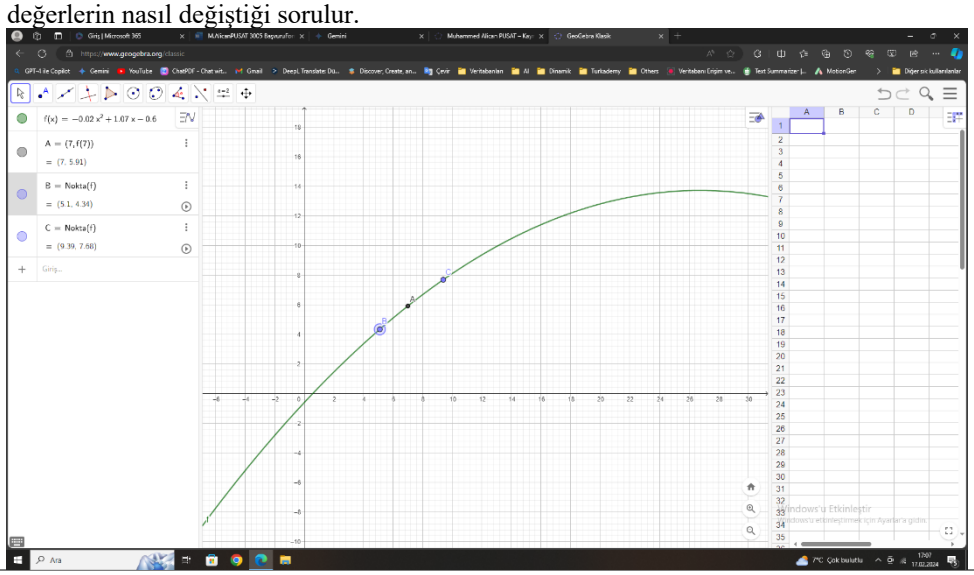
Sonuç

Aşağıda yöntem bölümünde aşamaları verilen ders içi etkinliğin son hali tablo olarak verilmiştir.

Tablo 1. Ders içi Etkinlik Formu.

Kazanımlar	Yapay zekâ dil modelleri için komut (prompt) yazabilir. Yapay zekâ dil modeline veri oluşturtabilir. Oluşturttuğu veriyi geogebra gibi araçlara taşıyıp analiz edebilir. Verilen noktalar için ax^2+bx+c=y denkleminde a,b,c değerlerini tahmin edebilir. Grafiğin üstünde belli bir noktanın civarında grafiğin nasıl davrandığı (azalan, artan) tahmin eder. Türevin limit tanımına ulaşır.
Süre	40+40+40+40
Kullanılacak programlar	Gemini, Geogebra,
Uygulama 1. Aşama	Öğrencilerin gemini yardımı ile bir uçağın yükseklik zaman grafiğini çizdirmek için veri oluşturması sağlanır.

<table>
<tr><td></td><td> 
</td></tr>
<tr><td>Uygulama
2. Aşama</td><td>Veriler önce GeoGebra yazılımda tablo olarak aktarılır ve
 
</td></tr>
<tr><td>Uygulama
3. Aşama</td><td>ax^2+bx+c=y formatında grafik, a,b,c için sürgüler oluşturarak a,b,c yi tahmin etmesi sağlanır.
  </td></tr>
<tr><td>Uygulama</td><td>Elde edilen denklem yeni bir geogebra sayfasında açılıp öreneğin bir B=(7, f(7)) noktası belirlenir,</td></tr>
</table>

4. Aşama	bu noktanın iki tarafında grafik üzerinde iki nokta larak bu noktala, rın B noktasına yaklaşırken değerlerin nasıl değiştiği sorulur. 

Tartışma

Bu çalışma üretken yapay zeka destekli ve dinamik matematik yazılımlarından GeoGebra kullanılarak türev konulu bir ders içi etkinlik tasarlama çalışmasıdır. Dinamik matematik yazılımları ve eğitim teknolojilerinin özellikle soyut durumları çalışan matematik gibi bir alanda öğretmenler ve öğrenciler açısından kolaylıkları özellikle de matematik öğretimi litaretüründe yer almaktadır (Gökçe, 2017; Nicolaescu, 2014; Ülker, 2019; Kılıç, 2016; Şahin, 2018). DMY'nın geomerti dışında kullanım alanları olduğu konusu bu çalışma ve önceki çalışmalarla paralelleik göstermektedir (Estrada, 2018; Karimi, 2019; Tadeusiewicz, 2019; Estrada, 2018).

Öneriler

Aşağıda eğitimciler, eğitim programı yapıcılar ve araştırmacılar için öneriler yer almaktadır.

- Yapay zeka dil modelleri ve genel olarak yapay zeka eğitim programı geliştiricileri tarafından kullanılabilir.
- Eğitim programı planlayıcıları STEAM dallarına vurgu yapan benzer eğitim ortamları tasarlayabilirler.
- Fizik ve matematik alanlarında eğitim veren eğiticiler fizik ve matematiğin bu ve benzeri benzerliklerine dayalı eğitim içerikleri geliştirip uygulayabilirler.

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Çevrimiçi Öğrenmede Oyunlaştırma: Fırsatlar ve Riskler

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Özet

"Öğrenirken eğlenme" ilkesine dayanan oyunlaştırma; görev, rozet, puan, ödül, geribildirim ve lider tablosu gibi oyun ögelerinin oyun dışı bağlamlarda kullanılması olarak tanımlanmaktadır. Araştırmalarda oyunlaştırmanın öğrencilerin performans, motivasyon ve katılımları üzerinde etkin rol oynadığı vurgulanmaktadır. Ayrıca araştırmacılar özellikle çevrimiçi öğrenme sistemlerinde umut verici bir öğrenme yaklaşımı olarak görmektedir. Ancak çevrimiçi öğrenme ortamlarında oyunlaştırma kullanımına ilişkin araştırma sonuçları hala tartışmalıdır. Bu nedenle araştırmada 2016-2022 yılları arasında Science Direct, Taylor Francis Online ve Springer Link veritabanlarında çevrimiçi öğrenmede oyunlaştırma üzerine yayınlanmış 38 makale incelenerek bu konu alanındaki güncel araştırma eğilimleri belirlenmiş, potansiyel fırsatlar ve riskler tartışılmıştır. Çalışmalar incelendiğinde, araştırmaların çoğunluğunun kuramsal bir altyapıya sahip olmadığı belirlenmiştir. Bu durumun konu alanında teorik bir boşluk oluşturduğu söylenebilir. Çalışmaların büyük bir çoğunluğunun nicel araştırma olarak yürütüldüğü, gelecekte yapılacak daha fazla nitel ve karma yöntem araştırmalarına ihtiyaç olduğu belirlenmiştir. Araştırmalarda ulaşılan sonuçlara göre; oyunlaştırılmış öğrenme etkinliklerinin motivasyonu, performansı, katılımı ve ders tamamlama oranlarını artırdığı belirlenmiştir. Bunun yanı sıra araştırmalarda kullanılan oyun elemanlarının ve öğrencilerin kişisel özelliklerinin araştırma sonuçları üzerinde farklılaşma oluşturduğuna dikkat çekilmektedir. Bu bağlamda oyunlaştırmanın öğrencilerin içsel motivasyonunu artıracak ve kişisel özelliklerini yansıtacak oyun elemanları kullanılarak kişiselleştirilmesi, ortaya çıkabilecek riskleri önleyerek öğrencilerin potansiyel fırsatlardan üst düzeyde yararlanabilmesini sağlayacaktır. Böylece çevrimiçi öğrenmede var olan motivasyon eksikliği, sıkılma ve dersi bırakma gibi sorunların çözümü için oyunlaştırma etkili bir yöntem olabilir.

Anahtar Kelimeler: Oyunlaştırma, oyunlaştırılmış öğrenme ortamları, çevrimiçi öğrenme, literatür taraması.

Gamification in Online Learning: Opportunities and Risks

Abstract

Gamification is based on the principle of "having fun while learning." It is defined as the use of game elements such as tasks, badges, points, rewards, feedback, and leaderboards in non-game contexts. Studies emphasize that gamification plays an active role in students' performance, motivation, and participation. In addition, researchers think it's a promising way to learn, particularly in online learning environments. However, research results on the use of gamification in online learning environments are still controversial. Therefore, in the research, we examined 38 articles on gamification in online learning published in Science Direct, Taylor Francis Online, and Springer Link databases between 2016 and 2022, identifying current research trends in this subject area and discussing potential opportunities and risks. Upon examination, we discovered that most of the studies lacked a theoretical foundation. We can say that this situation creates a theoretical gap in the subject area. We determined that most studies used quantitative research methods and that further studies using mixed-methods and qualitative research were needed. Furthermore, the research findings are differentiated by the students' personal characteristics and the types of game elements. In this context, personalizing gamification with the use of game elements that increase students' intrinsic motivation and reflect their personal characteristics can prevent possible risks and enable students to benefit from potential opportunities at a high level. Thus, gamification can be an effective method to solve problems such as lack of motivation, boredom, and dropping out of the course in online learning.

Keywords: Gamification, gamified learning environments, online learning, literature review.

Giriş

Günümüzde teknolojik gelişmeler ile birlikte oyun tercihleri de değişmiş, bireyler eğlenmek ve vakit geçirmek için daha çok dijital dünyada var olan oyunlara yönelmeye başlamıştır (Şahin ve Samur, 2017). Araştırmalarda dünya çapında yaklaşık 3,2 milyar insanın aktif dijital oyuncu olduğu, özellikle gençlerin ve çocukların dijital oyunlara büyük ilgi gösterdiği dikkat çekmektedir (Behnamnia vd., 2020). Bu nedenle dijital oyunlar eğitimde sıklıkla kullanılmaktadır. Bazı araştırmacılar dijital oyunları eğitim amaçlı kullanmak yerine dijital oyunların olumlu yönlerini oyun dışı öğrenme ortamlarına aktarmaya odaklanmışlardır (Domínguez vd., 2013).

Oyunlaştırma olarak kavramsallaştırılan bu uygulamalar, öğrencilerin motivasyonunun (Cheong vd., 2013; Cózar-Gutiérrez ve Sáez-López, 2016; Özkan ve Samur, 2017; Shi vd., 2014; Stuart vd., 2020), öğrenme performansının (Lo ve Hew, 2020; Şen, 2019; Zainuddin vd., 2020) ve katılımının (Huang and Hev, 2018; Lavoué et al., 2021; Park et al., 2019) artırılması veya eğitim süreçlerinin iyileştirilmesi (Kapp, 2012; Larson, 2020) gibi birçok fayda sağlayabilir. Yapılan araştırmalarda çevrimiçi öğrenme ortamlarında sınırlı öğrenci-öğrenci ve öğrenci-öğretmen etkileşiminin, yetersiz geri bildirimin ve öğrencilere istedikleri özerklik ve esnekliğin sağlanamamasının öğrencilerin ilgi ve motivasyonunun azalmasına neden olabileceğini ve dolayısıyla, dersi bırakma oranlarında artış sorunlarının sıklıkla gözlendiği belirtilmektedir (Celen vd., 2011; de la Peña vd., 2021; Guohong vd., 2012; Khaldi vd., 2023). Aynı zamanda bu sorunların çözümü için eğlenceli, ilgi çekici, motive edici ve etkileşimli oyun unsurlarının öğrenme ortamlarında kullanılması (oyunlaştırma) önerilmiştir (Amriani vd., 2013; An vd., 2020; Çağlar ve Kocadere, 2015; Jarnac de Freitas ve Silva, 2020; Şahin vd., 2017). Ancak bazı araştırmalar, çoğu durumda oyunlaştırmanın eğitim bağlamında, özellikle oyunlaştırılmış eğitim sistemlerinde, kullanımının öğrencilerin sonuçlarını iyileştirmediğini belirtmektedir (Toda vd., 2017; Koivisto ve Hamari, 2019). Bu sonuçlar, oyunlaştırma kullanımının öğrencilerin deneyimlerini etkili bir şekilde ne zaman ve nasıl iyileştirdiğini daha iyi anlamak ve dolayısıyla öğrenme performansını olumlu yönde etkileyebilecek daha iyi bir oyunlaştırma tasarımı sağlamaya yönelik çözümler önermek için yapılacak araştırmaların önemine dikkat çekmektedir (Hamari ve ark., 2016; Koivisto ve Hamari, 2019; Oliveira vd., 2022; Rapp vd., 2019). Bu doğrultuda yapılan araştırmada çevrimiçi öğrenme ortamlarında oyunlaştırma konu alanındaki güncel araştırma eğilimlerinin belirlenmesinin yanı sıra, potansiyel fırsatlar ve risklerin incelenmesi, oyunlaştırmanın çevrimiçi öğrenmede nasıl daha etkili kullanılabileceğine yönelik araştırma sonuçlarının tarışılması ve öneriler sunulması amaçlanmıştır. Bu amaç doğrultusunda belirlenen araştırma soruları şu şekildedir:

Oyunlaştırma araştırmalarında,

- oyunlaştırma tasarımına dayalı teorik yaklaşımlar ve modeller nelerdir?
- hangi araştırma yöntemleri kullanılmıştır?
- katılımcılar hangi eğitim kademesinde yer almaktadır?
- oyunlaştırma sürecinde kullanılan oyun elementleri nelerdir?
- hangi değişkenler incelenmiştir ve bu değişkenlerle ilgili sonuçlar nelerdir?

Yöntem

Araştırmada son yıllarda oyunlaştırılmış çevrimiçi öğrenme ortamlarına ilişkin güncel araştırma eğilimlerini ortaya koymak amacıyla 2016-2022 yılları arasında yayınlanan araştırmalar incelenmiştir. Literatür taraması olarak yürütülen araştırmada Science Direct, Taylor & Francis Online ve Springer Link veritabanlarında kapsamlı bir tarama yapılarak Web of Science (ESCI, SCI, SSCI) tarafından indekslenen dergilerde yayınlanan makaleler dikkate alınmıştır. Bildiri, tez ve kitaplar ile derleme, teorik, tasarım temelli ve ölçek geliştirme çalışmaları araştırmaya dahil edilmemiştir. Yapılan filtreleme işlemlerinin arından ulaşılan 38 makale içerik analizi yöntemi ile analiz edilmiştir. İçerik analizi, verileri derinlemesine inceleyerek ayrıntılı bilgilere ulaşmayı sağlayan ve ulaşılan sonuçlar arasındaki ilişkileri inceleyen bir yaklaşımdır (Yıldırım ve Şimşek, 2006). İçerik analizi yaklaşımı ile verilerin ayrıntılı analizi yapılarak önceden planlanmamış kodlar, temalar, ya da kategoriler oluşturulabilir (Corbin ve Straus, 1990). Bu araştırmada da ulaşılan veriler içerik analizi ile kodlanmış ve araştırma soruları doğrultusunda temalar halinde açıklanmıştır.

Bulgular

Teorik Yaklaşımlar ve Modeller

Araştırmaların kuramsal çerçevesi incelendiğinde; en çok Kendi Kaderini Belirleme Teorisinin (Self-Determination Theory) kullanıldığı (f=6), Akış Teorisi (Flow Theoty), Oyunlaştırılmış Öğrenme Teorisi (Theory of Gamified Learning), Multimedya Öğreniminin Bilişsel Teorisi (Cognitive Theory of Multimedia Learning), Sosyal Kimlik Teorisi (Social Identity Theory), MUSIC Akademik Motivasyon Modeli (MUSIC Model of Academic Motivation), Werbach and Hunter'ın Modeli (Werbach and Hunter's Model), Grasha'nın Öğrenme Stilleri Modeli (Grasha's Learning Styles Model) teori ve modellerin ise diğer çalışmalar özelinde kullanıldığı görülmüştür. Ancak çalışmaların %58'inin (f=22) herhangi bir teori ya da modele dayalı olarak yürütülmediği belirlenmiştir. Bu durum oldukça dikkat çekici bir bulgu olarak karşımıza çıkmaktadır.

Kullanılan Araştırma Yöntemleri ve Katılımcılar

Çalışmaların büyük bir çoğunluğunda (*f*=26) nicel araştırma yöntemi kullanılmıştır. Bu araştırmalar daha çok deneysel ve ilişkisel araştırmalar olarak yürütülmüştür. Ayrıca 10 makalenin karma yöntem ve sadece bir makalenin nitel araştırma yöntemi ile desenlendiği belirlenmiştir. Araştırmalardaki katılımcılar incelendiğinde ise, en çok lisans düzeyinde çalışma yapıldığı (*f*=28), sonrasında sırasıyla ortaokul (*f*=4), lisansüstü (*f*=3), yetişkin eğitimi (*f*=2), lise (*f*=1) ve ilkokulun (*f*=1) yer aldığı görülmüştür. Oyun unsurlarına olan ilgileri göz önünde bulundurulduğunda, ilkokul ve ortaokul düzeyinde oldukça az çalışma yapılmış olması dikkat çekicidir.

Kullanılan Oyun Elementleri

Oyun elementlerinin eğitim faaliyetlerinde kullanılması eğlenceli ve aktif bir öğrenme ortamının oluşmasını sağlamaktadır. Rozetler, puan, lider tablosu, geribildirim gibi bir çok oyun elementi bulunmasıyla birlikte her araştırmada farklı bir çok oyun elementi kullanılarak sonuçlar tartışılmıştır. İncelenen makalelerde öğrenme ortamının oyunlaştırılması sürecinde kullanılan oyun elementleri Tablo 1'de verilmiştir.

Tablo 1. Kullanılan oyun elementleri

Oyun Elemanları	*f*	%	Oyun Elemanları	*f*	%
Puan	27	71	Profil/Avatar	10	26
Lider Tablosu	24	63	İlerleme Çubuğu	9	24
Rozet	22	58	Seçim Özerkliği	7	19
Görev	21	55	Zaman sınırlaması/Süre	5	13
Ödül	18	47	Meydan okuma/Yarışma	5	13
Geribildirim	16	42	Ceza	4	11
Seviye	16	42	Anlamlı hikâye	4	11
Sosyal etkileşim	13	34	İpucu	2	5
Takım/grup/işbirliği	12	32			

Tablo 1 incelendiğinde araştırmalarda en çok puan, lider tablosu, rozet ve görev oyun elementlerinin kullanıldığı görülmektedir. Bu oyun elementlerini geribildirim, seviye, sosyal etkileşim, takım görevleri, profil/avatar oluşturma ve ilerleme çubuğu takip etmektedir. Ayrıca bazı araştırmalarda kullanıcılara seçim özerkliği imkanı sunulmuş, görev/seviyenin tamamlanması için belirli bir süre verilmiştir.

Araştırılan Değişkenler ve İlgili Sonuçlar

Yapılan çalışmalarda araştırma sürecinde incelenen değişkenler Tablo 2'de verilmiştir. Makalelerde en çok öğrencilerin akademik başarı/performansı, motivasyonu ve katılım düzeyleri araştırılmıştır (Tablo 2). Algı, memnuniyet, kaygı, kişisel özellikler gibi değişkenler de araştırmalarda incelenmiştir.

Tablo 2. Araştırılan değişkenler

Araştırılan Değişkenler	*f*	%
Akademik başarı/Performans	20	53
Motivasyon	14	37
Katılım/tamamlama oranı	14	37
Algı	4	11
Memnuniyet	3	8
Oyun elemanları	3	8
Kaygı	2	5
Kişisel özellikler	2	5
Kullanıcı/oyuncu türleri	2	5
Öz yeterlik	1	3
Tutum	1	3

Bu çalışmada makalelerde araştırılan değişkenlere ilişkin ulaşılan sonuçlar da analiz edilmiştir. Ulaşılan sonuçlara göre oyunlaştırma, öğrencilerin başarı ve performansını, motivasyonunu, sosyal ilişkilerini, katılım ve ders tamamlama oranını artırmaktadır. Bunun yanı sıra katılımcı memnuniyetinin yüksek olduğu, oyunlaştırmaya ilişkin algı ve tutumların olumlu olduğu; bir araştırmada kaygının azaldığı başka bir araştırmada ise arttığı belirlenmiştir. Ayrıca oyunlaştırma etkililiği üzerinde; kişisel özellikler, kullanıcı/oyuncu türleri ve kullanılan oyun elemanlarının belirleyici olduğu sonucuna ulaşılmıştır. Bazı araştırmalarda; rozet ve lider tablolarının, sadece dışsal motivasyonu sağladığı ve olumsuz rekabete yol açarak öğrencilerde stres ve kaygı oluşturduğu; görevlerin zorluk seviyesinin yüksek olması ile öğrencilerin başarısızlık duygusuna kapıldığı ve bu nedenle öğrenme ve derse katılma motivasyonunun zamanla düştüğü belirlenmiştir.

Tartışma, Sonuç ve Öneriler

Araştırmada ulaşılan sonuçlara göre, çalışmaların çoğunluğunun kuramsal bir altyapıya sahip olmadığı ve bu durumun konu alanında teorik bir boşluk oluşturduğu söylenebilir. Gelecekte yapılacak araştırmalarda oyunlaştırılmış öğrenme ortamları, kuram ve modeller temel alınarak daha etkili bir şekilde tasarlanabilir. Oyun çağında olan ilkokul ve ortaokul düzeyinde çok az sayıda araştırma yapılmış olması dikkat çekicidir. Bu eğitim düzeylerinde yürütülecek çalışmalara ve daha fazla nitel ve karma yöntem araştırmalarına ihtiyaç olduğu belirlenmiştir. Genel olarak oyunlaştırma, performans, katılım ve motivasyon üzerinde olumlu bir etkiye sahiptir. Oyunlaştırma, çevrimiçi öğrenmede var olan motivasyon eksikliği, sıkılma ve dersi bırakma gibi sorunların çözümü için etkili bir yöntem olabilir. Jayalath ve Esichaikul'a (2022) göre oyunlaştırma yaklaşımı, motivasyon ve katılım sorunlarını çözmenin yanı sıra öğrenci memnuniyetsizliği ve can sıkıntısını da ortadan kaldırarak önemli faydalar sağlayabilir. De la Peña vd. (2021), üniversite düzeyinde çevrim içi bir oyunlaştırma modeli tasarlamış ve sonuçlarını analiz etmiştir. Sonuçlara göre öğrencilerin sınıftaki etkileşimi artmış, sınava giren ve dersi geçen öğrenci sayısı artmış ve öğrenme gelişmiştir.

Oyunlaştıma sürecinde fırsatlar ve risklerin iyi bir şekilde analiz edilmesi, kullanılacak oyun elementlerinin doğru seçimi, oyunlaştırmanın tasarımı ve etkili bir şekilde uygulanması oldukça önemlidir. Nitekim araştırmada ulaşılan sonuçlara göre kullanılan oyun elemanları, öğrencilerin kişisel özellikleri ve oyuncu türleri araştırma sonuçları üzerinde farklılık oluşturmaktadır. Benzer şekilde oyunlaştırılmış sistemlerde son araştırmalar, oyunlaştırmanın cinsiyet, kullanıcı türü ve pedagojik görevler gibi farklı yönlere göre bireyselleştirilmesinin, kullanıcıların deneyimlerini olumlu veya olumsuz bir şekilde etkileyebileceğini göstermiştir (Denden vd., 2022; Hallifax vd., 2019; Klock vd, 2020; Rodrigues vd, 2020, Tan vd., 2023). Bu nedenle oyunlaştırmanın; içsel motivasyonunu artıracak ve öğrencilerin kişisel özelliklerini yansıtacak oyun elemanları kullanılarak kişiselleştirilmesi, ortaya çıkabilecek riskleri önleyerek öğrencilerin potansiyel fırsatlardan üst düzeyde yararlanabilmesini sağlayabilir.

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Türkiye'deki Açıköğretim Sistemlerinin Karşılaştırmalı Program ve Ders Analizi

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Özet

Türkiye'de 2024 yılı itibarı ile Açıköğretim yolu ile hizmet veren dört üniversite bulunmaktadır. Bu üniversitelerin özellikle ön lisans ve lisans düzeyinde birçok program sunduğu ve çok çeşitli derslere yer verdiği görülmektedir. Araştırmada, 2023-2024 öğretim yılı itibarı ile bu üniversitelerin Açıköğretim aracılığı ile sunduğu program sayıları ve bu programların derecelerine göre dağılımı, ders sayıları, ders kredileri (AKTS) ve derslerin tekil ve/veya ortak dağılımının analizi sunulmuştur. Araştırmada, nitel araştırma yöntemlerinden biri olan doküman analizi yöntemi kullanılmış; veriler, dört üniversitenin resmî web sitelerinde yayımlanmış olan program bilgilerine dayanarak toplanmıştır. Çalışma kapsamında, ders kredilerinin dağılımı, ortak kullanılan derslerin programlara göre dağılımı, dönemlik olarak verilen ders sayılarının program ve üniversitelere göre dağılımı gibi farklı açılardan analizi yapılmıştır. Her ne kadar ön lisans düzeyi en az 120 ve lisans düzeyi en az 240 kredi içerse de bu dört üniversitede, programların tasarımı ve derslerin kullanım şekillerinin (kredi, sayı, dağılım) farklı olduğu görülmüştür. Araştırma sonunda, elde edilen bulgulara göre Açıköğretim Sistemlerinde programların izlenmesi ve iyileştirilmesi süreci değerlendirilmiş, ölçme değerlendirme, ders kredilerinin belirlenmesi ve diğer standartlar açısından zorluklar, görüşler ve öneriler ortaya konmuştur. Bu araştırmanın, Türkiye'de yer alan Açıköğretim Sistemlerine, program geliştirme ve izleme süreci açısından katkı sağlayacağı düşünülmektedir.

Anahtar Kelimeler: Yükseköğretim, Açık ve Uzaktan Öğrenme, Program Geliştirme, Program Değerlendirme, Doküman Analizi

Giriş

Türkiye'de yükseköğretim hizmeti veren dört üniversiteden açıköğretim sistemine göre öğretim yapmaya ilk olarak Anadolu Üniversitesi 1982 yılında Açıköğretim Fakültesinin kurulmasıyla başlamıştır. Merkezi Açıköğretim yetkisi de Anadolu Üniversitesinde bulunmaktadır (Açık Yükseköğretim Yönetmeliği, 1982; Anadolu Üniversitesi, 2024). Daha sonra 2010 yılında Atatürk Üniversitesi ve İstanbul Üniversitesi açıköğretim faaliyetlerinde bulunmaya başlamıştır (Atatürk Üniversitesi, 2024; İstanbul Üniversitesi, 2024). Son olarak ise Ankara Üniversitesi 2020 yılında açıköğretim hizmeti sunmaya başlamıştır (Ankara Üniversitesi, 2024). Açıköğretim sistemlerinde programların sayısı zaman içinde artmış ve buna bağlı olarak okutulan dersler de çeşitlilik göstermeye başlamıştır. Örneğin Anadolu Üniversitesinde 1982-1983 öğretim yılında İktisat ve İşletme Lisans Programlarının 1. sınıfında tüm dersler ortak olarak okutulurken 2023-2024 öğretim yılında bu iki programın 1. sınıfında (1 ve 2. yarıyıllarda) yüksek oranda farklı derslerin okutulduğu görülmektedir (Öncü & Süral, 2024). Programların ders listeleri; okutulması gereken derslerle ilgili çeşitli mevzuatlarda güncelleme yapılması, program amaç ve çıktılarının zamanın ruhuna uygun olarak güncellenmesi ve okutulan bir dersin içeriğinin güncelliğini yitirmesi gibi nedenlerle değiştirilebilmektedir. Güncellenen veya yeni eklenen derslerin, başka derslerde de yer alması durumunda öğrenciler aynı konuyu farklı derslerde tekrar alabilmektedir. Ayrıca bir programda yapılan ders değişiklikleri diğer programları da etkileyebilmektedir. Programda yer alan içerilerin hem kendi hem de diğer programları kapsayacak şekilde sistematik olarak ele alınmaması, özellikle açık ve uzaktan öğretim yapan kurumlarda müfredatın birbiriyle çakışan ya da tekrar eden içeriklerden oluşmasına neden olabilmektedir.

Avrupa'da yer alan ülkelerde alınan eğitimin tanınması kararı doğrultusunda Yükseköğretimle İlgili Belgelerin Tanınmasına İlişkin Sözleşme (Lizbon Tanıma Sözleşmesi) Avrupa ülkeleri arasında 1997 yılında imzalanmıştır. Daha sonra ise Bologna Üniversitesinin 600. yılı olan 1999 yılında yayınlanmış olan Bologna Bildirisi imzalanmış ve Bologna Sürecinin ilk adımları atılmıştır. Bu sürecin 2010 yılına kadar tamamlanması amaçlanmıştır (Kehm, 2010). Bologna Bildirisi, ülkelerin belirlenen hedeflere ulaşılabilmesi için kalite ve standardizasyon ile ilgili süreçleri içinde barındırmaktadır. Avrupa ülkelerinde yükseköğretimin yanı sıra ilgili dereceleri (ön lisans, lisans, yüksek lisans, doktora) ülkeler arasında tanınması, öğrenci hareketliliği, yaşam boyu öğrenme ve derslerin sayılması için düzenlenen Avrupa Kredi Transfer Sistemi (AKTS) konularında Bologna Süreci kapsamında standartlar belirlenmiştir. Türkiye'deki tüm yükseköğretim kurumları, Yükseköğretim Kurumunun (YÖK) da

yönlendirmesi ile Bologna Sürecine uyum göstermek için çalışmalarda bulunmaktadır. Ayrıca, Türkiye, Temel Yeterlilikler Çerçevesini oluşturmuş ve Avrupa Yeterlilikler Çerçevesine dahil olmuştur (Baykal, 2017). "YÖK'ün Yükseköğretimde Yeniden Yapılanma: 66 Soruda Bologna Süreci Uygulamaları" adlı kılavuzuna göre; ön lisans programlarında en az 120 AKTS ve lisans programlarında en az 240 AKTS kredinin okutulması, bir öğretim yılında 60 AKTS, bir dönemde ise 30 AKTS dersin okutulması, 1 AKTS kredisinin dersi alan öğrencinin ders yükü göz önünde bulundurularak 25-30 saate karşılık getirilmesi, ders ve kredi transferlerinin Bologna Sürecine uygun bir şekilde yapılarak öğrenci hareketliliğinin etkin kılınması gerekmektedir (Yükseköğretim Kurulu, 2010). Ancak, Türkiye'de açıköğretim sistemine göre öğretim yapan dört üniversitede seçmeli ders uygulaması bulunmadığı için programların ders listeleri oluşturulurken AKTS matematiğine uygun olarak derslerin kredilendirilmesi ve ölçme ve değerlendirme işlemleri belirli sınırlılıklara göre tasarlanabilmektedir. Mevcut ders listelerinin değiştirilmesi, kayıtlı öğrencileri de doğrudan etkilediği için bu güncelleme kısıtlı olarak yapılabilmektedir. Artan değişime rağmen; insan, kaynak ve zamanın kısıtlı olması programların birlikte ve sistematik olarak ele alınmasını kaçılmaz hale getirmiştir. Bu bağlamda, yükseköğretim kurumlarının program ve dersler ile ilgili özel veri tabanları ve uzman gruplar oluşturarak çalışma yapmaları kaçınılmaz hale gelmiştir.

Roberts (2015) yükseköğretim kurumlarının müfredatla ilgili kararlar alırken; eğitimsel amaçlar, disiplin (alan), eğitim-öğretim, öğrenciler, akademik kimlik, kurumsal kimlik, araştırma ve toplumsal-politik bağlamı göz önünde bulundurması gerektiğini ifade etmektedir. Law (2022) müfredat değişiklikleri ile ilgili akademisyenin görüşlerinin yönetim tarafından dikkate alınması gerektiğini ancak değişiklikler yapılırken idari personel ve alan uzmanı desteğinin önemini vurgulamaktadır. Ayub Khan vd. (2015) Yükseköğretim kurumlarının müfredat değişikliklerini planlı ve kapsamlı olarak bütüncül bir yaklaşımla yapması gerektiğinin altını çizmektedir. Detaylı inceleme ve analiz yapılmadan programlarda yapılacak değişiklikler, gelecekte akademik ve idari sorunlar yaratma ihtimalini artırmakta, soyut ve somut kaynakları verimsiz kullanmaya sebep olmaktadır. Brooman vd. (2015) programlarda okutulan dersler için öğrencilerin sesine kulak verilmesinin önemini vurgularken derslerle ilgili öğrencilerden gelen geribildirimlerin dersteki öğrencilerin akademik performansıyla beraber değerlendirilmesinin gerektiğini ifade etmektedir. Clifford & Montgomery (2017) ise yükseköğretim kurumlarının ders müfredatlarında evrensel standartları yakalaması gerektiğini vurgulamaktadır.

Literatür incelendiğinde; bir programda okutulan derslerin farklı üniversitelerde nasıl yer aldığına ilişkin karşılaştırmaların yapıldığı görülmekle birlikte, bütüncül olarak birden fazla üniversitenin tüm programlarında okutulan derslerin karşılaştırılmasıyla ilgili çalışmaya rastlanmamıştır. Bu nedenle araştırma, Türkiye'de Açıköğretim Sistemine göre öğretim yapan yükseköğretim kurumlarının mevcut program ve ders yapısını ortaya koyması bakımından önem taşımaktadır. Bu çalışmada Türkiye'de açıköğretim sistemine göre öğretim yapan Üniversitelerin resmî web sitelerinde yer alan 2023-2024 öğretim yılına ait bilgilere göre; program, derece, yarıyıl, ders kodu, ders adı ve AKTS kredileri incelenmiştir. Bu bağlamda araştırmada dört üniversite için aşağıdaki sorulara yanıt aranmıştır.

1. Programların derece (ön lisans/lisans) bazında dağılımı nasıldır?
2. Tekil ders ve ortak ders sayılarının dağılımı nasıldır?
3. Yarıyıl bazında ders sayılarının dağılımı nasıldır?
4. Programlarda yer alan toplam ve yarıyıl bazlı ortalama ders sayıları nedir?

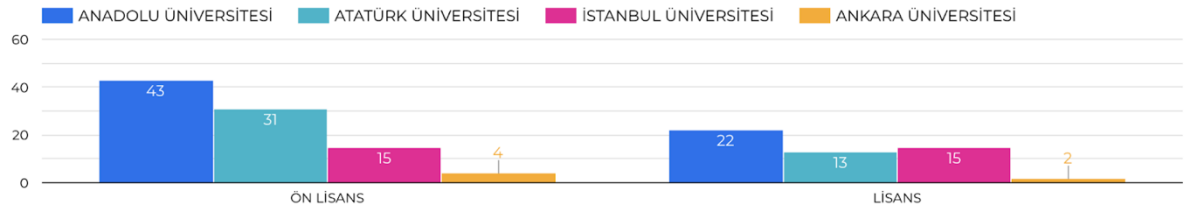
Yöntem

Bu çalışmada nitel araştırma yöntemlerinden doküman analizi yöntemi kullanılmıştır (Creswell, 2013). Veri toplamak için mülakat, doğrudan gözlem, katılımcı gözlem, somut eserler ve arşiv kayıtları kullanılabilmektedir (Yin, 2009). Bowen (2009) doküman analizinin aşamalarını analitik bir şekilde; dokümanları bulma, seçme, değerlendirme ve sentezleme olarak sıralamaktadır. Bu araştırmada doküman analiziyle ilgili Bowen'ın sıraladığı adımlar izlenmiştir. Araştırmada ilk olarak dört üniversitenin resmî web sitesinde yer alan tüm dersler bir veri tabanında toplanmış, daha sonra Google Data Studio uygulaması üzerinden veriler incelenmiş ve araştırma sorularına uygun olarak incelenmiştir. Son aşamada ise araştırmada elde edilen bulgular değerlendirilmiş, karşılaştırmalı analizler yapılmış ve önerilerde bulunulmuştur.

Üniversitelerin web sitelerinde yayınladıkları program ve ders bilgilerinde, farklı programda aynı isimle yer alan derslerin birbirinden farklı olmadığı varsayılarak ilgili analizler yapılmıştır.

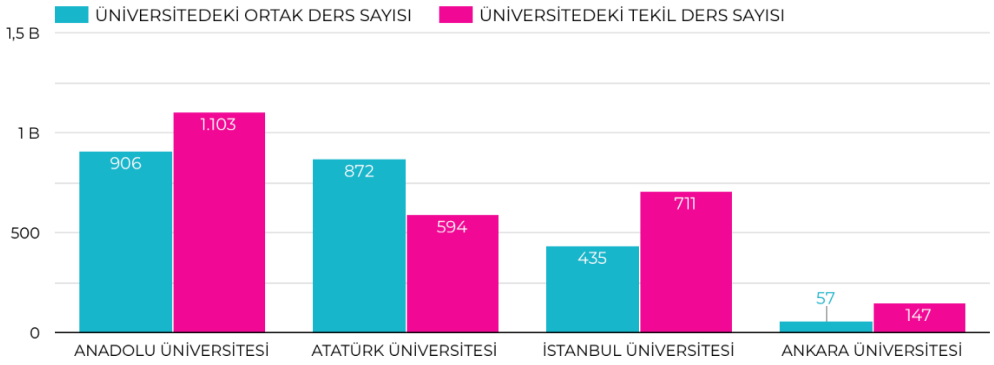
Bulgular ve Yorum

Çalışmada elde edilen bulgular, aşağıda yer almaktadır.



Grafik 1. Derecelerine Göre Program Sayıları

Grafik 1'de üniversitelerin derecelerine göre program sayıları gösterilmektedir. Grafik 1'e göre en fazla ön lisans programları sırasıyla Anadolu Üniversitesi (43), Atatürk Üniversitesi (31), İstanbul Üniversitesi (15) ve Ankara Üniversitesinde (4) bulunurken en fazla lisans programı ise sırasıyla Anadolu Üniversitesi (22), İstanbul Üniversitesi (15), Atatürk Üniversitesi (13) ve Ankara Üniversitesinde (2) bulunmaktadır. Anadolu Üniversitesinde öğrenci alımı yapılmayan Adalet Ön Lisans Programı ile Özel Güvenlik ve Koruma Ön Lisans Programları bu çalışma kapsamında araştırmaya dahil edilmiştir. 1981 yılında faaliyete başlayan Anadolu Üniversitesi Açıköğretim Sisteminin, en fazla ön lisans-lisans programlarına sahip olduğu görülmüştür. Aynı yıl hizmete başlayan Atatürk ve İstanbul Açıköğretim Sistemleri karşılaştırıldığında 2024 yılı itibarı ile Atatürk Üniversitesinin, İstanbul Üniversitesi'ne göre 2 kat daha fazla ön lisans programı açtığı görülmüştür. Lisans programlarında ise İstanbul Üniversitesi'nin önde olduğu görülmüştür.



Grafik 2. Toplam Ders Sayıları ve Tekil Ders Sayıları

Grafik 2'ye göre üniversitelerin tüm programlarındaki toplam ders sayıları ve program havuzundaki tekil ders sayıları gösterilmektedir. Tekil ders sayıları hesaplanırken, farklı programda aynı isimde verilen dersler tek bir ders olarak hesaplanmıştır. Buna göre Anadolu Üniversitesinde toplam 2.009 ders varken tekil ders sayısı 1.103, Atatürk Üniversitesinde toplam 1.466 ders varken tekil ders sayısı 594, İstanbul Üniversitesinde toplam 1.146 ders varken tekil ders sayısı 711, Ankara Üniversitesinde toplam 204 ders sayısı varken tekil ders sayısı 147'dir. Belli derslerin farklı programlarda ortak olarak kullanılması, Açıköğretim Sistemlerini daha verimli ve etkili kullanmayı sağlayabilir. Ancak ders içeriklerinin değişimi, güncellenmesi, kredisinin hesaplanması ve ölçme değerlendirme süreçlerinde ortak dersler göz önünde bulundurulmalıdır. Sistem verimliliği açısından bakılacak olursa, Atatürk Üniversitesi Açıköğretim Sisteminin 594 dersi toplamda 1466 yerde kullandığı görülmüştür. Bu da daha az dersle daha fazla program oluşturulduğunu göstermektedir. İstanbul Üniversitesi'nde tekil olarak kullanılan ders sayısı daha fazla iken, en son faaliyete başlayan Ankara Üniversitesinde ise tekil olarak kullanılan ders sayısı çok daha yüksektir. Açıköğretim Sistemlerinin faaliyete başladığı yıllar göz önüne alındığında program sayısının artması ile birlikte ortak olarak kullanılan ders sayılarının da arttığı söylenebilir.

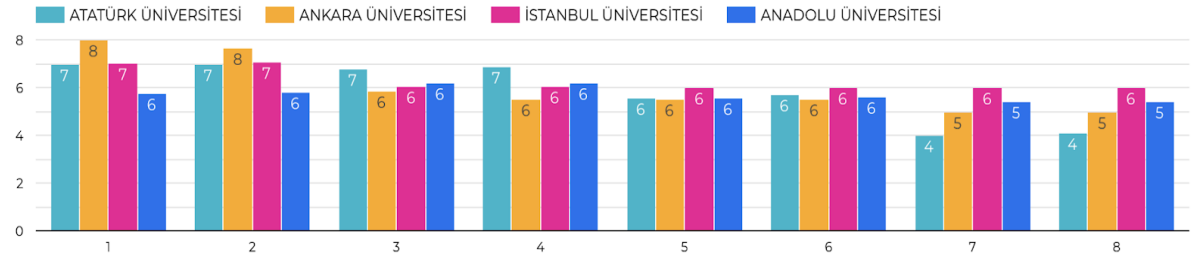
Bu dağılımların daha iyi anlaşılabilmesi adına Tablo 1'de ilgili Açıköğretim Sistemlerinde en çok okutulan derslerden ilk 5'i derece bazında sunulmuştur (YÖK Zorunlu Dersler olan Atatürk İlkeleri ve İnkılap Tarihi, Türk Dili ve Yabancı Dil dışında).

Tablo 1. YÖK Zorunlu Dersler Dışında Üniversitelerde En Çok Okutulan Dersler (İlk 5)

Üniversite	Ders Adı	Ön Lisans	Lisans	Toplam
Anadolu Üniversitesi	Hukukun Temel Kavramları	15	11	26
	Genel İşletme	8	6	14
	Temel İlk Yardım Bilgisi	9	2	11

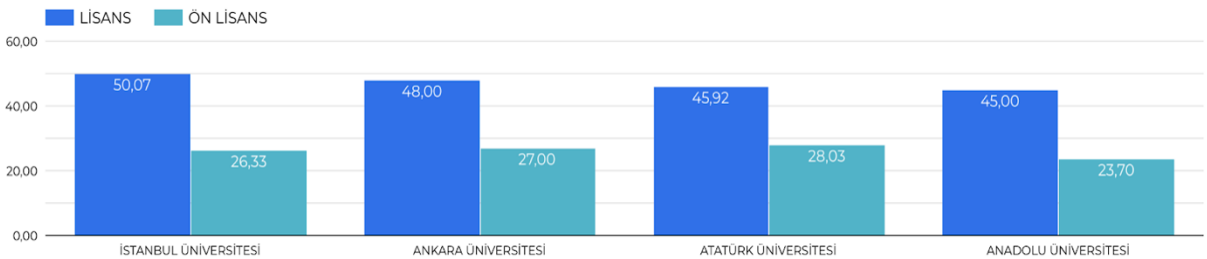
	İktisada Giriş I	2	9	11
	İktisada Giriş II	2	9	11
Ankara Üniversitesi	Grafik Tasarım	2	1	3
	Algoritmalar ve Programlama	2	1	3
	Medya, İletişim ve Teknoloji	2	1	3
	Web Tasarımı	1	2	3
	Sistem Analizi ve Tasarımı	2	1	3
Atatürk Üniversitesi	Temel Bilgi Teknolojileri I	28	11	39
	Temel Bilgi Teknolojileri II	26	8	34
	Hukukun Temel Kavramları	23	7	30
	İşletme Bilimlerine Giriş	17	3	20
	İktisada Giriş	12	6	18
İstanbul Üniversitesi	İşletme Yönetimi	4	7	11
	Hukukun Temel Kavramları	3	8	11
	İstatistik	2	6	8
	İnsan Kaynakları Yönetimi	2	6	8
	Örgütsel Davranış	2	5	7

Tablo 1 incelendiğinde, Atatürk Üniversitesi ortak okutulan dersler bakımından en yüksek sayılara sahip olup Temel Bilgi Teknolojileri I dersi 28 ön lisans ve 11 lisans olmak üzere toplam 39, Temel Bilgi Teknolojileri II dersi 26 ön lisans ve 8 ön lisans olmak üzere toplam 34, Hukukun Temel Kavramları dersi ise 23 ön lisans ve 7 lisans programı olmak üzere toplam 30 programda okutulmaktadır. Anadolu Üniversitesinde ise Hukukun Temel Kavramları dersi, en fazla programda okutulan ders olup bu ders 15 ön lisans ve 11 lisans programında olmak üzere toplam 26 programda okutulmaktadır. Ankara Üniversitesi Açıköğretim Sistemi'nin 2020 yılında hizmete başladığı göz önüne alındığında, diğer 3 Açıköğretim Sistemi içinde dersleri en fazla ortak olarak kullanan Sistemin Erzurum Atatürk Üniversitesi olduğu söylenebilir. Bu noktada, aynı derslerin hem lisans hem de ön lisans programlarında okutulması, bu derslerin içerik, güncelleme, yenileme, ders kredisi belirleme, intibak ve ölçme-değerlendirme süreçlerinde çok daha dikkatli olunmasını gerektirmektedir.



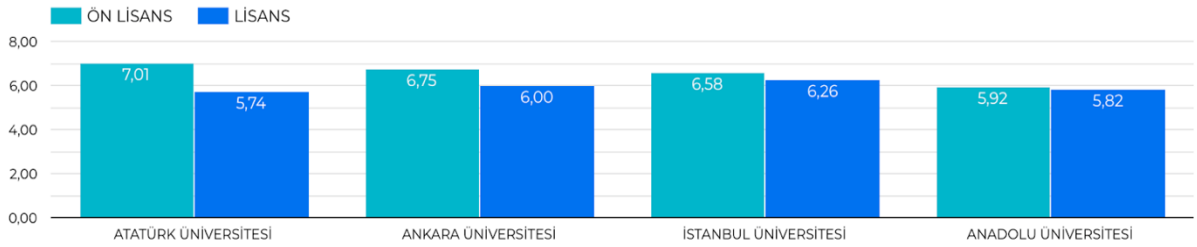
Grafik 3. Yarıyıl Bazında Ders Sayılarının Ortalaması

Ön lisans ve lisans derecesinde sunulan programlarda, yarıyıl bazında ders sayılarının tam yuvarlanmış ortalama değerleri, Grafik 3'te gösterilmektedir. Bir yarıyılda okutulan ortalama ders sayısı en fazla ilk 2 yarıyılda Ankara Üniversitesinde (8) olup en az ders sayısı ise 7 ve 8. yarıyıllarda Atatürk Üniversitesindedir (4). Bu veriler incelendiğinde, genel olarak tüm Açıköğretim Sistemlerinde ilk 2 yarıyılda çok daha fazla ders verildiği görülmektedir. Özellikle YÖK zorunlu derslerin bu dönemlerde yer alması, bu sayının artışında başroldedir.



Grafik 4. Derece Bazında Programların Toplam Ders Sayılarının Ortalaması

Grafik 4'te derece bazında tüm programların bütün yarıyıllarındaki toplam ders sayılarının ortalama değerleri gösterilmektedir. Lisans programında en yüksek değer İstanbul Üniversitesinde (50,07) iken ön lisans programında en yüksek değer Atatürk Üniversitesindedir (28,03). Anadolu Üniversitesi ön lisans (23,70) ve lisans (45,00) düzeyinde en düşük değerlere sahiptir. Tüm Açıköğretim Sistemlerinde ön lisans programlar için toplam 120, lisans programları için toplam 240 kredi olduğu göz önüne alınırsa, İstanbul Üniversitesi Açıköğretim Sistemi lisans programlarında ders kredilerinin, diğer sistemlerdeki lisans programlarına göre daha düşük olduğu söylenebilir. Ders kredi ortalamalarını lisans ve ön lisans seviyesinde en yüksek olduğu sistemin Anadolu Üniversitesi olduğu görülmektedir.



Grafik 5. Derece Bazında Bir Yarıyılda Okutulan Ders Sayılarının Ortalaması

Derece bazında tüm programların bir yarıyılında ortalama okutulan ders sayılarının gösterildiği Grafik 5'e göre ön lisans düzeyinde en yüksek değer Atatürk Üniversitesinde (7,01) iken en düşük değer Anadolu Üniversitesindedir (5,92). Lisans düzeyindeki en yüksek değer İstanbul Üniversitesinde (6,26) iken en düşük değer Atatürk Üniversitesindedir (5,74).

Tartışma ve Sonuç

Araştırmada elde edilen bulgulara göre, Anadolu Üniversitesi Açıköğretim Sisteminin en fazla programa ve derse sahip olduğu, bunun da kuruluş tarihine bağlı olduğu ileri sürülebilir. Aynı yıl kurulmasına rağmen, Atatürk Üniversitesi'nin, İstanbul Üniversitesi'ne göre çok daha fazla ön lisans programı sunduğu görülmüştür. Program sayılarının daha hızlı artmasına ek olarak, Atatürk Üniversitesi Açıköğretim Sisteminde ortak derslerin, tekil derslere göre çok daha fazla olduğu görülmüştür (Grafik 2). En fazla verilen ilk 5 ders incelendiğinde de (Tablo 1) tüm Açıköğretim Sistemlerinde aynı derslerin farklı derecelerde okutuldukları görülmüştür. Açıköğretim Sistemlerinde program tasarımı yapılırken derslerin ortak kullanımı verimlilik sağlayabilir. Ancak özellikle bu derslerin yer aldığı yarıyıl, hitap ettiği hedef kitle özellikleri ve ölçme-değerlendirme süreçlerinin dikkate alınması gerekir. Aynı dersin hem ön lisans hem de lisans seviyesinde farklı yarıyıllarda verilmesi, ön lisans öğrencileri için zorlayıcı olabilirken, lisans öğrencileri için de tekrara veya zaman kaybına yol açabilir. Bu zorluk, program sayılarının ve ortak okutulan derslerin artışı ile tüm Açıköğretim Sistemleri için geçerlidir. Uzun vadede ders veya programlarda yapılacak değişiklikler (intibak), ders içeriklerinin güncellenmesi ve ders kredilerinin tekrar belirlenmesi gibi çalışmalarda özel bir bakış açısı gerekli olacaktır. Tüm üniversitelerde yarıyıl bazında ortalama ders sayısına bakıldığında; programların ilerleyen yarıyıllarında ders sayısının düştüğü görülmektedir (Grafik 3). YÖK zorunlu derslerin ilk yılda sunulması, bu durumu belirleyen öncelikli faktörler arasındadır. Açıköğretim Sistemlerinin tamamına bakıldığında ders sayısı veya yarıyıl bazlı dağılım değişse de program bazında öğrencilere tek bir seçenek sunulmaktadır. Öğrencilere, alan içi veya alan dışı farklı ders seçenekleri (seçmeli ders sistemi) sunulmamaktadır.

Mezun olabilmek için gerekli kredi açısından, Türkiye'deki tüm Açıköğretim Sistemleri ön lisans için 120, lisans için 240 krediyi zorunlu tutmaktadır. Program başına düşen ortalama ders sayısına bakıldığında (Grafik 4) İstanbul Üniversitesi ilk sıradayken ön lisans düzeyinde ise Atatürk Üniversitesi ilk sıradadır. Bu kapsamda Anadolu Üniversitesi her iki düzeyde de ortalama olarak en az dersi dolayısıyla en fazla ders başı ortalama krediyi sunmaktadır. Krediler genel olarak her programda yer alan öğrencilerin iş yüklerine göre hesaplanırken, derslerin farklı program ve derecelerde okutulması, bu hesabın yapılmasını zorlaştırmaktadır. Özellikle program güncelleştirme süreçlerinde ders kredilerinde yapılacak bir değişiklik, ilgili tüm programları etkileyebilmektedir. Derslerin verildiği programlardaki kredileri incelendiğinde oranları farklı olmakla birlikte Türkiye'deki tüm Açıköğretim Sistemlerinde aynı derslerin yeri geldiğinde farklı krediler ile sunulabildiği görülmüştür. Ders içerikleri ve ölçme değerlendirme yöntemleri aynı olan derslerde kredilerin farklı olması bir tartışma konusu olurken, diğer taraftan çok farklı programlarda yer alan öğrenciler için de iş yüklerinin hesaplanması diğer bir tartışma konusudur. Aynı ders, bir programda yer alan öğrenciler için daha az iş yükü ile tamamlanabilirken, farklı bir programda yer alan öğrenciler için daha farklı bir iş yükü oluşturabilmektedir.

Alanyazın incelendiğinde Türkiye'de yer alan Açıköğretim Sistemlerini makro düzeyde karşılaştıran bir çalışmaya rastlanmamıştır. Savaş ve Ekergil (2019) Türkiye'deki üniversitelerde Sağlık Yönetimi Programlarında Muhasebe ve Finansman derslerinin durumunu araştırmış ve bu derslerin yeterince okutulmadığı sonucunu elde etmiştir. Türkiye ve yurtdışındaki üniversitelerin spesifik programlarında yapılan incelemelerde de okutulan derslerin farklılık gösterdiği sonucunu elde eden çalışmalar bulunmaktadır (Özdemir Akgül vd., 2021; Üstün & Deregözü, 2021). Türkiye'de yaklaşık 3 milyon öğrencinin aktif olarak yer aldığı Açıköğretim programlarının etkili, verimli ve sürdürülebilir şekilde devam ettirilebilmesi için program tasarımlarının çok daha ayrıntılı olarak incelenmesi, iyi örneklerin ortaya konabilmesi ve çok paydaşlı tartışmalara ve araştırmalara yer verilmesi gerekir.

Öneriler

Türkiye'de Açıköğretim hizmeti sunan kurumların program tasarımı, izlenmesi, iyileştirilmesi ve değerlendirilmesi açısından farklı uzmanlardan oluşan ekiplerin hem kendi içlerinde hem de sistemler arasında ortak çalışma yürütmesinin önemi ortaya çıkmıştır. Bu noktada, çalışma kapsamında elde edilen bulgular ve araştırmacıların görüşleri ile kurum ve araştırmacılara bazı öneriler sunulabilir.

Ortak dersler kullanılarak oluşturulan bir sistemde, tek bir uzman grubunun tek başına çalışması yeterli değildir. Bu nedenle program sorumlularının (uzman/koordinatör/bölüm başkanı); öğrenci işleri, içerik, ölçme değerlendirme, istatistik ve program geliştirme uzmanlarından oluşan bir komisyon ile birlikte bütüncül bir bakış açısı ile değerlendirmesi önem taşımaktadır. Hatta bu komisyonda, program sorumlularının sadece dikey anlamda kendi programlarını değerlendirdikleri bir yapı ile birlikte, belli alanlar belirlenerek farklı programda okutulan derslerin takibi için alan koordinatörlerinin belirlenmesi de önemlidir. Bu komisyon; öğrenci-mezun görüşleri, öğrenme analitikleri (içerik ve malzeme kullanımı), ders ve program başarıları, öğrenci durumları (aktif, pasif, ortalama mezuniyet süresi vb.), program ve alan uzmanları, dış değerlendirme kurulu görüşleri ve kalite raporlarından yararlanabilmelidir.

Program sayılarının artırılması ya da yapılacak program geliştirme çalışmaları kapsamında farklı programlarda okutulan ortak derslerin yönetimi özel bir hassasiyet gerektirmektedir. Bu derslerin, verilen her programdaki sorumlu/koordinatör/bölüm başkanı tarafından aynı anda yönetilmesi zor olacağı için, derslerin temel bir programla ilişkilendirilerek ana sorumlularının belirlenmesi (ders aidiyeti) karar vermeyi kolaylaştırabilir.

Avrupa Kredi Transfer Sistemine uyumlu olarak, ders kredilerinin belirlenmesi, seçmeli ders çalışmalarının yapılabilmesi ve mikro-kredi gibi yeniliklere hızlı uyum sağlanabilmesi için programların önce kendi içinde, sonra birbirleri arasındaki tutarlılığı büyük önem taşımaktadır. Gerektiğinde programların ders bazlı değil ünite/modül seviyesinde de bölünerek kullanılması verimliliği artırabilir.

Sınırlılıklar

Bu çalışma, araştırmanın yapıldığı tarihte ilgili üniversitelerin resmî web sitelerinden erişilen bilgiler ile sınırlıdır.

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Okul Öncesi Öğretmen Adaylarının Uzaktan Eğitim ile İlgili Görüşleri

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ÖZET

Uzaktan eğitim, pandemi, doğal afet, savaş gibi olağanüstü durumlarda veya eğitimde teknolojinin artan önemi nedeniyle genel politikaların değişmesi durumunda örgün eğitimin yerini alabilecek bir eğitim yöntemidir. Bu çalışmanın amacı, okul öncesi öğretmen adaylarının uzaktan eğitime ilişkin algılarını belirlemek ve uzaktan eğitime hazırlık düzeylerini incelemektir. Böylece, uzaktan eğitimin okul öncesi eğitimdeki yeri, önemi, avantajları ve dezavantajları hakkında öğretmen adaylarının görüşleri ortaya konulacak ve uzaktan eğitim için akıllı teknolojilerdeki kritik paradigma değişimlerini keşfetmek için çıkarımlarda bulunacaktır.

Yapılan alanyazın taramasında okul öncesi öğretmenliği öğretmen adayları ile yapılan bir çalışmaya rastlanılmamıştır. Bu çalışmanın bulguları, uzaktan eğitim sürecinde öğretmen adaylarının ihtiyaçlarını, beklentilerini, zorluklarını ve çözüm önerilerini belirlemek için bir temel oluşturabilecektir. Çalışmamızda, nitel araştırma desenlerinden durum çalışması benimsenmiştir. Araştırmanın evrenini, Marmara Üniversitesi Atatürk Eğitim Fakültesi Okul Öncesi Öğretmenliği Bölümünde öğrenim gören 3. ve 4. sınıf öğrencileri oluşturmaktadır. Örneklem seçimi, gönüllülük esasına göre yapılmıştır. Bu kriterlere göre, 21 öğretmen adayı çalışmaya katılmıştır. Veri toplama aracı olarak görüşme kullanılmıştır. Görüşme formu araştırmacılar tarafından oluşturulmuş, okul öncesi eğitimi alanında uzman 3 öğretim üyesine görüşleri için iletilmiştir. Uzman görüşlerinin dönütleri doğrultusunda sorular yeniden düzenlenmiş ve son olarak 6 soru olarak belirlenmiştir. Soruların anlaşılırlık düzeyini kontrol etmek için bir öğretmen adayı ile pilot görüşme gerçekleştirilmiş ve anlamı daha net ortaya koyacak kelime düzenlemeleri ile son hali elde edilmiştir. Görüşmeler araştırmacılar tarafından transkript edildikten sonra açık kodlama ile kodlanmıştır.

Çalışmanın sonucunda, okul öncesi öğretmen adaylarının uzaktan eğitime ilişkin algılarının farklılık gösterdiği, ancak genel olarak uzaktan eğitimin okul öncesi eğitimde yeterli olmadığı yönünde bir görüşe sahip oldukları ortaya çıkmıştır. Bu sonuç, uzaktan eğitimin okul öncesi eğitimdeki yeri, önemi, avantajları ve dezavantajları hakkında daha fazla araştırma yapılması gerektiğini göstermektedir. Ayrıca, uzaktan eğitim için akıllı teknolojilerdeki kritik paradigma değişimlerini keşfetmek için eğitim programlarının geliştirilmesi ve güçlendirilmesi gerektiği sonucuna ulaşılmıştır. Bu çalışmanın sınırlılıkları, örneklem grubunun bir üniversiteden seçilmesi, veri analiz yönteminin içerik analizi ile sınırlı kalması olarak sayılabilir.

Anahtar Kelimeler: Uzaktan Eğitim, Okul Öncesi Aday Öğretmen, Okul Öncesi Eğitim

ABSTRACT

Distance education is an education method that can replace formal education in extraordinary situations such as pandemics, natural disasters, wars, or if general policies change due to the increasing importance of technology in education. The purpose of this study is to determine the perceptions of pre-school teacher candidates regarding distance education and to examine their preparedness levels for distance education. Thus, the opinions of prospective teachers about the place, importance, advantages and disadvantages of distance education in pre-school education will be revealed and inferences will be made to discover critical paradigm shifts in smart technologies for distance education.

In the literature review, no study was found with pre-school teacher candidates. The findings of this study can provide a basis for determining the needs, expectations, difficulties and solution suggestions of prospective teachers in the distance education process. In our study, case study, one of the qualitative research designs, was adopted. The population of the research consists of 3rd and 4th grade students studying at Marmara University Preschool Teaching Department. Sample selection was made on a voluntary basis. According to these criteria, 21 teacher candidates participated in the study. Interview was used as a data collection tool. The interview form was created by the researchers and sent to 3 faculty members who are experts in the field of preschool education for their opinions. In line with the feedback of expert opinions, the questions were rearranged and finally determined as 6 questions. A pilot interview was held with a prospective teacher to check the clarity level of the questions, and the final version was obtained with word arrangements that would reveal the meaning more clearly. After the interviews were transcribed by the researchers, they were coded with open coding.

As a result of the study, it was revealed that pre-school teacher candidates' perceptions of distance education differed, but in general they had the opinion that distance education was not sufficient in preschool education. This result shows that more research is needed on the place, importance, advantages and disadvantages of distance

education in pre-school education. Additionally, it was concluded that educational programs should be developed and strengthened to explore critical paradigm shifts in smart technologies for distance education. The limitations of this study can be listed as the sample group being selected from a university and the data analysis method being limited to content analysis.

Key Words: Distance Education, Preschool Candidate Teacher, Preschool Education

GİRİŞ

Çağdaş uygarlığın bilgi düzeyi, bilim ve teknolojideki gelişmelerle artmıştır. Toffler'in "üçüncü dalga" olarak adlandırdığı aşama, "bilgi çağı" olarak tanımlanabilir. Bu dönemde toplumlar bilgiye ulaşma yolları farklılaşmakta ve eğitim alanı da bu yönde düzenlenmektedir. İletişim teknolojilerinin hızlı gelişimi, internet tabanlı eğitimin yaygınlaşmasına yol açmıştır (Ataş, 2017).

Uzaktan eğitim, öğrenci ve öğretmenin farklı mekanlarda olduğu ve zaman ile mekândan bağımsız olarak öğrenmeye imkan tanıyan bir eğitim sistemidir. Aslantaş (2014) bu eğitim türünün e-learning ve web tabanlı eğitim gibi isimlerle anıldığını ve dünya genelinde artan başarılı uygulamalarıyla ilgi gördüğünü belirtmiştir. Uşun (2006) ise uzaktan eğitimi, öğrenci ile eğitim kaynağı arasındaki etkileşim üzerinden yürütülen bir süreç olarak tanımlar. Gök ve Kılıç-Çakmak (2020) farklı fiziksel ortamlardaki öğretmen ve öğrencilerin bilgi teknolojileri aracılığıyla birbirine bağlandığı uygulamalar olarak açıklarlar. Banar ve Fırat (2015) herhangi bir merkezden sunulan, öğrenen odaklı ders materyalleri ile bireysel öğrenmeyi amaçlayan ve sanal ortamlarda yürütülen bir yöntem olarak uzaktan eğitimi tanımlarlar. Avrupa Birliği, uzaktan eğitimi, eğitim faaliyetlerinin kalitesini artırmak için internet ve çoklu ortam teknolojileri kullanılarak kaynaklara erişim, bilgi değişimi ve iş birliğinin sağlanması olarak tanımlamıştır (Yalçınkaya, 2006). Aydın (2011) ise, her yaştan bireyin zaman ve mekan sınırları olmaksızın öğrenmelerini sağlayan ve nitelikli eğitime erişimi kolaylaştıran çağdaş bir eğitim sistemini ifade eder. Uzaktan eğitim, yüz yüze eğitimden temel olarak öğrenen ve öğretenin farklı mekanlarda bulunmasıyla ayrılır. Ayrıca, farklı zaman ve mekanlarda gerçekleşebilir, öğretim tasarımı ve tekniklerini gerektirir, çeşitli teknolojilerle iletişim kurulmasını sağlar ve özgün kurumsal ve yönetimsel yapılanma gerektirir. Yüz yüze eğitimle benzerlik gösteren yönleri ise, aynı eğitim felsefesi, yaklaşımlar, yöntemler, modeller ve tekniklerin kullanılabilmesidir (Korucuk, 2023).

Uzaktan eğitim, ilk olarak 1892'de Wisconsin Üniversitesi kataloğunda yer alan bir terimdir. 1906'da aynı üniversitenin yöneticisi William Lighty tarafından bir yazıda kullanılmıştır. Daha sonra Alman eğitimci Otto Peters tarafından 1960'larda ve 1970'lerde Almanya'da tanıtılmış ve Fransa'da uzaktan eğitim kurumlarına isim olarak verilmiştir (İşman, 2008).

Günümüzde uzaktan eğitim, öğrencilerin fiziki bir okul ortamına ihtiyaç duymadan, zaman ve mekân serbestliği içinde bireysel olarak yerleşik bulunduğu ortamda eğitilmesi olarak tanımlanmaktadır.

Uzaktan eğitim sistemi, 1800'lü yılların son çeyreğinden günümüze kadar önemli değişmeler geçirmiştir. İşman (2008) ve Demiray ve İşman (2005) uzaktan eğitimin tarihsel gelişimini beş evrede ele almaktadır: "Mektupla öğretimden önceki evre, mektupla öğretimin yoğun kullanıldığı evre, öğretimsel tek yönlü radyo ve televizyon uygulamalarını içeren evre, öğretimsel çift yönlü radyo ve televizyon uygulamaları içeren evre ve uydular ve geleceğin teknolojilerinin kullanıldığı evre". Bilgi ve iletişim teknolojileri, uydular gibi teknolojilerin kullanımını içerir. Bugün gelinen en son nokta diyebileceğimiz sanal öğrenme ortamlarıdır. Özellikle internet teknolojilerinin yaygınlaşması sanal öğrenmeye doğru gidişte hızlı bir artışın olduğunu söylemek mümkündür.

Türkiye'de uzaktan eğitim, 1961'de Millî Eğitim Bakanlığı'nın Mektupla Öğretim Merkezi'ni kurmasıyla başlamış ve zamanla çeşitli kurumlar ve programlar aracılığıyla gelişmiştir. Önemli kilometre taşları arasında 1974'te Mektupla Yükseköğretim Merkezi'nin, 1983'te Anadolu Üniversitesi Açık Öğretim Fakültesi'nin açılması, 1990'larda Okul Radyosu ve TV Okulu'nun eğitimi desteklemesi, 1992'de Açık Öğretim Lisesi'nin ve 1997'de Açık İlköğretim Okulu'nun kurulması yer alır. Ayrıca, 1992'de Fırat Üniversitesi Radyo-TV'nin, 1998'de ODTÜ'de İnternete Dayalı Asenkron Eğitim (IDE-A) ve Bilgi Teknolojileri Sertifika Programı'nın başlatılması, 2000'den itibaren Sakarya Üniversitesi'nin İnternet Destekli-Asenkron Öğretim çalışmaları, İstanbul Bilgi Üniversitesi'nin e-MBA programı ve Ahmet Yesevi Üniversitesi'nin çeşitli programları bu gelişimin parçalarıdır (Atıcı, 2006).

COVID-19 pandemisi sırasında Türkiye'de eğitim sistemi, yüz yüze öğretimden uzaktan eğitime hızlı bir geçiş yapmıştır. İlk COVID-19 vakasının tespit edilmesinin ardından, 16 Mart 2020'de okullar kapatılmış ve 23 Mart 2020'den itibaren TRT EBA TV ve Eğitim Bilişim Ağı (EBA) aracılığıyla uzaktan eğitim başlamıştır. EBA üzerinden öğrencilere ders içerikleri, videolar ve etkinlikler sunulmuş, Mayıs 2020'de canlı ders uygulamalarına geçilmiştir. Yükseköğretimde ise ilk olarak üç haftalık bir ara verilmiş, sonrasında 2020 bahar dönemi tamamen uzaktan eğitimle tamamlanmıştır (Çakır, Taban ve Taşer, 2023; YÖK, 2020). Pandemi, eğitim sistemlerini zorlayarak "Acil Uzaktan Eğitim" uygulamalarının gelişmesine neden olmuş, bu da özellikle kriz dönemlerinde eğitimin devamlılığını sağlamak için önemli bir yöntem haline gelmiştir. Türkiye, Avrupa ülkelerine göre virüsle daha geç karşılaşmış olsa da salgının yayılma hızının artmasıyla birlikte diğer ülkelerin deneyimlerinden yararlanarak tedbirlerini şekillendirmiştir (Dolmaz ve Metin, 2021; Telli, Altun, 2020; Keskin, Kaya, 2020; Altın, Gündoğdu, 2021).

Pandemi, özellikle okul öncesi çocuklar üzerinde sosyal ve eğitimsel etkiler bırakmış, sosyalleşme ihtiyacını karşılayamayan çocuklar için olumsuz deneyimlere yol açmıştır (Baysan, 2022; Pınar, 2021). Yüksel ve Aybaş (2023) araştırmalarında COVID-19 salgının çocuklar üzerindeki etkilerinin uzun dönemli olduğu kısıtlama ve yasakların sona ermesine rağmen halen devam ettiği tespit etmiştir. Uzaktan eğitimin ihtiyaç haline gelmesi ile öğretmenlerin teknolojiyi kullanma yeterlilikleri de değerlendirilmeye başlanmıştır (Merç, 2015). Ülkelerin Covid-19'a karşı verdiği mücadelede eğitim-öğretimin aksamaması adına dijital teknolojilerden yararlanılmıştır (Rehab, 2021). Ancak öğretmenlerinin teknoloji kullanmadaki yeterliliklerinin yanı sıra sistemin de altyapı, içerik, kalite, tasarım gibi açılardan güçlendirilmesi gerektiği görülmektedir (Alsuwidan, 2018).

Bu kapsamda yapılan araştırmalar okul öncesi eğitim alanında yaşanılan sorunlara değinerek çözüm önerileri sunmayı amaçlamaktadır. Gayatri'nin (2020) çalışmasına göre, öğretmenler ve ebeveynler, çevrimiçi öğrenme sürecinde çocukların bilişsel, sosyal ve duygusal gelişimini desteklemekte önemli bir rol oynamaktadır. Kurupınar ve Kanmaz (2023) ise pandemi sürecinde öğrenme kayıplarının, psikomotor, sosyal-duygusal, dil, öz bakım, bilişsel ve akran ilişkisi gibi çeşitli gelişim alanlarında gözlemlendiğini belirtmektedir. Tunca ve Bay (2022) araştırmasında, okul öncesi öğretmenlerinin çoğunlukla oyun etkinliklerini tercih ettikleri, aynı zamanda gösteri, uygulama ve soru-cevap tekniklerini de kullandıkları vurgulanmıştır. Öğretmenler, derslerinde doğal malzemelere önem vermiş ve Zoom programını kullanarak uzaktan eğitim yürütmüşlerdir. Okul öncesi öğretmenleri, uzaktan eğitim dönemi ve çocuklar üzerindeki etkileri konusunda çoğunlukla olumsuz görüş belirtmiştir. Kuset ve arkadaşları (2021) pandemi sürecinde okul öncesi öğretmenleri ile yaptıkları araştırmada, öğretmenlere yönelik eğitimlerin artırılması ve uzaktan eğitime aile katılımının dahil edilmesi önerisinde bulunmuşlardır. İnan (2021) ise erken çocukluk eğitimcilerinin COVID-19 salgını sırasında karşılaştığı zorlukları incelediği araştırmasında, uzaktan eğitimin farklı yollarını keşfetmeleri ve çocukların öğrenimini desteklemek için yenilikçi yaklaşımlar kullanmaları gerektiğini vurgulamıştır. Ona göre eğitimciler, uygulamalarını yeniden gözden geçirmeli ve yeni normalde yeni öğretme ve öğrenme yollarını keşfetmelidir.

Bu bağlamda araştırmamız, okul öncesi öğretmen adaylarının uzaktan eğitime karşı algılarını tespit etmeyi ve aldıkları eğitimin uzaktan eğitime geçilmesi durumunda yeterli olup olmadığını sorgulamayı amaçlamaktadır.

YÖNTEM

Bu araştırma, nitel araştırma yöntemlerinden durum çalışması ile gerçekleştirilmiştir. Durum çalışması, belirli bir durumu, olguyu veya olayı derinlemesine incelemeyi ve anlamayı amaçlayan bir araştırma desenidir. Bu çalışmada, uzaktan eğitim sürecinde okul öncesi öğretmen adaylarının ihtiyaçları, beklentileri, zorlukları ve çözüm önerileri gibi konulara ilişkin görüşleri incelenmiştir. Araştırmanın evrenini, 2023-2024 eğitim-öğretim yılında Marmara Üniversitesi Atatürk Eğitim Fakültesi Okul Öncesi Öğretmenliği Bölümünde öğrenim gören 3. ve 4. sınıf öğrencileri oluşturmaktadır. Örneklem seçimi, gönüllülük esasına göre yapılmıştır.

Veri toplama aracı olarak görüşme kullanılmıştır. Görüşme, nitel araştırmalarda sıkça kullanılan bir veri toplama tekniğidir. Görüşme, araştırmacının katılımcılarla yüz yüze veya online olarak iletişim kurarak, onların görüşlerini, deneyimlerini, duygu ve düşüncelerini anlamasını sağlar. Bu çalışmada, yarı yapılandırılmış görüşme formu kullanılmıştır. Yarı yapılandırılmış görüşme formu, araştırmacının önceden belirlediği soruları katılımcılara sormasını, ancak aynı zamanda sorulara ek açıklama yapmasını, soru sırasını değiştirmesini veya yeni sorular eklemesini de mümkün kılan bir görüşme türüdür.

Görüşme formu araştırmacılar tarafından oluşturulmuş, okul öncesi eğitimi alanında uzman 3 öğretim üyesine görüşleri için iletilmiştir. Uzman görüşlerinin dönütleri doğrultusunda sorular yeniden düzenlenmiş ve son olarak 6 soru olarak belirlenmiştir. Soruların anlaşılırlık düzeyini kontrol etmek için bir öğretmen adayı ile pilot görüşme gerçekleştirilmiş ve anlamı daha net ortaya koyacak kelime düzenlemeleri ile son hali elde edilmiştir. Görüşme formundaki sorular şunlardır:

- Size göre okul öncesi eğitimde uzaktan eğitim uygulamalarının avantajları nelerdir? Bu avantajların çocuğun gelişimine etkileri neler olabilir?
- Size göre okul öncesi eğitimde uzaktan eğitim uygulamalarının dezavantajları nelerdir? Bu dezavantajların çocuğun gelişimine olumsuz etkileri neler olabilir?
- Uzaktan eğitim vermeniz durumunda hangi etkinlik türlerini tercih edersiniz?
- Uzaktan eğitim vermeniz durumunda velilerin katılım düzeylerini etkileyebilecek faktörler neler olabilir?
- Uzaktan eğitim vermek için aldığınız örgün eğitimin yeterli olduğunu düşünüyor musunuz?
- Uzaktan eğitim uygulamalarına hazır hale gelmek için nasıl bir destek almak istersiniz?"

Verilerin analizi için, nitel verilerin sistematik bir şekilde tanımlanması, sınıflandırılması ve yorumlanması için kullanılan bir veri analizi yöntemi olan içerik analizi kullanılmıştır. İçerik analizi, verilerin kodlanması,

temaların oluşturulması ve bulguların sunulması aşamalarından oluşmaktadır (Dereli-İman, Deli, 2022). Bu aşamalar, araştırmacı tarafından NVivo 12 nitel veri analizi programı kullanılarak gerçekleştirilmiştir. Verilerin kodlanması, açık kodlama tekniği ile yapılmıştır. Açık kodlama, verilerin satır satır okunarak, anlamlı birimlere ayrılması ve bu birimlere kod adları verilmesi işlemidir. Elde edilen kodlar, benzerlik ve farklılıklarına göre gruplandırılarak temalar oluşturulmuştur. Bulguların sunulmasında, temalar, kodlar ve katılımcı alıntıları kullanılarak, betimsel olarak anlatılmıştır.

BULGULAR

Tablo 1. 'Size göre okul öncesi eğitimde uzaktan eğitim uygulamalarının avantajları nelerdir? Bu avantajların çocuğun gelişimine etkileri neler olabilir?' sorusuna ilişkin frekans dağılımı

Tema	*f*
Teknoloji kullanımı açısından avantaj	9
Eğitimde fırsat eşitliği	1
Ekonomik açıdan avantaj	3
Bilişsel gelişimi destekler	4

Tablo 1 incelendiğinde, öğretmen adaylarının okul öncesi eğitimde uzaktan eğitim uygulamalarının avantajlarına ilişkin görüşleri sorusuna verdikleri cevaplar analiz edilmiş ve kodlama sonucunda dört farklı tema altında toplanmıştır. Bu temalar; Teknoloji kullanımı açısından avantaj, Eğitimde fırsat eşitliği, Ekonomik açıdan avantaj ve Bilişsel gelişimi destekler şeklinde sıralanmaktadır. Öğretmen adayları tarafından en çok vurgulanan tema, Teknoloji kullanımı açısından avantaj (*f*=9) olmuştur. Diğer temalar ise sırasıyla; Bilişsel gelişimi destekler (*f* =4), Ekonomik açıdan avantaj (*f* =3) ve Eğitimde fırsat eşitliği (*f* =1) olarak belirlenmiştir. Öğretmen adayları tarafından verilen cevaplara ilişkin örnekler şöyledir:

- *Katılımcı 10: " Uzaktan eğitim, her yerde eğitim için avantajlıdır, okula ulaşamayan çocukların eğitim alması bakımından önem arz etmektedir." (Eğitimde fırsat eşitliği)*
- *Katılımcı 4: "Zaman ve erişebilirlik açısından ekonomik olmasıyla avantajlı bir uygulama. Aynı zamanda çocuklara çağa uyumlanma ve teknoloji kullanımı fırsatını erkenden sunmasıyla da olumlu bir etkisi bulunabilir." (Teknoloji kullanımı açısından avantaj) (Ekonomik açıdan avantaj)*

Tablo 2. Size göre okul öncesi eğitimde uzaktan eğitim uygulamalarının dezavantajları nelerdir? Bu dezavantajların çocuğun gelişimine olumsuz etkileri neler olabilir? Sorusuna ilişkin frekans dağılımı

Tema	*f*
Sosyalleşmeyi engelleme	11
İletişim eksikliği	4
Akranlar arası etkileşim eksikliği	8
Dil ve bilişsel gelişimin olumsuz etkilenmesi	8
Ekran süresinin artıp fiziksel aktivitenin azalması	2
Güven ve iletişim problemlerinin yaşanması	1
Sosyal becerilerin gelişememesi	4

Tablo 2 incelendiğinde, öğretmen adaylarının okul öncesi eğitimde uzaktan eğitim uygulamalarının dezavantajlarına ilişkin görüşleri sorusuna verdikleri cevaplar analiz edilmiş ve kodlama sonucunda yedi farklı

tema altında toplanmıştır. Bu temalar; Sosyalleşmeyi engelleme, İletişim eksikliği, Akranlar arası etkileşim eksikliği, Dil ve bilişsel gelişimin olumsuz etkilenmesi, Ekran süresinin artıp fiziksel aktivitenin azalması, Güven ve iletişim problemlerinin yaşanması ve Sosyal becerilerin gelişememesi şeklinde sıralanmaktadır. Öğretmen adayları tarafından en çok vurgulanan tema, Sosyalleşmeyi engelleme (*f* =11) olmuştur. Diğer temalar ise sırasıyla; Akranlar arası etkileşim eksikliği ve Dil ve bilişsel gelişimin olumsuz etkilenmesi (her ikisi de *f* =8), Sosyal becerilerin gelişememesi ve İletişim eksikliği (her ikisi de *f* =4), Ekran süresinin artıp fiziksel aktivitenin azalması (*f* =2) ve Güven ve iletişim problemlerinin yaşanması (*f* =1) olarak belirlenmiştir. Öğretmen adayları tarafından verilen cevaplara ilişkin örnekler şöyledir:

- *Katılımcı 6: "Çocukların etkileşime girebilecekleri sosyal bir ortam yoktur. Ayrıca karşılaştıkları sorunlarda geribildirim almaları zordur. Bu durumda çocukların hata denetimi eksik kalacağı için bilişsel; sosyalleşemedikleri için de hem sosyal hem de motor gelişimleri olumsuz etkilenecektir." (Akranlar arası etkileşim eksikliği) (Dil ve bilişsel gelişimin olumsuz etkilenmesi) (Sosyalleşmeyi engelleme)*
- *Katılımcı 9: "Sosyalliğin en aza indiği ve ekran süresinin maksimumda olduğu bir eğitim olurdu." (Sosyalleşmeyi engelleme)*

Tablo 3. Uzaktan eğitim vermeniz durumunda hangi etkinlik türlerini tercih edersiniz? Sorusuna ilişkin frekans dağılımı

Tema	***f***
Çocukların aktif katılımını ve hareketli olmasını sağlayan etkinlikler	8
Sosyalleşmeyi ve iletişimi artıracak grup çalışmaları ve oyunlar	2
Farklı alanlarda (sanat, dil, matematik, fen, teknoloji vb.) etkinlikler	11
Müzik etkinlikleri	5
Bilişsel gelişimi destekleyen etkinlikler	1
Aile katılımı etkinlikler	2
Açık hava etkinlikleri	1

Öğretmen adaylarının 'Uzaktan eğitim vermeniz durumunda hangi etkinlik türlerini tercih edersiniz?' sorusuna verdikleri cevaplar analiz ve kodlama sonucunda yedi tema belirlenmiştir. Bu temalar; Çocukların aktif katılımını ve hareketli olmasını sağlayan etkinlikler (*f* =8), Sosyalleşmeyi ve iletişimi artıracak grup çalışmaları ve oyunlar (*f* =2), Farklı alanlarda etkinlikler (sanat, dil, matematik, fen, teknoloji vb.) (*f* =11), Müzik etkinlikleri (*f* =5), Bilişsel gelişimi destekleyen etkinlikler (*f* =1), Aile katılımı etkinlikler (*f* =2) ve Açık hava etkinlikleri (*f* =1) şeklinde sıralanmıştır. Öğretmen adayları tarafından verilen cevaplara ilişkin örnekler şöyledir:

- *Katılımcı 2: "Çocukların aktif katılımını sağlayacak, sosyalleşmesine yardımcı olacak grup çalışmaları ve fiziksel olarak aktif olanlarını gerektirecek etkinlikler tercih ederdim." (Çocukların aktif katılımını ve hareketli olmasını sağlayan etkinlikler) (Sosyalleşmeyi ve iletişimi artıracak grup çalışmaları ve oyunlar)*
- *Katılımcı 10: "Sanat,Fen,Müzik" (Müzik etkinlikleri) (Farklı alanlarda (sanat, dil, matematik, fen, teknoloji vb.) etkinlikler)*

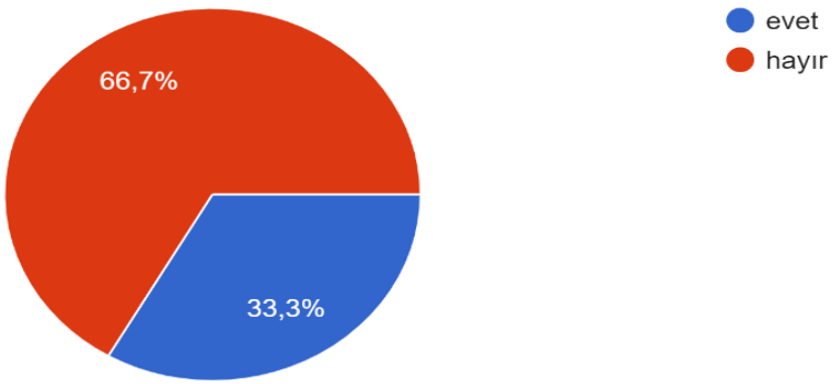
Tablo 4. Uzaktan eğitim vermeniz durumunda velilerin katılım düzeylerini etkileyebilecek faktörler neler olabilir? Sorusuna ilişkin frekans dağılımı

Tema	***f***
Etkinliklerin türü ve zamanlaması	9
Sosyoekonomik faktörler	2
Velilerin çalışma saatleri	4
Teknoloji kullanımı	2

Öğretmen adaylarının 'Uzaktan eğitim vermeniz durumunda velilerin katılım düzeylerini etkileyebilecek faktörler neler olabilir?' sorusuna verdikleri cevaplar analiz edilmiş ve kodlama sonucunda dört tema belirlenmiştir. Bu temalar Etkinliklerin türü ve zamanlaması (*f* =9), Sosyoekonomik faktörler (*f=2)*, Velilerin çalışma saatleri (*f* =4) ve Teknoloji kullanımı (*f=2)* olarak sıralanmıştır. Öğretmen adayları tarafından verilen cevaplara ilişkin örnekler şöyledir:

- *Katılımcı 8: "Gündüz saatlerinde meşgul olabilirler bu nedenle aile katılımı etkinliklerini akşam saatlerinde yaparsam daha fazla katılım sağlayabilirler." (Velilerin Çalışma Saatleri)*
- *Katılımcı 16: "Çocukların tek başına yapmakta zorluk çekeceği velileriyle yapması gereken etkinlikler verilebilir. Tabi her çocuk bu şartı sağlayamayabilir. Katılım düzeyinde çalışan velilerin çok aktif olacağı konusunda kararsızım." (Etkinliklerin Türü ve Zamanlaması)*

Grafik 1. Uzaktan eğitim vermek için aldığınız örgün eğitimin yeterli olduğunu düşünüyor musunuz? Sorusuna ilişkin grafik



Öğretmen adaylarına "Uzaktan eğitim vermek için aldığınız örgün eğitimin yeterli olduğunu düşünüyor musunuz?**"** sorusu, sorulduğunda, çoğunluğun ileride uzaktan eğitim vermek zorunda kaldıklarında aldıkları örgün eğitimin yetersiz olacağı cevabı verdiği görülmüştür.

Tablo 5. Uzaktan eğitim uygulamalarına hazır hale gelmek için nasıl bir destek almak istersiniz? Sorusuna ilişkin frekans dağılımı

Tema	***f***
Teknoloji Kullanımı ve Eğitim	9
Çocuk Psikolojisi ve Etkili Uzaktan Eğitim	4
Öğretmen Tecrübeleri ve Destek	4

Öğretmen adaylarına yöneltilen 'Uzaktan eğitim uygulamalarına hazır hale gelmek için nasıl bir destek almak istersiniz?' sorusuna verilen cevaplar analiz edilmiş ve kodlama sonucunda öğretmen adaylarının görüşleri üç ana tema altında toplanmıştır: Teknoloji Kullanımı ve Eğitim (*f* =9), Çocuk Psikolojisi ve Etkili Uzaktan Eğitim (*f* =4) ve Öğretmen Tecrübeleri ve Destek (*f* =4). Öğretmen adayları tarafından verilen cevaplara ilişkin örnekler şöyledir:

- *Katılımcı 2: "Online eğitim için bilişim teknolojileri kursları." (Teknoloji Kullanımı ve Eğitim)*
- *Katılımcı 13: "Öncelikle üniversite bazen yapılan uzaktan eğitim de eğer hocalarımız bizi derste yeterince aktif hale getirebiliyor mu buna bakarım. Yani bunun için eğitim veren kişilerin yeterli olması çok önemli. Onun dışında çocuklarla fiziki bir temas halinde değilken çocuk psikolojisini nasıl yürütebiliriz buna dair bir destek almak isterim. Onları uzaktan nasıl kontrol edeceğimize dair." (Öğretmen Tecrübeleri ve Destek) (Çocuk Psikolojisi ve Etkili Uzaktan Eğitim)*

SONUÇ

Okul öncesi öğretmen adaylarının uzaktan eğitime karşı algılarını tespit etmeyi ve aldıkları eğitimin uzaktan eğitime geçilmesi durumunda yeterli olup olmadığına ilişkin görüş ve değerlendirmelerinin incelendiği araştırmada, "Size göre okul öncesi eğitimde uzaktan eğitim uygulamalarının avantajları nelerdir? Bu avantajların

çocuğun gelişimine etkileri neler olabilir?" sorusuna verdikleri cevaplar ışığında dört ana tema ortaya çıkmış olup en çok vurgu yapılan temalar "teknoloji kullanımı açısından avantaj" ve "Bilişsel gelişimi destekler" olmuştur.

Araştırmaya katılan okul öncesi öğretmen adayları, "Size göre okul öncesi eğitimde uzaktan eğitim uygulamalarının dezavantajları nelerdir? Bu dezavantajların çocuğun gelişimine olumsuz etkileri neler olabilir?" sorusuna verdikleri cevaplar ışığında yedi ana tema ortaya çıkmış olup en çok vurgu yapılan temalar "Sosyalleşmeyi engelleme", "Akranlar arası etkileşim eksikliği" ve "Dil ve bilişsel gelişimin olumsuz etkilenmesi" olmuştur. Uzaktan eğitim sırasında bu dezavantajları en aza indirmek için çeşitli stratejiler ve müdahaleler geliştirilebilir. Örneğin, çocukların sosyal etkileşim ihtiyaçlarını karşılamak için sanal oyun grupları oluşturulabilir veya ekran süresini dengelemek için fiziksel aktiviteler teşvik edilebilir. Ayrıca, çocukların dil ve bilişsel becerilerini desteklemek için etkileşimli ve eğitici uygulamalar kullanılabilir. Araştırmada, teknoloji kullanımının ve bilişsel gelişimi desteklemenin önemli avantajlar olduğu belirlenmiştir. Mevcut araştırmalarla uyumlu olarak bu avantajlar eğitim fırsatlarına erişimi kolaylaştırırken, ekonomik ve zaman açısından da faydalar sağlamaktadır (İşman, 2011; Kaya, 2002). Ancak, öğretmen adayları, uzaktan eğitimin sosyalleşmeyi engellediği, akranlar arası etkileşim eksikliği yarattığı ve dil ile bilişsel gelişimi olumsuz etkileyebileceği konusunda endişelerini dile getirmişlerdir. Bu alanda yapılan araştırmalarda belirlendiği gibi dezavantajları en aza indirmek için çeşitli stratejiler ve müdahalelerin geliştirilmesi gerektiği vurgulanmıştır (Aktan Acar, vd., 2021; Başaran, vd., 2020; Öz, 2021; Tarlakazan, 2020; Yolcu & Kurt, 2021).

Araştırmaya katılan okul öncesi öğretmen adayları, "Uzaktan eğitim vermeniz durumunda hangi etkinlik türlerini tercih edersiniz?" sorusuna verdikleri cevaplar ışığında yedi ana tema ortaya çıkmış olup en çok vurgu yapılan temalar "Farklı alanlarda (sanat, dil, matematik, fen, teknoloji vb.) etkinlikler", "Çocukların aktif katılımını ve hareketli olmasını sağlayan etkinlikler" ve "Müzik etkinlikleri" olmuştur. Öğretmen adayları uzaktan eğitimde çeşitliliği ve çocukların aktif katılımını ön planda tutan etkinliklerin önemini vurgulamışlardır. Bu etkinliklerin, çocukların hem bilişsel hem de sosyal gelişimlerine katkıda bulunabileceği düşünülmektedir. Etkinlik seçimlerinde çocukların ihtiyaçları ve ilgi alanları göz önünde bulundurulmalıdır. Öğretmen adayları, uzaktan eğitimde çeşitliliği ve çocukların aktif katılımını ön planda tutan etkinliklerin önemini vurgulamışlardır. Bu etkinliklerin, çocukların hem bilişsel hem de sosyal gelişimlerine katkıda bulunabileceği düşünülmektedir.

Araştırmaya katılan okul öncesi öğretmen adayları, "Uzaktan eğitim vermeniz durumunda velilerin katılım düzeylerini etkileyebilecek faktörler neler olabilir?" sorusuna verdikleri cevaplar ışığında dört ana tema ortaya çıkmış olup bu temalar Etkinliklerin türü ve zamanlaması, Sosyoekonomik faktörler, Velilerin çalışma saatleri ve Teknoloji kullanımı olmuştur. Öğretmen adayları velilerin katılım düzeyleri ile ilgili soruya cevaplarında uzaktan eğitimin dezavantajlarına da değinilmiş ve bu dezavantajları telafi edecek yöntemler önerilmiştir. Etkinliklerin türü ve zamanlaması, sosyoekonomik faktörler, çalışma saatleri ve teknoloji kullanımı gibi faktörlerin veli katılımını etkileyebileceğini vurgulamaktadır. Karavida, Charissi ve Tympa (2021) "eğitimciyle iletişim kurmanın önemi" olarak belirttiği gibi, velilerin etkinliklere katılımını sağlamak için farklı zamanlamalar, etkinlik türleri ve çevrimiçi toplantılar gibi yöntemler önerilmektedir. Uzaktan eğitimde veli katılımı önemli bir konudur ve çeşitli yöntemlerle teşvik edilebilir. Farklı veli profilleri ve farklı koşullar farklı yöntemler gerektirebilir. Öğretmenler, çeşitli yöntemler kullanarak, engelleri göz önünde bulundurarak ve velilerle iletişimi açık tutarak veli katılımını en üst düzeye çıkarabilirler.

Araştırmaya katılan okul öncesi öğretmen adaylarının %66.7'si, aldıkları örgün eğitimin uzaktan eğitim vermek için yetersiz olduğunu ifade etmiştir. Bu oran, eğitim programlarının uzaktan eğitim becerilerini yeterince geliştiremediğini göstermektedir.

Araştırmaya katılan okul öncesi öğretmen adayları, "Uzaktan eğitim uygulamalarına hazır hale gelmek için nasıl bir destek almak istersiniz?" sorusuna verdikleri cevaplar ışığında üç ana tema ortaya çıkmış olup bu temalar "Teknoloji Kullanımı ve Eğitim", "Çocuk Psikolojisi ve Etkili Uzaktan Eğitim" ve "Öğretmen Tecrübeleri ve Destek" olmuştur. Öğretmen adaylarının uzaktan eğitim uygulamalarına hazırlanırken karşılaştıkları zorlukları ve ihtiyaç duydukları destekleri daha ayrıntılı bir şekilde yansıtmaktadır. Adaylar hem teknolojik becerilerini geliştirmek hem de öğrencilerin öğrenme deneyimlerini zenginleştirecek yöntemler öğrenmek istemektedirler. Ayrıca, çocukların uzaktan eğitim sürecindeki psikolojik ihtiyaçlarını anlamak ve onlara uygun stratejiler geliştirmek için de destek talep etmektedirler. Uzaktan eğitim uygulamalarının etkili bir şekilde uygulanabilmesi için öğretmenlerin ihtiyaçlarının ve beklentilerinin karşılanması büyük önem taşımaktadır. Bu ihtiyaçlar ve beklentiler doğrultusunda kapsamlı bir eğitim ve destek programı geliştirilmesi, uzaktan eğitimde kaliteli bir eğitim sunulmasına katkıda bulunacaktır. Öğretmen adayları, lisans eğitimlerinde daha fazla uzaktan eğitim odaklı içerik ve uygulama becerisi kazanmayı arzu etmektedirler. Altıok (2016) 'a göre uzaktan eğitimde uygun yöntem ve öğretim etkinlikleri kullanılır, öğrenen-eğitici arasındaki etkileşim kurulur ve öğrenene zamanında dönüt verilir ise yüz yüze eğitim kadar başarılı olunabilir. Aday öğretmenler bu tespit ile uyumlu olarak uzaktan eğitim uygulamalarına hazır hale gelmek için teknoloji kullanımı ve eğitim, çocuk psikolojisi ve etkili uzaktan eğitim, öğretmen tecrübeleri ve destek gibi konularda daha fazla destek talep etmektedirler.

Diğer çalışmalara uyumlu olarak araştırma sonuçlarına göre aday öğretmenler uzaktan fırsat eşitliği, zaman ve mekân bağımsızlığı, ekonomik olması, eğitimin sekteye uğramadan devam etmesi gibi olumlu algıya

sahip oldukları ortaya çıkmaktadır (Doğan ve Koçak, 2020; Yılmaz ve Güven, 2015). Ancak çalışmamız öğretmen adaylarının uzaktan eğitim konusundaki ihtiyaçları ve beklentilerini tespit etmek ve eğitim programlarının bu alandaki eksikliklerine yönelik düzenlenmesi açısından önemlidir. Uzaktan eğitim süreçlerini daha etkili hale getirmek için bilişim becerileri, pedagojik yaklaşımlar ve çocuk psikolojisi konularında daha fazla destek sağlanmalıdır.

ÖNERİLER

Okul öncesi öğretmen adaylarının uzaktan eğitimle ilgili ihtiyaçlarını ve beklentilerini karşılamak için lisans müfredatında aşağıdaki düzenlemeler yapılabilir:

Teknoloji Kullanımı ve Eğitim: Uzaktan eğitim araçlarını etkin kullanabilmek için öğretmen adaylarına teknoloji becerileri kazandırmak önemlidir. Bu nedenle, lisans müfredatına teknoloji eğitimi dersleri eklenmeli ve öğretmen adaylarına sanal sınıf yönetimi, çevrimiçi etkileşim araçları ve dijital içerik oluşturma konularında pratik bilgiler verilmelidir.

Çocuk Psikolojisi ve Etkili Uzaktan Eğitim: Uzaktan eğitim sürecinde çocukların psikolojik ihtiyaçlarını anlamak ve onlara uygun stratejiler geliştirmek için pedagoji ve psikoloji dersleri güncellenmelidir. Öğretmen adayları, çocukların dikkat süreçleri, ekran zamanı yönetimi ve çevrimiçi etkileşim ihtiyaçları konusunda bilinçlendirilmelidir.

Öğretmen Tecrübeleri ve Destek: Mentorluk programları oluşturularak deneyimli öğretmenlerle etkileşim sağlanmalıdır. Bu sayede aday öğretmenler, uzaktan eğitimde karşılaştıkları zorlukları paylaşabilir ve çözüm yolları bulabilirler. Ayrıca, öğretmen adaylarına uzaktan eğitimde etkili yöntemler ve stratejiler konusunda rehberlik edilmelidir.

Veli Katılımı: Velilerin uzaktan eğitim süreçlerine katılımını artırmak için lisans müfredatında veli iletişimi ve iş birliği konularına daha fazla vurgu yapılmalıdır. Velilere, uzaktan eğitimde nasıl destek olabilecekleri ve çocuklarının eğitimine nasıl katkı sağlayabilecekleri konusunda bilgi verilmelidir.

Sosyal Etkileşim: Uzaktan eğitimde sosyal etkileşimi artırmak için lisans müfredatında sanal oyun grupları oluşturmak, çocukların akranlarıyla etkileşimini sağlamak ve sosyal becerilerini geliştirmek için stratejiler sunmak gereklidir.

Bu düzenlemeler, okul öncesi öğretmen adaylarının uzaktan eğitim süreçlerini daha etkili ve verimli hale getirmelerine yardımcı olacaktır. Ayrıca, bu önerilerin uygulamaya geçmesi halinde, okul öncesi öğretmenler adaylarının uzaktan eğitimde daha donanımlı ve bilinçli olmaları sağlanabilir. Eğitim programlarının bu alanlardaki eksiklikleri gidermek için güncellenmesi ve öğretmen adaylarının ihtiyaçlarına yönelik destek sağlanması önemlidir. Uzaktan eğitimin geleceğin eğitim ortamında önemli bir rolü olabileceği için öğretmen adaylarının bu alanda hazırlıklı olmaları gerekmektedir.

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Problemli İnternet Kullanımının İlkokul Ve Ortaokul Sınıf Ortamlarına Etkilerinin Karşılaştırılması

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Özet

Teknolojinin gelişmesiyle birlikte günümüzde insanlar bilgiye kolay bir şekilde ulaşma, rutin işlerini kolaylaştırma ve ihtiyaçlarını karşılamada internetten yararlanmaktadır. İnternet ortamı bireylere çeşitli avantajlar sunmaktadır. İnternetin yaygın kullanımı bireylere birtakım avantajlar sağlamasının yanında birtakım olumsuzluklara da sebep olmaktadır. Çünkü bazı bireyler internet kullanımını sınırlandırabilirken, bazı bireyler internet kullanımını sınırlandırmakta güçlük çekmektedir. Bu durum da problemli internet kullanımına yol açmaktadır. Nitel araştırma yöntemlerinden durum çalışması ile yürütülen bu çalışmada problemli internet kullanımının ilkokul ve ortaokul sınıf ortamlarına etkileri araştırılmıştır. Katılımcılar, Türkiye'de Batı Karadeniz Bölgesinde Zonguldak ilinde Millî Eğitim Bakanlığına bağlı ilkokul ve ortaokullarda görev yapan kadrolu öğretmenlerdir. Araştırma sonunda; öğrencilerin internet ortamıyla çok daha erken yaşlarda tanıştıkları, internet ortamıyla birlikte meydana gelen birtakım olumsuzlukların tespit edilmemesi halinde artarak devam ettikleri görülmektedir. İlkokul ve ortaokul öğrencilerin gelişim ve yaş grubu özelliklerinin farklı olması nedeniyle problemli internet kullanımının sınıf ortamında oluşturduğu etkiler farklılaşmaktadır. İlkokulda problemli internet kullanımı sınıf ortamını orta şiddette etkilerken, ortaokulda bu oran yüksek şiddettedir. Problemli internet kullanımı ilkokulda sınıf yönetimini çok fazla etkilememekte, ortaokullarda sınıf yönetimini zorlaştırmaktadır. Sınıf yönetimi konusunda tecrübeye sahip olmayan öğretmenler, bu durumla baş etmede çözümsüz kalmaktadır. Problemli internet kullanımı akran ilişkilerini olumsuz yönde etkilemekte, özellikle ortaokullarda akran zorbalığı sonucu oluşan olumsuz davranışlar sınıf ortamını da bozmaktadır. Bu durum öğrencilerin derse katılımlarını ve derse karşı motivasyonlarını da olumsuz yönde etkileyerek akademik başarıyı düşürmektedir. Problemli internet kullanımına sahip olan öğrenciler sınıf kurallarına da uymamakta, bu durum olumsuz bir sınıf iklimine yol açmaktadır. Problemli internet kullanımına sahip olan öğrencilerin sahip olduğu davranış özelliklerini ve çözüm yollarını bilmek, gelecekte öğretmen adaylarına da kolaylık sağlayacaktır. Problemli internet kullanımının önemli başlangıç noktalarından birinin aileler olduğu tespit edilmiştir. Bu durum teknolojinin özellikle internetin bilinçli kullanımı konusunda veli eğitimlerinin artırılması gerektiğini ortaya koymaktadır. Özellikle okullarda rehber öğretmenlerin bu konuda yapılan çalışmaları artırması verimli sonuçlar üretebilir.

Anahtar Kelimeler: Problemli internet kullanımı, sınıf ortamı, ilkokul, ortaokul, durum çalışması.

Comparison of the Effects of Problemic Internet Use on Primary School and Secondary School Classroom Environments

Abstract

With the development of technology, people today use the internet to easily access information, facilitate their routine work and meet their needs. The internet environment offers various advantages to individuals. While the widespread use of the Internet provides some advantages to individuals, it also causes some negativities. Because while some individuals can limit their internet use, some individuals have difficulty limiting their internet use. This situation leads to problematic internet use. In this study, which was conducted with a case study, one of the qualitative research methods, the effects of problematic internet use on primary and secondary school classroom environments were investigated. The participants are permanent teachers working in primary and secondary schools affiliated with the Ministry of National Education in Zonguldak province in the Western Black Sea Region of Turkey. At the end of the research; It is seen that students are introduced to the internet environment at a much earlier age, and that some of the negativities that occur with the internet environment will continue to increase if they are not detected. Due to the different development and age group characteristics of primary and secondary school students, the effects of problematic internet use in the classroom environment vary. While problematic internet use affects the classroom environment moderately in primary school, this rate is high in secondary school. Problematic internet use does not affect classroom management much in primary schools, but makes classroom management difficult in secondary schools. Teachers who do not have experience in classroom management are left unable to cope with this situation. Problematic internet use negatively affects peer relationships, and negative behaviors resulting from peer bullying, especially in secondary schools, also disrupt the classroom environment. This situation negatively affects students'

participation in the lesson and their motivation towards the lesson, thus reducing academic success. Students with problematic internet use do not comply with classroom rules, and this leads to a negative classroom climate. Knowing the behavioral characteristics and solutions of students with problematic internet use will also make it easier for teacher candidates in the future. It has been determined that one of the important starting points of problematic internet use is families. This situation reveals the need to increase parent training on the conscious use of technology, especially the internet. Increasing the work done on this subject by guidance counselors, especially in schools, can produce fruitful results.

Key Words: Problematic internet use, classroom environment, primary school, secondary school, case study.

Giriş

Teknolojinin hızlı geliştiği günümüzde internet kullanımı günlük yaşamın vazgeçilmez bir teknolojisi haline gelmiştir. İnternet ortamı bireylere birtakım avantajlar sağlamaktadır fakat internetin bilinçsiz ve kontrolsüz kullanımı aksi durumlara da neden olmaktadır. Bireyin amaçsız ve plansız internet kullanımı, bireyin olumsuz davranışlara yönlendirebilecek durumlarla karşılaşma ihtimalini artmaktadır (Hebebci ve Shelley, 2018). Böylece bireyin davranışlarında bazı olumsuz sonuçlar görülmektedir (Caplan, 2005).Bireylerin internet kullanımlarını kontrol etmekte zorluklar yaşamaları, internetten uzak kaldıklarında zihinsel olarak internetle meşgul olmaları, internet bağlantısı kuramadıklarında sinirlilik, öfke ve saldırganlık gibi yoksunluk durumları yaşamaları ve bu durumun bireylerin akademik, mesleki, sosyal ve aile yaşamlarını olumsuz etkilemesi problemli internet kullanımının sonucudur (Young, 2011). Beard ve Wolf (2001), ise interneti aşırı kullanmanın bireyin gün içerisinde içinde bulunduğu ortamlarda (okul, arkadaş ortamları vb.) sorunlar oluşturduğunu belirtmektedir.

Problemli internet kullanımı; yoğun internet kullanımı sonucunda oluşan çok boyutlu bilişsel ve davranışsal belirtilerin, olumsuz akademik, sosyal ve mesleki sonuçlara neden olması olarak tanımlanmaktadır (Caplan, 2003, Caplan, 2005). Caplan (2003)'a göre problemli internet kullanımı, çevresel, ailevi, bireysel akademik/mesleki olumsuz, bazen de patolojik sonuçlara yol açan bilişsel, psikolojik ve davranışsal boyutların bir araya gelmesiyle oluşan bir sendromdur.Alan yazında sıklıkla problemli internet kullanımı ile internet bağımlılığı kavramına da sık sık rastlanmaktadır (Caplan (2002). Bu durumun internetin bilinçsiz ve kontrolsüz kullanımı ile bireyde gözlenen olumsuz durumlarla ortaya çıktığı söylenebilir. Davis (2001) ise, problemli internet kullanımını sadece bir davranış bağımlılığı olarak değil, aynı zamanda kişinin yaşamına olumsuz sonuçları olan, biliş ve davranışlarla belirli bir durum olarak nitelemiştir.Öyle ki (Lim ve Nam, 2018) tarafından problemli internet kullanımı, bireyin internet olmadığı zamanda kendini iyi hissetmemesi ifade edilmektedir. Bu olumsuz sonuçlar özellikle küçük yaştaki öğrencilerin edinmiş olduğu davranışların sınıf ortamına getirilmesine neden olmaktadır. Bunun yanında Cengizhan (2005)'e göre, okul çağındakiler üzerinde hem sosyal hem de akademik sorunlara neden olan problemli internet kullanımı; başarıyı düşürmekte ve sosyal ilişkileri zedelemektedir.

Çocuklar da yetişkinlerde olduğu gibi şiddet, erotizm, pornografik içerikli film veya sitelere internet ortamında kolaylıkla ulaşabilmektedir. Çocuklar internette oyun oynarken, arkadaşları ile sohbet ederken ya da sosyal medyada dolaşırken, gelişimlerini olumsuz etkileyebilecek birçok olumsuz içerikle karşı karşıya gelebilmekte, çoğu zaman da aileleri bu durumdan haberdar olmamaktadır. Şiddet içeren oyunlarla birlikte fiziksel zarar verme, vurma, ölümcül davranışlara maruz kalma gibi olaylar normalleşebilmekte, çocuklar birçok olumsuz durumu doğal bir olgu gibi kabul edip benimseyebilmektedir. İnternet kullanımı konusunda bilinçli olmayan çocuklar, kendilerine ya da ailelerine ait özel bilgileri sanal ortamda, yabancı insanlarla paylaşabilmekte, bu durum da onları taciz ve istismara açık hale getirmektedir (Karahisar, 2014). Yapılan çalışmaların daha çok ergenler üzerinde yoğunlaştığı görülmektedir.Oysaki çocukluk döneminde de problemli internet kullanımının sebep olduğu bir takım durumların tespit edilmesi gerekmektedir. Bu amaç doğrultusunda bu araştırmada problemli internet kullanımının sınıf ortamına etkileri ilkokul ve ortaokul öğrencileri açısından araştırılacaktır.

Yöntem

Bu çalışmanın amacı, internetin bilinçsiz ve kontrolsüz bir şekilde kullanımı sonucu oluşan problemli internet kullanımının oluşturduğu durumların ilkokul ve ortaokul sınıf ortamlarını nasıl etkilediğini ortaya koymaktır. Çalışmada nitel araştırma yöntemlerinden durum çalışması kullanılmıştır. Creswel (2014)' e göre durum çalışması, bilgilerin derinlemesine toplandığı; bir durumu,bir gerçek hayat olayı, mevcut sistem veya belirli bir durumdaki bir durumu derinlemesine anlamak için birden fazla bilgi kaynağının kullanılıp, durumun temalarının ortaya konulduğu nitel bir yaklaşımdır.

Katılımcılar

Araştırmanın katılımcılarını Türkiye'de Batı Karadeniz Bölgesi Zonguldak ilinde Millî Eğitim Bakanlığına bağlı görev yapan kadrolu 9 sınıf öğretmeni ve 11 branş öğretmeninden oluşturmaktadır. Sınıf öğretmenlerinin 5(%55)'i erkek, 4(%45)'ü kadın, branş öğretmenlerinin 2 (%19)'si erkek, 9 (%81)'u kadındır.

Veri Toplama Araçları

Araştırmada veri toplama aracı olarak araştırmacılar tarafından geliştirilen 20 sorudan oluşan "Problemli İnternet Kullanımına Yönelik Görüşme Formu" kullanılmıştır. Görüşme formu, iki bölümden oluşmaktadır. Birinci bölümde öğretmenlerin cinsiyeti, branşı, hizmet yılı gibi kişisel bilgilere yer verilmiştir. Formun ikinci bölümü öğretmenlerin problemli internet kullanımına sahip öğrencilere ilişkin deneyimlerinin olup olmadığı, problemli internet kullanımının sınıf ortamını ne derece etkilediği (0- Hiç etkisi yok 5- Orta 10- Çok etkilemektedir) gibi sorulardan oluşmaktadır. Formda ayrıca problemli internet kullanımının sınıf yönetimine etkileri, problemli internet kullanımına sahip öğrencilerin sahip olduğu davranışlar ve problemli internet kullanımına sahip öğrencilerde oluşan bilişsel, duyuşsal, akademik durumlara karşı çözüm önerileri yer almaktadır. Form yaklaşık 20 sorudan oluşmakta, cevaplama süresi yaklaşık 30 dakikadır.

Prosedürler

Verilerin toplanması sürecinde öncelikle sınıf öğretmenleriyle görüşmeler yapılmış, daha sonra Türkçe, Matematik, Fen Bilimleri, Sosyal bilimleri gibi branşlarda ortaokul öğretmenleriyle görüşmeler devam etmiştir. Katılımcılara araştırmanın içeriği, amacı, gönüllülük esası, süreç ve gizlilik hakkında bilgi verilmiştir. Görüşmeler bireysel olarak gerçekleşmiş, görüşmelerde ses kayıt cihazı kullanılmıştır.

Veri Analizi

Öğretmenlerle yapılan görüşmeler sonucu elde edilen veriler içerik analizi ile analiz edilmiştir. Toplanan veriler kavramsallaştırılmış, ortaya çıkan kavramlara göre mantıksal olarak kategorize edilmiş ve verileri açıklayan temalar belirlenmiştir (Yıldırım ve Şimşek,2013). Bu bağlamda araştırmacılar tarafından elde edilen notlar anlamlı bölümlere ayrılarak temalar haline getirilmiş, daha sonra bu temalar altında benzer anlama sahip bölümler kategorileştirilmiştir. Kategorilerin altında da belli temalar oluşturulmuştur. Katılımcılardan sınıf öğretmeni olanlara S1,S2,S3.., branş öğretmeni olanlara da B1,B2, B3..kodlaması yapılmıştır. Veriler, doğrudan alıntılarla italik olarak parantez içinde veri numarası verilerek belirtilmiştir.Araştırmadaki sorulara yönelik oluşturulan tema, kategori ve kodlar tabloda gösterilmiştir.

Tema	Kategori	Kod
Öğretmenlerin Problemli İnternet Kullanımı Deneyimleri	Problemli İnternet Kullanımının Etkileri	Sınıf ortamına etkileri
		Derse katılımlarına etkisi
		Ders başarısına etkileri
		Öğrenci motivasyonuna etkileri
		Akran ilişkilerine etkileri
		Akranlar Arası Zorbalık Durumları

Problemli İnternet Kullanımının Sınıf İklimine Etkileri	Sınıf Yönetimine Etkileri	Sınıf Kurallarına Uyum
		Öğrenci-Öğretmen İlişkisi
Problemli İnternet Kullanımının Tespiti ve Çözümü	Tespit ve Çözüm Yöntemleri	Problemli İnternet Kullanımının Kaynağı
		Sınıf İçi İstenmeyen Davranışları Çözmede Kullanılan Yöntemler
		Kullanılan Tespit Yöntemleri
		Çözüm Yöntemleri

Bulgular

Öğretmenlerin Problemli İnternet Kullanımına Yönelik Deneyimleri

Araştırmada öğretmenlere problemli internet kullanımına yönelik deneyimlerinin olup olmadığı sorulduğunda sınıf öğretmenlerinin %66'sı problemli internet kullanımına sahip öğrencilerle deneyim yaşadıklarını belirtmiştir.

"Oldu. Daha önceki sınıfımda oldu. Pandemiden sonra aldığım bir sınıfım vardı. Bir öğrencim vardı. Aslında çok başarılı, zeki bir çocuk. Çocuğun tek derdi internet. Çocuk ödev yapmıyor,sorumluluklarını yerine getirmiyor.Rehber öğretmenle görüştük, aile ile görüştük.Çocuğu bir türlü internetten koparamadık. Bizden mezun oldu ama çocuğu ben şu an takip ediyorum. Benzer davranışları yine devam ettiriyor. Aynı problem devam ediyor.Bu çocuk internetle ve oyunlarla vaktini geçiriyor. Çocuk bence liseye doğru kaybolacak. Bu durumun önünü alabilseydik, çocuk kendisini biraz çekebilseydi, otokontrolü sağlayabilseydi çocuğu kurtarabilirdik. Biz internetle 1990 yılından beri haşır neşiriz. 1990 sonrasındaki dönemde biz bunun etkilerini görmeye başladık. Sokağa çıkması gereken çocuk internetle yalnız kalıyor. İnternete gitmesini sağlayan da aile. İnternet ortamının faydasının ve zararının farkına varamadığı için, aile de bunu teşvik ettiği için artıyor. Zaten problemli internet kullanımının ortaya çıkmaması anormal olur. Çocuklar çünkü şu anda yasaklı şeylerin cazip gelmesi nedeniyle internetin renkli dünyasına kapılmış durumda." (S9)

Deneyim yaşamayan öğretmenler ise öğrencilerin interneti yaygın bir şekilde kullanmaları sonucu bir takım olumsuz durumlarla karşılaştığını belirtmektedir.

"Olmadı ama öğrencilerimizin aşırı şekilde internette zaman harcadıklarına şahit oldum. Velileriyle iletişim kurduğumuzda bunu bizzat müşahede ettim, gördüm ve belli bir sınırlama olmadığı sürece aşırı internet kullanımının çocuğun akademik başarısını olumsuz yönde etkilediğine şahit oldum. Bunun yanında bir takım davranışsal sorunlar da ortaya çıktığı tarafımdan gözlendi." (S8)

Ortaokul öğretmenlerinin problemli internet kullanımına yönelik deneyimlerine bakıldığında çoğunluğunun problemli internet kullanımından kaynaklanan sorunlar yaşadığı görülmektedir. Özellikle çoğu öğretmen, uzun süre internet kullanımından dolayı uyku problemleri yaşadıklarını vurgulamıştır.

"Özellikle çocukların uykusuz oldukları durumlarda bunun sebebinin genellikle gece boyunca oyun oynamaları. Yani en büyük gözlemlediğimiz problem bu oluyor. Bunun yanında günün 7-8 saatini geçirdiklerini ifade ediyor çocuklar ki yani okul dışında kalan zaman 7-8 saatini telefonla geçiriyorsa, sosyal medya ile geçiriyorsa bizim için çok fazla. Tabi ne oluyor derslerine çalışmıyorlar. Gözlerinde büyük problemler fark ediyoruz. Bunun sebebinin de genellikle telefona çok yakın bakmaktan kaynaklandığını görüyoruz." (B3).

Uyku problemi dışında öğrencilerin bilinçsizce farklı içerikleri içselleştirerek sınıf ortamına taşıdıkları görülmektedir. Bu durumun dikkat dağınıklığına da sebep olduğunu belirtmektedir. Özellikle öğrencilerin Tik Tok tarzı uygulamaları da sık sık kullandıkları görülmektedir.

"Şöyle ki fütursuzca izlediği şeylerden nasıl denir çoğunlukla izlenilen şeylerden dolayı belirli reklamlar önlerine düşüyor. Reklamlar biliyorsunuz hani tekrar edilmesi daha kolay daha ritmik şeyler olduğu için bilinçsizce bunu tekrarlıyor. Cinsel içerikli veya daha şiddet içerikli şeyleri derste durduk yere, kendini boş hissettiği zaman yüksek sesle söyleyebiliyor ama bunu bilinçsizce yapıyor çocuk. Diğerleri de ne oluyor, bir anda uyaran etkisi yapıyor. Hem kendisi uyarılmış oluyor çocuk bilinç altında hem de şöyle düşünün minimum 30 kişilik bir sınıfta, diğerleri de etkilenmeyen ya da kendini sınırlandıran ya da ailesi daha bilinçli olan öğrencilerde "Ne oluyor, bu nedir?" diyor. Onları da uyarmış oluyor ve böyle olunca kelebek etkisi yapabiliyor. Bu konuda sıkıntı yaşıyoruz. Ailelerine söylediğimizde ailelerinin sınırlandırdıklarını söylüyorlar ama hani beş dakika duruyor, altı dakika duruyor ama her an karşısında nelerin çıkabileceğini bilemiyoruz. İnternet ortamı bir sanal bir çöplük haline geldiği için böyle bir problem yaşıyoruz. Çok yakın zamanda bunu yaşadık. Öğrenciyi rehberlik servisine yönlendirdik. Birkaç hafta görüşmeler sürdü. Kesinlikle örneğin küfrediyor ama onun küfür olduğunun, ya da kötü bir şey olduğunun farkında değil. Cinsel içerikli bir şey söylüyor ama onun hani tabi ki gelişimi de fiziksel gelişimi de buna elvermediği için öyle bir şey olduğunun da farkında değil. Bu kez biz bunu açıklamakta sıkıntı yaşıyoruz. Bu mevzulardan daha akademik kısmına, sınıf rehber öğretmenliğinden İngilizce öğretmenliğine geçiş çok zor oluyor. Bu konuda sıkıntı yaşıyoruz."(B7).

Problemli İnternet Kullanımının Etkileri

Problemli İnternet Kullanımının Sınıf Ortamına Etkileri

Sınıf öğretmenlerine göre problemli internet kullanımı sınıf ortamını sınıfta bulunan problemli internet kullanımına sahip öğrenci sayısı kadar etkilemektedir. Bu tür öğrencilerin sayı olarak fazla olması sınıf ortamını olumsuz olarak etkilemektedir. Problemli internet kullanımı sınıf ortamına etkisi ayrıca öğrencilerin interneti kullanış amacına bağlı olarak değişmektedir. Fakat genel olarak problemli internet kullanımı sınıf ortamını olumsuz etkilemektedir.

"Yani bence bu sınıftaki öğrencilerin problemli interneti kaç kişinin kullandığına bağlı diye düşünüyorum.Çünkü interneti ben direkt olumsuz bir şey olarak düşünmüyorum. Çocuklar bunu olumlu anlamda kullanıyorsa sınıfın tamamı bunu olumlu anlamda kullanıyorsa ben iyi olduğunu düşünüyorum ama problemli internet kullanan öğrencilerimiz yani bunda sınır koyamayan, olumsuz şeylere yönelen öğrencilerimiz sınıfta sayı olarak çoksa tabi ki bu sınıf ortamını akademik başarının yanında davranış veya çocukların sosyal gelişimleri ya da sosyalleşmeleri anlamında çok olumsuz etkileyeceği, ya da sınıftaki ders performanslarını düşüreceğini düşünüyorum. Bu durum bir değişken. Sınıftaki öğrenci sayısı ne kadar problemli kullanırsa o kadar etkiler diye düşünüyorum." (S3).

Ortaokul öğretmenlerine göre ise, problemli internet kullanımı sınıf ortamını oldukça olumsuz yönde etkilemektedir. İnternetin kontrolsüz kullanımı öğrencilerin düşünme yetilerini azaltmakta ve düşünmeyi olumsuz yönde etkilemektedir.

"Çocuklar sürekli ekranda vakit geçirdikleri için derste stabil duramıyorlar. Sürekli ilgi dağınık veya tamamen beyin uyuşmuş durumda oluyor. Bu çok uç noktalarda etkiliyor bizi. Ben çok etkilediğini düşünüyorum." (B8).

Problemli İnternet Kullanımının Öğrencilerin Derse Katılımına Etkisi

Sınıf öğretmenlerine göre problemli internet kullanımı öğrencilerin derse katılımlarını olumsuz yönde etkilemektedir. Problemli internet kullanımına sahip öğrencilerin derse karşı ilgisiz olduklarını, dikkat dağınıklıklarının olduğunu, özellikle internette oynadıkları oyunu sınıf ortamında bulamamaktan dolayı derslerden çok çabuk sıkıldıklarını, derse katılımlarının az olduğunu belirtmektedir.

"Derse katılımlarını olumsuz etkiliyor. Derse hiç ilgisi olmuyor, derse karşı ilgi duymuyor, kafası o anda başka yerde olabiliyor. Hayal dünyasında ne yaşadığını bilmiyorum açıkçası. Olumlu etkilemiyor. Örnekleri var. Çocuğa baktığınızda gerçekten çocuk birçok şeyi yapabilecek düzeyde olmasına rağmen dersler onu ilgilendirmiyor. Onun dünyasında nasıl bir şey yaşıyor onu bilemiyoruz, onun ilgisini çekmiyor, onun ilgisini neden çekmiyor? İzlediği şeyler ya da bağımlısı olduğu herhangi bir teknolojik aletin etkisinden kaldığından dolayı olduğunu düşünüyorum." (S1)

Ortaokul öğretmenleri de sınıf öğretmenleri gibi problemli internet kullanımına sahip olan öğrencilerin dikkat dağınıklığına sahip olduklarını, dikkat çekmek için farklı şeylere yönelebileceklerini, derse dinlemeye karşı isteksiz olduklarını ya da hareketli olduklarını, öğrencilerin uykusuz okula geldiklerini belirtmektedir. İnternetin öğrencileri hazırcılığa alıştırdığını, problemli internet kullanımına sahip olan öğrencilerin internette

çok fazla zaman geçirdiklerinden dolayı fiziksel veya bilişsel yorgunluğa sahip olduklarını ve problemli internet kullanımının ders ile ilgili sorumluluklarını yerine getirmediğini, sorumluluklarını unuttuklarını, bu durumların da öğrencinin derse katılımını zorlaştırdığını ifade etmektedir.

"Derse karşı ilgisizler. Çünkü hep internete yoğunlaşmışlar. Çocuklarda isteksizlik var. Özellikle LGS öğrencilerine bakıyorum. Hiçbiri azimli değil, sınav başarısı gütmüyorlar. Genelde çocukların hep sosyal medya konuşmalarına şahit oluyorum. Derse karşı katılım az. Çünkü çocukların ilgi alanı kaymış. Benim kendi çocuklarımda da var. Hemen yapalım, hemen onun başına geçelim durumu var." (B2)

Problemli İnternet Kullanımının Ders Başarısına Etkileri

Çocuklarda küçük yaşlarda problemli internet kullanımı ile başlayan internet bağımlılığı bazı öğrencilerde kaygıya veya hiperaktiviteye yol açmaktadır. Sınıf öğretmenleri öğrencilerde ders başarısının düşük olmasını sadece problemli internet kullanımına bağlamamakla fakat problemli internet kullanımına sahip öğrencilerin internette çok fazla vakit geçirdiklerinde derse yönelik sorumluluklarını yerine getiremediklerini, internetin olumsuz yönlerini değil, faydalı yönlerini ele aldıklarında başarılı olabileceklerini ifade etmektedir. İnternet ortamının öğrenciyi yalnızlaştırmasıyla birlikte sınıf içerisinde problemli internet kullanımına sahip öğrencilerin grup çalışmalarına katılmak istemedikleri görülmektedir. Tüm bunların ders başarısını olumsuz yönde etkilemektedir.

"Tabi her ne kadar hani böyle çok fazla bir ödev, hatta okul dışı sorumluluğa da karşı olsak bile sonuçta eğitim sadece okullar sınırlı değil. Okul dışında verilen görev ve sorumlulukları problemli internet kullanımı yüzünden yerine getiremeyen öğrencilerin tabi ki ders başarılarının da düşeceğini düşünüyorum. Çünkü okulda yapılan hani öğrenciye verilen ödevin veya okul dışı görevin amacı okulda öğrenilenleri tekrar etmek veya onları pekiştirmektir. Fakat bunu yapmak yerine öğrenci problemli internet kullanımıyla birlikte sınırsız bir şekilde internet kullandığında zamanının büyük bir bölümünü oyunlarla ya da sosyal medya araçlarıyla harcayacak ve bu ödev ve sorumluluklarını yerine getiremeyecektir. Bu da ders başarısının düşeceği anlamına gelmektedir. Gerekli pekiştirmeleri yapayamacak, gerekli tekrarları yapamayacak bu da ders başarısını düşürecektir." (S3)

Ortaokul öğrencilerinde problemli internet kullanımı, dinleme becerilerini olumsuz yönde etkilediği için öğrencilerde ders başarısı düşüktür. Öğrencilerin internet ortamında oynadığı oyunlar, sosyal medyada kurdukları yeni arkadaşlıklar, onları ders çalışma ortamından uzaklaştırmaktadır. Ortaokul öğretmenleri de sınıf öğretmenlerine benzer şekilde internetin faydalı yönlerinin alınması durumunda öğrencilerin ders başarılarının artacağını düşünmektedir.

"Olumsuz anlamda etkilemekte tabiki. Sınırlarını bilmeyen, interneti nasıl kullanacağını bilmeyen çocuk olumsuz şekilde iki şekilde kullanabilir. Bir onu destekleyecek, derslerini şekilde kullanabilir. İkincisi bataklık kısmına çekilebilir. Diğer kısmına çekiliyor çünkü.Bilinçsizce izliyor.Bir video diğerini çağırıyor. Öbürü öbürünü çağırıyor gibi düşünün. Ders başarıları kötü, düşüyor çünkü verimsiz bir şekilde kullanıyor zamanını, ilgisi odağı orda, bilinçsizce ekrana bağlı kalmak demek, düşünme yetisini, analiz, sentez, bütün bunları etkilemekte. Bunlar bizim istediğimiz üst bilişsel düzeyler. Bunlara ulaşamayınca öğrenme oluşamıyor. Bu da olumsuz etkiliyor öğrenciyi." (B7)

Problemli İnternet Kullanımının Öğrenci Motivasyonuna Etkileri

Küçük yaşlardaki çocuklarda dikkat süresinin kısa olduğu için problemli internet kullanımıyla birlikte öğrenmeye ilişkin motivasyon düşüklüğü de artmaktadır. Özellikle bu tür öğrencilerin derse dikkatini veremediği, internetteki hızı sınıf ortamında da beklediği, sınıfta bu hızı bulamadığında öğrenmeye ilişkin motivasyonunun düştüğü görülmektedir.İlkokul öğrencilerinde internet daha çok eğlence ve oyun amaçlı kullanıldığı için öğrenmeye ilişkin motivasyonları da düşüktür.

"Motivasyon günümüzde en büyük problemlerden bir tanesi bu. Ebeveynler çocuklarını hiç üzmek istemiyorlar. Bu anlamda ebeveynler çocukların her dediğini yapıyorlar. Her isteği yerine getirilen öğrencinin de bir şeylere ulaşmak için veyahut bir ödüle ulaşma ya da bir şeyi öğrenme motivasyonlarını sağlamak çok zor oluyor. Bu anlamda zaten günümüzdeki öğrencilerin motivasyonunu sağlamak güç. Hele kontrolsüz bir şekilde internet kullanan, problemli internet kullanan çocukları diyelim ki motivasyonları başka yöne iken, onları oradan alıp okul ile ilgili konulara motive etmek çok daha zor." (S3)

Ortaokullarda derse karşı ilgisini kaybeden öğrenciler, öğrenmeye ilişkin motivasyonlarını da kaybetmektedir. Öğrenciler internette görüp etkisinde kaldıkları olay ve durumları ders ortamına taşımaktadır. Bu durum öğrencilerin derse ve öğrenmeye ilişkin motivasyonlarını düşürmektedir. Ayrıca öğrencilerin internette gördükleri bilgilerin doğruluğuna inanmaları nedeniyle dersteki içeriği dikkate almadıkları görülmektedir.

"Yani etkiliyor. İlgi alanları farklı artık. Aklında fikrinde o hesap, bu hesap derken ilgi alanları değişiyor. Kılık kıyafeti başka şeylere gidiyor. Kız çocukları için makyaj siteleri, takip ediyor. tırnak vs. Erkekler de daha çok bilgisayar oyunları üzerinde olduğu için. Motivasyon yok. Artık çocukları hediyelerle de ödüllerle de kandıramıyorsunuz. Bizim bir oyunumuz var. "Yarına akıl yapar" diye eski bir oyun ama ben onu güncelledim. Tamamen bu konuyu içeriyor. Orada bir çocuğu bir bebekle, bir oyuncak arabayla kandırırken, ben bunu güncelledim. Cep telefonu ve sosyal medya hesaplarını oyuna taşıdık. Değiştirince çocuklar da daha güzel oldu dediler. Hepsinde var çünkü cep telefonum iyi olsun, o hesapları takip edeyim, o fenomenleri takip edeyim. Değiştiler, kılık kıyafet, davranış olarak. Öğrencileri kandıramıyoruz artık derse çekemiyoruz." (B2)

Problemli İnternet Kullanımının Akran İlişkilerine Etkileri

Problemli internet kullanımının ilkokulda öğrenciler arasındaki sosyal ilişkileri zayıflattığı, bu tür öğrencilerin yalnız kalmaktan hoşlandıkları, internette gördükleri şeylerin etkisinde kalarak gördüklerini arkadaşlarına uyguladıkları, özellikle oynadıkları oyunlarda sıkılma, mutsuzluk, sabırsızlık, hırçınlık, şiddet vb. durumların ortaya çıktığı, öğrencilerin sosyalleşemedikleri ve internet ortamıyla gerçeği ayırt edemedikleri görülmektedir.

"Öğrencilerimiz diyelim oyun oynuyorlar. Kendi aralarında oynadıkları oyunlarda robotsu hareketler yapabiliyorlar.Kendi internet ortamında gördükleri kahramanları canlandırıyorlar.Robotsu hareket ediyorlar. Aynen sanal ortamdaki kahramanlar gibi oradaki duygusuz ve ruhsuz kahramanlar gibi bazen duygusuz ve ruhsuz bir şekilde empati yapmadan davranabiliyorlar. Yani arkadaşına çelme takıp düşürdüğünde yada arkadaşına vurduğunda arkadaşının canının yanacağını, birisi kendisine vursa kendisinin canının yanıp ta arkadaşına vurmaması gerektiğini artık düşünmüyorlar. Çünkü kendilerine model olarak oradaki ruhsuz duygusuz kahramanları model alıyorlar.Bu da arkadaşlar arasında bir şiddet uygulamanın çok rahat bir şekilde gerçekleştirilebilmesi anlamına geliyor. Çocuk hiç arkadaşıma vurursam canı yanar, ya da bana küser diye düşünmüyor çocuk.Bu ilkokul olarak örneklendirebileceğimiz durumlar.." (S3)

Problemli internet kullanımının ortaokullarda akranlar arası iletişim becerilerini zedelediği, kelime dağarcığını zayıflatarak konuşma becerilerini olumsuz etkilediği, ilkokullarda olduğu gibi ortaokulda da öğrencilerin internet ortamında şiddet içerikli oyunlar oynadıkları, internette veya sosyal medyada gördükleri olumsuz şeyleri okul ortamına taşıyıp arkadaşlarına uyguladıkları, sosyalleşmenin azaldığı görülmektedir. Ayrıca ortaokul öğrencilerinin ilkokul öğrencilerinden farklı olarak birbirlerine siber zorbalık yaptıkları, şiddet olaylarını normalleştirdikleri, internet ortamındaki tartışmaları okul ortamına taşıdıkları, internetin olumsuz etkileri yüzünden merhamet gibi birtakım değerleri kaybettikleri görülmektedir.

"Okulda yapmadıkları veya yüz yüze söyleyemedikleri pek çok şeyi sosyal medyadan birbirine söyleyebiliyorlar. Okulda zorbalık yapıyorlar birbirlerine. Özellikle sosyal medya üzerinden.Buna müdahale ediyorsun ama okuldan çıktığı anda telefonu eline alıyor. Oradan o kişiye tehdit, küfür vb şeyler yapabiliyor. Öğrenciler siber zorbalık yapabiliyorlar. Öğrenciler siber zorbalığa maruz kalabiliyorlar. Bu tip olaylar var." (B4)

Akranlar Arası Zorbalık Durumları

İlkokullarda problemli internet kullanımına sahip olan çocuklarda sıklıkla akranlar arası zorbalık durumlarına rastlanılmaktadır. İlkokullarda akran zorbalığı şiddetten ziyade öğrencinin öz benliğine zarar verecek, öğrencilerde psikolojik duygu durum bozukluklarına yol açacak şekilde olmaktadır. Öğrencilerin birbirlerine karşı yetersiz duyguları aşıladıkları, dinleme becerilerini zayıflattığı, tahammül seviyelerini düşürdüğü, kısmen de olsa şiddetle birbirlerine karşılık verdikleri,öğrencilerin özellikle kendisinden güçsüz gördükleri öğrencilere karşı fiziksel ve sözlü şiddet uyguladıkları, internetten öğrendikleri kelimeleri arkadaşlarına rahatlıkla söyleyebildikleri görülmektedir. Öğrenciler arasındaki zorbalık durumları sınıf ortamını olumsuz etkilemekte, öğretmenin öğretimden önce çözmesi gereken bir sorun haline gelmektedir.

"Çocukların birbirlerine uyguladıkları zorbalık yani bunlar tabi sınıf ortamını çocukların birbirine şiddet uygulaması, çocukların birbirine psikolojik şiddet bile uygulaması, çünkü zorbalık deyince sadece vurmak, itmek şeklinde fiziksel olarak gelmemeli. Sınıfımızda bazen bir tane öğrenciyi herhangi bir fiziksel görüntüsünden dolayı ya da herhangi bir özelliğinden dolayı oyunlara almamak,dışlamak gibi akran zorbalığı görebiliyoruz.Bunlar da sınıf ortamını, arkadaşlık ortamını, sınıfın genel havasını bozuyor." (S3).

İlkokul öğrencilerinde olduğu gibi ortaokul öğrencilerinde de akran zorbalığı görülmektedir. İnternetin yalnızlaştırıcı etkisiyle öğrenci bireysel olduğu için sınıf ortamında arkadaşlık ilişkilerinde eski dönemlere nazaran birlik olmadığı görülmektedir. Öğrencilerin oynadıkları şiddet içerikli oyunların etkisinin sınıf ortamında da devam ettiği, özellikle öğrencilerin internet aracılığıyla birbirlerine zorbalık yaptıkları, interneti zorbalık aracı olarak kullandıkları, problemli internet kullanımına sahip öğrencilerde sinirlilik durumlarının gözlemlendiği, yaşça büyük öğrencilerin küçük öğrencilere zorbalık yaptıkları, özellikle sosyal medyanın akran

zorbalığını tetiklediği, ilkokullara nazaran cinsel ve şiddet içerikli paylaşımların daha fazla olduğu görülmektedir.

"Siber zorbalık evet. Küfürleşme, hakaret, karşı tarafı küçümser şekilde yazma, birbirleriyle yazıştıklarını, mesajlaştıklarını rastladım.Siber zorbalık evet. Küfürleşme, hakaret, karşı tarafı küçümser şekilde yazma, birbirleriyle yazıştıklarını, mesajlaştıklarını rastladım. ama okul ortamında birebir bir zorbalığa rastlamadım. Birbirlerine cinsel içerikli birbirleriyle paylaşımlar yapıyorlar. çirkin paylaşımlar yapıyorlar. O cinsel içerikler üzerinden sohbet ediyorlar. Sohbetin kalitesi düşüyor. İğrenç muhabbetlere dönüyor.Bunlar üzerinden de zorbalık yapıyorlar ama benim gördüğüm kadarıyla siber zorbalık durumunda kalıyor." (B6)

Problemli İnternet Kullanımının Sınıf İklimine Etkileri

Problemli İnternet Kullanımının Sınıf Yönetimine Etkileri

Problemli internet kullanımı, ilkokullarda sınıf yönetimini kısmen olumsuz yönde etkilemektedir.Sınıf öğretmenleriyle yapılan görüşmelerde öğretmenlerin veli iletişimlerine önem vermeleriyle problemli internet kullanımının sınıfta yaratacağı sorunların önüne geçtikleri görülmektedir. Sınıf öğretmenleri, problemli internet kullanımıyla birlikte gelen sorunları bekletmeden çözmeye çalıştıklarını ifade etmektedir.

"Problemli internet kullanan çocukta, akran zorbalığı yapan çocukta tahtaya çıkarken, mesela çocuk tahtadaysa ağzıyla burnuyla hareketler yapıyor, ya da eliyle, 'Yapamadın, yanlış yaptın. Yapamayacaksın, senin cevabı bu mu' gibilerinden. O zaman da sınıfınızın yönetimi sizin elinizden hafifi kayar gibi oluyor. Çünkü o sınıfta sağladığınız ortamı, bu öğrenci bozuyor. Ha dönüyorsunuz bu çocuğa 'Neden böyle davrandın?' diyorsunuz, o zaman da bir gerginlik oluyor, sınıf yönetiminiz tehlikeye girmiş oluyor aslında.Sizin yönetiminizden hafif çıkmış oluyor. Cevap veren öğrenciyle alay etme, tahtaya çıkan öğrenciye hani 'Cevabın bu mu?' deme, kılık kıyafetini ayakkabısını beğenmeme, 'Bunu mu giydin, bunu mu yaptın?' gibi davranışlarla karşılaşıyorum." (S7)

Ortaokullarda ise problemli internet kullanımının öğrencilerde oluşturduğu davranış sorunları nedeniyle sınıf yönetiminin zorlaştığı, internetin öğrencileri değerlerimizden uzaklaştırdığı, öğrencilerin uykusuz olmaları sebebiyle derse ilgilerini çekmenin zor olduğu, öğrencilerinin derse karşı ilgilerinin düşük olmasının da sınıf yönetimini olumsuz etkilediği görülmektedir. Ortaokul öğretmenleri sınıfta ders ile ilgili öğrencilerin ilgisini çekecek etkinliklere yer verildiğinde olumsuz durumların en aza indiğini ifade etmektedir.Ayrıca erkek öğretmenlerin problemli internet kullanımından dolayı bayan öğretmenler kadar sınıf yönetiminde sıkıntılar yaşamadıkları, kıdemi az öğretmenlerin sınıf yönetiminde daha fazla zorlandıkları görülmektedir.

"Ders işlenirken çocukların bir arkadaşı bilemediğinde bilemedi diyerek gülmesi, onu aşağılaması gibi problemler görüyoruz. ama buna yerinde müdahale ettiğinizde yerinde müdahale ettiğinizde bu problem tekrar etmiyor. Çocukların birbirine altında yatan mutlaka bir öncesinde problem vardır. Birbirleriyle problem yaşamışlardır. Bunu da derse yansıtıyorlar ama buna göz yummak yerine yerinde doğru müdahale ederek problemi ortadan kaldırmaya çalışıyoruz." (B3)

Problemli İnternet Kullanımının Sınıf Kurallarına Uymadaki Etkisi

İlkokulda küçük yaşlardaki sınıflarda sınıf kurallarına uymada çok sıkıntı yaşamadığı fakat yaşları itibariyle büyük olan öğrencilerin öğretmenin dikkat çekmeye çalıştığı, kural tanımadıkları, kurallardan sıkıldıkları, sınıf kurallarına aykırı davrandıkları görülmektedir. Problemli internet kullanımına sahip olan öğrenciler akademik olarak kendilerini ifade edemediklerinde kötü davranışlarla kendilerini ifade etmeye çalışmakta, bu durum da sınıf kurallarına uyumu zorlaştırmaktadır.

"Genellikle ilkokul öğretmenlerinin genel uygulamalarından bir tanesi, okul kuralları ve sınıf kuralları diye bizim kural listemiz olur.Bu kuralları çocuklar görsünler, bunları takip etsinler, bunları uyduklarında biz onları küçük sözle bile ödüllendiririz kurallara uymaları için ama problemli internet kullanımı zaten bir davranış bozukluğuna sebep olduğu için sınıfta bizim beklediğimiz ideal davranışlardan çocukları uzaklaştıracaktır. Bu kuralların dışına çıkmasını sağlayacaktır. Zaten bizim yazdığımız okul kuralları içerisinde kimseye zarar vermemeliyiz, kimseye saygısızlık yapmamalıyız, arkadaşlarımızın özel eşyalarına dokunmamalıyız gibi maddeler var. Zaten problemli internet kullanımı olan ve buna bağlı olarak davranış bozukluğu olan öğrenciler tabiki bu kuralları zorluyorlar veya sınırları aşıyorlar. Bu problemli internet kullanımı problemli öğrenci ortaya çıkarıyor. Kurallar da çiğneniyor." (S3)

Ortaokullarda ilkokullara nazaran problemli internet kullanımıyla birlikte gelen olumsuz davranışlar sonucunda sınıf kurallarına uymama daha fazla görülmektedir. Özellikle 7. ve 8. sınıflarda kurallara uymama daha fazla görülmektedir. Özellikle ergenliğe geçişte görülen değişimlerle öğrencilerde farklı duygu durumları meydana gelebilmekte, bu durum sınıf kurallarına uymalarını zorlaştırmakta problemli internet kullanımıyla birlikte de kurallara uymama durumu artmaktadır. Ortaokul öğrencileri internetteki özgür ortamı sınıf ortamında

bulamadığı için kurallara uymakta da zorlanmakta, kurallara uymamaktadır. Özellikle internet bağmlılığı onları istenmeyen davranışlara sevk etmektedir. İnternetteki oynadıkları şiddet içerikli oyunlar da öğrencilerin sınıf kurallarına ihlal etmelerini tetiklemektedir.

"Yasak olan bir şeyi gizli bir şekilde getirmeye çalışıyorlar. Telefonları tuvaletlerde saklamalar gibi durumlar yaşanıyor.Sevilmeyen bir öğrencinin onu şikâyet etmesiyle diyoruz ya akran zorbalığı. Bir arkadaşıyla arası bozuk. Gidiyor onu şikayet ediyor. Telefonunu orda saklıyor, burda saklıyor ya da başka bir şey getirmiş vs. Bu tabi sosyal olarak arkadaşlık ilişkilerinde de hem de kendini yasal olmayan bir şeyin içine girerek, yasak olan bir şeyi yapmasına sebep olarak suç işleme meyiline doğru itiyor. Bugün telefon saklama olur, yarın farklı zamanlarda bunu normalleştirip bir tık üst seviyeye çıkıp zararlı alışkanlık, davranışlar sergilemeye götürebilir. Yakalanmadığı müddetçe çok normal bir davranış olduğunu çocuk kendi kendine sorguluyordur." (B10)

Problemli İnternet Kullanımının Öğretmen-Öğrenci İlişkisine Etkisi

İlkokullarda problemli internet kullanımının öğrenci-öğretmen ilişkisine etkisine bakıldığında sınıf ortamında kontrolün daha çok sınıf öğretmeninde olması, sınıf ortamında öğrenci ile geçirilen sürenin uzun olması nedeniyle ilkokullarda problemli internet kullanımıyla birlikte öğretmen-öğrenci ilişkisine zarar verecek durumlarla karşılaşılmadığı görülmektedir. Sınıf öğretmenleri, sınıf yönetimine hâkim olmadıkları durumlarda öğrenci-öğretmen arasındaki ilişkinin zedelenebileceğini belirtmektedir

Ortaokullarda problemli internet kullanımı ilkokullara göre öğrenci-öğretmen ilişkisini daha fazla olumsuz şekilde etkilemektedir. Problemli internet kullanımı özellikle ergenlik dönemindeki öğrencilerin içine kapanık bir durum sergilemesiyle öğrencilerin sosyalleşememelerine neden olmakta ve bu tür öğrencilerin iletişime kapalı olmaları sebebiyle öğrenci-öğretmen ilişkisi olumsuz yönde etkilenmektedir. Öğretmenle iletişime geçen öğrencilerde ise internetteki özgür ortamın getirmiş olduğu rahatlığın sınıf ortamında da beklenmesiyle birlikte öğretmene karşı üslupsuz hitap şeklinde problemler görülmektedir.

"Zor oluyor sadece öğretmen-öğrenci arasındaki ilişki değil. O çocuklar zaten genelde sosyalleşemedikleri için diğer insanlarla da iletişim kurmakta zorlanıyor. Boş bakıyor, dinlemiyor seni, sosyallikten uzak, iletişimden uzak çocuklar olduğu için genel anlamda sıkıntı oluyor.Biz o damardan girip oynadığı oyun hakkında yorum yapabiliyoruz ya da 'Yapmamalısın bu kadar olmamalı.', siber suçlardır, hakarettir, küfürdür bunlarla ilgili bilgi verdiğimizde, o noktadan girdiğimizde bir şeyler ya düzeliyor ya kafası karışıyor çocuğun. Biz sıkıntı yaşamıyoruz iletişimde Genel anlamda çocuk iletişime kapalı zaten. Zor yani açmak. Öğretmenin çabasıyla açılırsa açılıyor. İşine gelen konuyu, o damardan girilirse açılırsa açılıyor. Yoksa çocuk kendini kapatmış, boş bakan, iletişime kapanan, asosyal çocuklar bunlar." (B6)

Problemli İnternet Kullanımının Tespiti ve Çözümü Yöntemleri

Problemli İnternet Kullanımının Kaynağı

Problemli internet kullanımının kaynağının bilinmesi, durumun çözümünde öğretmenlere yol gösterici olmaktadır. İlkokullarda problemli internet kullanımı ilgisizliğinden kaynaklandığı görülmektedir. Öğrencilerin boş zamanlarını nasıl değerlendireceklerini bilmemeleri, özellikle anne babası çalışan öğrencilerin ebeveynlerinin çocuklarıyla geçirecek kaliteli zamanlara sahip olmamaları, ebeveynlerin de internet bağımlısı olmaları,öğrencilerin internet bağımlısı ailelerini örnek almaları, arkadaş çevresi, ebeveynlerin internet, tablet, bilgisayar vb. teknolojik araçlara süre sınırı koymamaları, ebeveynlerin denetimsizliği etkili olmaktadır.

"Problemli internet kullanımına yol açan faktörlerin başında aile gelmektedir. Aileler çocuklarına internet kullanımı ilgili bir süre sınırı koymamakta, koyamamaktadır. Çünkü anne babaların çoğunluğu çocuğuna ayıracağı zamanı internette geçirmektedir. Hal böyle olunca da veliler çocuklarına sınır koyamamaktadır. İkinci bir etken de arkadaş çevresidir. Arkadaşları internette zaman geçiren çocuklar onları kendilerine rol model almaktadır."(S5)

Ortaokullarda problemli internet kullanımının kaynağına bakıldığında ilkokullara benzer şekilde aile içi iletişimin yetersiz olması, ailenin ilgisizliği, öğrencinin boş zamanlarını etkili bir şekilde değerlendireceğini bilmemesi, ebeveynlerin öğrencileri sosyal etkinliklere yönlendirmemeleri ve çocuklarının ilgi alanlarını bilmemeleri, öğrencilerin internet ortamında gördükleri popüler içeriklerden etkilenmeleri, bu içeriklerin doğru olup olmadığı konusunda bilgi sahibi olmamaları, öğrencilerin sınırsız kaynaklara sahip olması, yine ailelerin ekonomik durumlarının kötü olması nedeniyle sosyal platformlarda para getiren uygulamaların kullanımı, ebeveynleri tarafından çocuklarının duygusal ihtiyaçlarının karşılanmaması nedeniyle bu ihtiyaçların sosyal medya aracılığıyla giderilmeye çalışılması gibi faktörler problemli internet kullanımının kaynağı olarak gösterilmektedir.

"Ülkemizde yeni bir şey de çıktı ya influencer. İçerik üreticileri. Bunları çok çok örnek alıyorlar. Orada olan yanlış bir şeyi insanlar çok izliyor. İzlenen şey doğru mu acaba kavramı oluyor. Çocuklar da bunu uyguluyorlar bu ortamlarda. İsmini bizim hiç duymadığımız kişiler onlar için çok popüler. Onların yaptığı yanlış şeyler bile onlar için olumlu bir şeymiş gibi davranıyorlar. İnternetteki o içerikler, o sınırsız videolar. Bunlar etkiliyor çocukları. Değer yargılarını çok etkiliyor. Önlerine hep düşüyor." (B7)

Sınıf İçi İstenmeyen Davranışları Çözmede Kullanılan Yöntemler

Problemli internet kullanımı sonucunda öğrencilerde sınıf içerisinde istenmeyen davranışlar görülmektedir. Sınıf öğretmenlerinin görüşleri alındığında; o öğrenciyle bire bir ilgilenerek sorunun kaynağına inilmeye çalışıldığı, çocuğun kendisinin farkına varmasının sağlandığı, veli görüşmelerine ağırlık verildiği, çözüm bulunamadığında rehber öğretmenden yardım alındığı, öğrenciye davranışın yanlış olduğunun anlatılarak durumun farkına varmasının sağlanmaya çalışıldığı görülmektedir. Problemli internet kullanımına sahip öğrencilere farklı etkinlikler sunulmaktadır.

"Sınıf ortamında öğrenciyle birebir görüşüyorum. Ona ilk dediğim şu: "Sana birisi aynı şekilde davransa nasıl hissedersin?" Burada zaten öğrenci sessiz kalıyor. Cevap vermek istemiyor sonuçta, çünkü yaptığının doğru olmadığını o da biliyor. Sonra öğrenciye bunu "Ailenle paylaştığımda onun üzüleceğini biliyor musun?" diyorum. Yine sessiz kalıyor. Söz vermesini istiyorum. Asla bunu hemen veliye yansıtmıyorum, çünkü bu sınıfta olan bir olaydır. Sınıfta olan bir olayın da öğretmenin çözmesi gerektiğini her zaman düşünürüm. Veli en son duraktır. Çünkü hiç bir velinin çocuğuna derste söz almadan konuş ya da arkadaşına kötü davran, ya da arkadaşınla alay et diye gönderdiğini düşünmüyorum. Bütün veliler çocuklarını güzel şeylerle tembih ederek gönderirler ama veliye sizin çocuğunuz şöyle yapıyor böyle yapıyor diye dönmüyorum, çünkü yapılan hareket sınıftadır. Sınıfta düzeltilmesi gerektiğini düşünürüm. Bu yöntem etkili oluyor çünkü çocuğa güvendiğimi, bir daha böyle yapmayacağını, yanlış yaptığının kendisinin de farkında olduğunu, hani bağırmadan, çağırmadan, öğrenciye kendisini kötü hissettirmeden, aslında ona "Senin de böyle yapmak istemediğini düşünüyorum." şeklinde güzelce konuşuyoruz. Bu 10 gün gidiyor ama 10. gün tekrar konuşma ihtiyacı oluyor. Öğrencinin yapısıyla ilgili. Aile bireyleri ile ilişkisi de çok önemli. Özellikle internette gezinen çocuklar acımasız oluyor." (B7)

Problemli internet kullanımının sınıf içerisinde oluşan istenmeyen davranışları çözmede ortaokul öğretmenlerin öğrencileri sözel yollarla uyardıkları, öğrencileri ilgilerini uyandıracak etkinliklere yönelttikleri, öğrencilerle bireysel olarak görüşmeler yapıldığı görülmektedir. Bireysel görüşmelerin yeterli olmadığı durumlarda öğrenci velileriyle görüşülmekte, okul idaresiyle görüşmeler yapılmaktadır.

"Bizler bu çağın eğitimcileriyiz. Anlamaya çalışıyoruz. Öğrenciler belli bir dönemden geçiyorlar. Ergenlik dönemi. Teknolojinin etkisiyle daha farklı, daha hassas geçirebiliyorlar. Anlamaya çalışıyoruz. Görüşmeler yapıyoruz, onlarla empati kurmaya çalışıyoruz. Öğrencideki o soruna odaklanıp sorunu nasıl çözebileceğimizin yoluna öncelikle gidiyoruz. Aile ile de işbirliği yapmamız gerekiyor. Rehber öğretmeni ile de iş birliği yapıyoruz. Tabi öğrencinin de bu iş birliğine açık olması gerekiyor. Kendini kapatan öğrenciye yaklaşmak ta zor oluyor. Elimizden geldiğince ilgileniyoruz bu konuda." (B8)

Problemli İnternet Kullanımını Tespit Yöntemleri

Problemli internet kullanımın ilkokul seviyesinde tespitinde öğrenci davranışları önem arz etmektedir. Bu tür öğrencilerin sınıf içerisinde göstermiş olduğu durumlara bakarak öğrencileri tespit etmek oldukça kolaydır. Problemli internet kullanımına sahip olan öğrenciler, sabırsız, dikkatsiz davranışlar sergileyebilmektedir. Problemli internet kullanımına sahip öğrenciler internette çok fazla zaman geçirdiklerinden dolayı okula uykusuz gelebilmektedir. İnternette oynadığı oyunlarla ilgili sınıf içerisinde konuşabilmekte ya da oynadığı oyunlardaki kahramanları sınıf içerisinde taklit edebilmektedir. Okulda oynanan bahçe oyunları, günlük hayatında sokakta oyun oynamayan çocuk için basit ve anlamsız gelmektedir. Bu tür öğrencilerde, yalnız kalma isteği oldukça fazla olup, oynadığı oyunlardan çabuk sıkılma durumları görülmektedir. Bu tür öğrenciler sınıf içerisinde oldukça hareketlidir, derse karşı ilgisizdir, dikkat süresi kısadır. Bu öğrencilerde göz bozuklukları, duruş veya yürüyüş bozukluğu gibi sağlık problemleri de görülebilmektedir. Öğretmenler öğrencilerin kendilerini olumsuz yönde ifade ettikleri, sınıf içerisinde farklı kelimeler kullandıklarını, paylaşımın olmadığı, sosyalleşmenin olmadığı, kendilerini rahatça ifade edemedikleri, empati kuramadıklarını ifade etmektedir.

İlkokullarda olduğu gibi ortaokulda da problemli internet kullanımı, öğrencilerin sınıf içerisinde göstermiş olduğu davranışlarla ortaya konulmaktadır. Ortaokul öğretmenlerinin görüşleri incelendiğinde bu öğrencilerin sınıftan kopuk bir şekilde, kendi hallerinde oldukları, iletişime açık olmadıkları, yorgun ve uykusuz oldukları, internette kalma sürelerini ayarlayamadıklarından dolayı ders esnasında zaman zaman uyudukları, dikkat dağınıklıklarının olduğu, öfkeli oldukları, şiddete eğimli oldukları, bedenin duruşunda ve oturma pozisyonunda farklılık olduğu, öğrencilerin kendi oynadıkları oyunlardan veya kullandıkları internet sitelerinden

bahsettikleri, sınıf içi sohbetlerin internet ortamında gördükleri şeylerden oluştuğu, bu öğrencilerde hiperaktivite belirtilerinin olduğu, böylelikle bu öğrencileri tespit etmenin kolay olduğu, bazı öğrencilerin sosyal bazı öğrencilerin ise asosyal davranışlar sergiledikleri görülmektedir. Yine ortaokul öğrencilerinde ergenlik döneminin özelliği gereği beğenilme, kendini ispat etme çalışmaları, kıskançlık ve ego yüksekliği görülebilmektedir.

"Söylemleri var. Benim Tik Tok um yok ama oradaki esprileri yapan öğrenciler de var. Kendi ağızlarıyla kendilerini ele veriyorlar. Olumsuz davranışlar var. Birbirlerine argo, küfür hoş olmayan kelimeleri kullanıyor. Veli gelmiş geçen diyor, 'İnternet başından kalkmıyor.'. Bu konuda benden medet umuyor. Kontrol sizde. Benim kızımın zamanında da var internet ama biz sınırlandırırdık, liseye kadar böyle gitti, lisede bilinçleniyor sonra." (B5)

Problemli İnternet Kullanımının Çözüm Yöntemleri

Problemli internet kullanımını çözmede okul aile iş birliği oldukça önemlidir. Sınıf öğretmenlerinin görüşlerine bakıldığında problemli internet kullanımını çözmede ailelere teknoloji kullanımının faydalı olduğu fakat kullanım süresinin aşılması halinde problemli hale gelebileceği konusunda bilgilendirmeler yapılmalıdır. Çözümün olmaması durumunda öğrencinin sağlık kuruluşundan yardım alması sağlanmaktadır.

"Burada okula düşen görevin ben daha çok öğrencileri sosyal etkinliklere, faaliyetlere yönlendirmek gerektiğini düşünüyorum. Okul sonrasında çocuklar mutlaka en azından bir hobilerinin olacağı bir sanatsal, sportif bir etkinliğe mutlaka yönlendirilmeli. Çocuk boş zamanlarında telefona, internete bağlı kalmak yerine bu faaliyetlere yönelmeli diye düşünüyorum. Bu işin sebeplerinden bir tanesi de evde ebeveynlerin çocuklarını telefonların, tabletlerin veya bilgisayarların ekranlarına terk etmeleridir." (S3)

Problemli internet kullanımının ortaokullardaki çözüm yöntemlerine bakıldığında ilkokullara benzer şekilde veli iletişimlerine önem verildiği, öğrencilerle birebir görüşmeler yapıldığı, bilişim öğretmenleri tarafından ders içeriğinde de yer alan bilişim suçları, zararlı yazılımlar, yapılması gerekenler, internette etik kurallar teknoloji bağımlılığı ile ilgili öğrencilere bilgilendirmelerin yapıldığı, öğrencilerin sosyal etkinliklere yönlendirildiği, müfredat kapsamında değerler eğitimi ile öz disiplin de dahil olmak üzere bir takım değerlerin öğrencilere verilmeye çalışıldığı belirtilmektedir.

"Yani şu an Millî Eğitim Bakanlığının yaptığı sınıflara telefonla girmeme uygulaması doğru ama bunun kontrolünü sağlamak çok zor olabilir. Her gün çocukların internete girip girmediklerini, telefonlarını yanlarında getirip getirmediklerini kontrol edemeyiz. Bunun kontrolü sağlamak ebeveynlerin eilnde. Aile, okul bunun kontrolünü sağlarsa daha sağlıklı bir okul ortamı ve daha iyi bir öğrenci gelişimi söz konusu olabilir. Başka türlü çözemezsiniz bunu. Çocuk okula telefonu getirmediği sürece dışarıda da ailesi bunu kontrol ettiği sürece belirli kötü eğilimler azalır yoksa ki başka türlü mücadele olamaz bununla ilgili." (B10)

Sonuç

Problemli internet kullanımının ilkokul ve ortaokul sınıf ortamlarına etkilerine bakıldığında pek çok faktörün sınıf ortamını etkilediği görülür. İlkokul ve ortaokul öğrencilerinde görülen problemli internet kullanımı konusunda birbirinden farklı sonuçlar elde edilmiştir. Farklı sonuçların çıkmasının sebebi, ilkokul ve ortaokul öğrencilerin gelişim ve yaş grubu özellikleridir.

İlkokullarda problemli internet kullanımının sınıf ortamını orta şiddette etkilediği görülürken, ortaokullarda yüksek şiddette etkilediği görülmektedir. Problemli internet kullanımı gösteren öğrencilerin ortaokulda problemli internet kullanımı gösteren öğrencilere oranla az olduğu görülmektedir. Bu durumun çeşitli sebepleri bulunmaktadır. İlkokulda problemli internet kullanımına sahip öğrenci davranışlarının sınıf ortamına çok yansımaması gösterilebilir. İlkokul seviyesindeki öğrenciler yaş dolayısıyla daha çok öğretmen kontrolünde oldukları için öğretmenlerin internet bağımlılığına giden davranışlarını açığa çıkarıp önlem almaları kolaylaşmaktadır. Problemli internet kullanımı ilkokula nazaran ortaokullarda sınıf ortamını çok daha olumsuz şekilde etkilemektedir.

Problemli internet kullanımının öğrencilerin derse katılımları açısından etkilerine bakıldığında, ilkokul öğrencilerinin derse karşı ilgisiz oldukları, dikkatlerinin dağınık olduğu, internette oynadıkları oyunları sınıf ortamında bulamamaktan dolayı derslerden çabuk sıkıldıkları görülmektedir ve bu öğrencilerin derse katılımları azdır. Ortaokul öğrencileri ise problemli internet kullanımına sahip olduklarını kolayca belli edebilmektedir. Yani ortaokul öğretmenleri için bu tür öğrencileri tespit etmek oldukça kolay olmaktadır. Çünkü zaten bu tür öğrenciler, çoğunlukla derse ya az katılmakta ya da hiç katılmamaktadır. Problemli internet kullanımına sahip

olan öğrenciler genel olarak derse katılmaya isteksiz, sınıf ortamından uzak, içine kapanık, internetin renkli dünyasından kopamamış öğrenciler olmaktadır. Sürekli ekrana maruz kalan öğrencilerde özellikle öğrencinin sahip olduğu tablet, bilgisayar vb. teknolojik araçlara kavuşma isteği yatmaktadır. Bu durum da ilkokul öğrencilerinde de görülse de ortaokul öğrencilerinde daha fazla hissedilmektedir. Problemli internet kullanımı, öğrencilerin sınıf ortamında yapılan ders içi etkinliklere katılımlarını olumsuz yönde etkilemektedir.

Problemli internet kullanımının derse başarısına etkilerine bakıldığında; ilkokul öğrencilerinde bu durum çok fazla hissedilmemektedir. Fakat ilkokul öğrencilerinde de oyun bağımlılığı görülmektedir. Öğrencinin sahip olduğu bağımlılıkla birlikte teknolojik aracın yokluğu onları okul ve sınıf ortamına karşı isteksiz yapabilmektedir. Bu durum da öğrencilerin ders başarılarını olumsuz yönde etkilemektedir.Ortaokul öğrencilerinde ise problemli internet kullanımı daha kolay hissedilebildiği için bu öğrencilerin ders başarılarının düşük olduğu kolayca görülebilmektedir. Ortaokul öğrencilerinde problemli internet kullanımı dinleme becerilerini olumsuz yönde etkilediği için derse odaklanmaları zorlaşmaktadır.Bu nedenle problemli internet kullanımı akademik başarıyı düşürmektedir.

Problemli internet kullanımına sahip olan öğrencilerde öğrenmeye ilişkin motivasyon durumları ise; ilkokul öğrencilerinde interneti bilinçli olarak kullanan öğrencilere oranla pek farklılık görülmemekle birlikte ortaokul öğrencilerinde bu durum daha kolayca tespit edilebilmektedir. Özellikle fazla internete maruz kalmanın öğrencilerde dikkat dağınıklığına ve birtakım olumsuz psikolojik davranışlara yol açtığı görülmektedir. Ortaokul öğretmenlerine göre bu tür öğrencileri tespit etmek oldukça kolaydır. Bu tür öğrencilerin öğrenmeye ilişkin bir kaygıları olmadığı görülmektedir. Benzer şekilde ilkokul öğrencilerinde de görülen sahip olduğu teknolojik araç (tablet, telefon, bilgisayar vb.) ayrılamama, ders içerisinde bu araçlarla oynadıkları oyunlara kavuşma düşüncesi ile derse veya konu ile ilgili öğrenmeye motive olmaları zorlaşmaktadır.

Problemli internet kullanımının öğrencilerin kendi aralarındaki ilişkileri açısından bakıldığında; ilkokullarda genellikle bu tür öğrencilerin yalnız kalma isteklerinin çok olması, özellikle günümüzde sahip olunan telefon, tablet veya bilgisayar ile oynanan oyunların artması nedeniyle akran ile oynanan oyunlardan oldukça uzaklaşıldığı görülmektedir. Çocuğa günlük hayatta arkadaşlarıyla oyun oynayabileceği bir ortam sunulmaması ile çocuklarda asosyal davranışlar ortaya çıkmaktadır.. İlkokul öğrencileri dışarıda oyun oynamak istememekte ya da özellikle beden eğitim ve oyun dersinde akranlarıyla birlikte oyun oynamaya teşvik edilse bile yalnız kalma isteklerinin çok olduğu hatta kimi zaman oyun kurulduğunda da kendi isteklerinin olmaması durumunda arkadaşlarına karşı olumsuz davranışlar sergiledikleri görülmektedir. İlkokulda akran ilişkileri açısından ortaokul öğrencileri kadar olumsuz davranışlar görülmese de kimi zaman akran zorbalığı da görülmektedir. Bu durum daha çok problemli internet kullanımına sahip olan öğrencilerin diğer arkadaşlarına isteklerini yaptırmaları şeklinde olmakta, istedikleri olmadığı zaman da internette oyunlardaki oyunlara benzer az da olsa fiziksel şiddet veya dışlama şeklinde psikolojik şiddet davranışları görülmektedir.

Problemli internet kullanımı ortaokul öğrencileri arasındaki akran ilişkileri de olumsuz yönde etkilemektedir. Ortaokul öğrencilerinde akran zorbalığının yanında siber zorbalık da görülmektedir. Öğrenciler özellikle kendi aralarında internet ortamında oynadıkları oyunlarda yaşadıklarını sınıf ortamına taşımaları akranlarıyla ilişkileri de olumsuz etkilenmektedir. Oyunu oynamayana arkadaşlarına karşı ya da oyunda yaşadıklarından dolayı arkadaşlarına okul ortamında da zorbalık yapabilmektedir. Hatta öğrenciler okul dışında internet aracılığıyla arkadaşlarına zorbalık yapabilmektedir. Akranlar arasında argo kelimeler, küfürlü konuşma tarzı olumsuz durumlar da görülebilmektedir. Bu durum farklı konuşma tarzlarıyla karşılaşan diğer öğrenciler arasında da olumsuz iletişime sebep olmaktadır.

Problemli internet kullanımı sonucu akranlar arasında oluşan zorbalık durumları özellikle ortaokullarda sınıf ortamını da olumsuz etkilemektedir. Bu tür öğrenciler arasında yaşanan çekişmelerin sınıf ortamında olumsuz bir atmosfer oluşturmaktadır. Oluşan olumsuz davranışlar karşısında öğretmenler öğretmeye, etkinliğe ayıracakları zamanları öğrenci davranışlarını düzeltmeye ayırdıklarını belirtmektedir. Bu durum da belirlenen öğretim programlarının aksamasına sebep olmakta, bu da etkili ve verimli zaman yönetimi konusunda da öğretmenleri zorlamaktadır.

Problemli internet kullanımına sahip olan öğrencilerin varlığı, sınıf yönetimini olumsuz etkilemektedir. Bu durum ilkokullarda öğretmenlerin sınıfı yönetme konusunda önemli bir probleme yol açmasa da öğretmen stili bu durumla baş etmeyi zorlaştırmaktadır. Problemli internet kullanımına sahip olan öğrenciler olmasa da sınıf yönetimi konusunda deneyimli olmama, öğretmenin sınıf yönetimi konusundaki zayıflığı olumsuz bir sınıf

ortamına neden olurken, problemli internet kullanımını eklenmesiyle de sınıf ortamı daha da bozulmaktadır. Bu durum özellikle öğretmenin geçirmiş olduğu kıdemle veya alanla ilgili değildir. Öğretmenlik mesleğinden gelmeyip öğretmenlik mesleğini yapan kişilerin sınıf yönetiminde oldukça başarılı olduklarına da rastlamak mümkündür. Bunda öğretmenin mesleğini sevmesi, mesleğin gerektirdiği becerilere sahip olmasıyla ilişkilidir.

Problemli internet kullanımı ile ortaokullarda sınıf yönetiminin ilkokullara oranla daha zor olduğu görülmektedir. Ortaokullarda özellikle öğrencilerin gelişim açısından ergenlik döneminin göstermiş olduğu belirtilerin de eklenmesiyle sınıf yönetimi daha da zor hale gelmektedir. Problemli internet kullanımının yol açmış olduğu olumsuz akran ilişkileri, dikkat dağınıklığı, hiperaktivite gibi belirtiler daha fazla görülmekte, ilkokula oranla ortaokulda öğretmenlerin sınıf yönetimleri daha zorlaşmaktadır. Öğretmenlerle yapılan görüşmeler sonucunda çoğu ortaokul öğretmeninin problemli internet kullanımıyla oluşan davranış bozukluklarını çözmede zorlandıkları görülmektedir. Özellikle problemli internet kullanımı sonucunda öğrencilerde oluşan dikkat dağınıklığı dinleme becerilerini zayıflatmakta bu durum da sınıf ortamını olumsuz yönde etkilemektedir. Tüm bu durumlar öğretmenlerin sınıf yönetimini zorlaştırmaktadır.

Problemli internet kullanımı sonucunda oluşan davranış problemlerini çözmede hem ilkokul hem de ortaokul öğretmenleri öncelikle bu tür öğrencileri fark etmeyle işe başladıklarını, veli iletişimlerini sürekli tuttuklarını, sorunun zaten aile ilgisizliğinden başladığını belirtmektedirler. Bu konuda velilerin de bilinçli olmaları gerektiği, veli eğitimlerinin artırılması gerektiği görülmektedir. Özellikle internet kullanımının daha küçük yaşlardaki çocuklardan başladığı düşünüldüğünde aile eğitimlerinin okul öncesinden başlaması gerektiği düşünülebilir.

Problemli internet kullanımının ortaokul öğrencilerinde bir takım psikolojik sorunlara da neden olduğu görülmektedir. Bu nedenle rehberlik servisi ile aktif bir şekilde görüşmeler yaptıklarını, rehber öğretmene yönlendirilen öğrenci sayısının fazla olduğu hatta rehberlik servisince çözülemeyen durumlarda sağlık kuruluşuna yönlendirme, psikolog, psikiyatri gibi bölümlerden yardım alındığı belirtilmektedir. Bu şekilde tespit edilip internet bağımlılığının olumsuz sonuçlarının aza indirildiği öğrencilerin olduğu görülmektedir.

Problemli internet kullanımı öğrencilerin sınıf kurallarına uymalarını olumsuz etkilemektedir. Sınıf kurallarına uymama, öğretmenin sınıf yönetimini de etkilemektedir. Problemli internet kullanımına sahip öğrenciler hem ilkokulda hem de ortaokulda sınıf kurallarına uymak istememektedir. Kurallara uymama ilkokul öğretmenleri tarafından iyi bir şekilde yönetilirken, ortaokul öğretmenleri sınıfı yönetmekte zorlanmaktadır. Öğrenciler dikkatleri dağınık oldukları için öğretmenlerini dinlemek istememektedir. Bu durum da öğretmenin sınıf yönetimini zorlaştırmaktadır. Öğrenci kimi zaman dikkat çekmek için de bazı olumsuz davranışlar sergilemekte, özellikle internet ortamında karşılaştıklarını okulda da uygulamak istemektedir. Bu davranışların yanlış olduğunun çoğunlukla bilincinde değildir. Bu durum da bilinçli internet kullanımına sahip, aile desteği almış öğrencilerin olumlu bir sınıf atmosferi içerisinde olmalarını zorlaştırmaktadır.

Öğretmenin sınıf yönetimindeki boşluklar, olumsuz davranışlar karşısında çözüm üretebilme, olumsuz durumlarla baş edebilme becerilerinin eksik olması, öğretmen-öğrenci arasındaki ilişkiyi de zedelemektedir. İlkokullarda öğretmen- öğrenci arasında çok büyük boşluklara neden olmamakla birlikte ortaokulda bu boşluk açılarak daha derin hale gelebilmektedir. Problemli internet kullanımına sahip olan öğrenciler, internet ortamında bireysel oldukları ve kendilerini yönetecek kimse olmadığı için, sınıf ortamına geldiklerinde kendilerine yönerge veren, kendisinden istenilen şeyleri yapmalarını bekleyen biriyle karşılaşmaktadır. Bu durum da problemli internet kullanımına sahip öğrencileri rahatsız etmektedir. Sınıf içerisinde öğretmen ile iletişime kapalı oldukları için de bu tür öğrencileri sınıf ortamına kazandırmada öğretmenler sorun yaşayabilmektedir.

Hem ilkokullarda hem ortaokullarda öğretmenleri problemli internet kullanımı sonucunda öğretmenleri zor duruma düşüren herhangi özel bir durum yaşanmasa da özellikle ilkokulda bu tür öğrencilerin internet ortamındaki hızı, sınıf ortamında da istemeleri nedeniyle sabırsızlık gibi durumların oluştuğu görülmektedir. Özellikle ilkokullarda öğrencilerin oynadıkları oyunlardan çok çabuk sıkılma, derslerden çok çabuk sıkılma gibi durumlar görülebilmektedir. Ortaokullarda ise bıkkınlığın yanında internet veya oyun bağımlılığı ile birlikte gelen birtakım davranışların devam etmesi söz konusudur. Özellikle ortaokullarda internet veya telefonda geçirilen sürenin artmasıyla gelişen öğrencilerde bir takım olumsuz davranışların arttığı görülmektedir. Bu durum da sınıfta verimli bir ders ortamının oluşmasını engellemekte ve başarısız bir sınıf olarak okula yansımaktadır.

Problemli internet kullanımının sınıf ortamına yansıyan olumsuzlukları tespit etmek etkili bir eğitim ortamı oluşturmada önemlidir. Bunun kaynağını bilmek öğretmenlere verimli ve etkili bir sınıf ortamı sağlamada önemlidir. Öğretmenlerle yapılan görüşmeler sonucunda hem ilkokul hem de ortaokul öğretmenleri, problemli internet kullanımının çok küçük yaşlarda başladığını, kaynağının ailenin ilgisizliği olduğunu belirtmektedir. Özellikle hem sınıf öğretmenleri hem de branş öğretmenleri tarafından çalışan ebeveynlerin çocuklarına karşı ilgisiz davranışları, çocuklarını telefonla veya teknolojik araçla tek başına bırakmaları, çocuklarıyla kaliteli vakit geçirmemeleri çocukları internet ortamına sürüklemektedir.

Problemli internet kullanımı sonucunda oluşan olumsuz davranışlar kronikleştiği zaman, içinden çıkılamaz, çözülemez, tüm öğretmenleri, öğrencileri, sınıf ortamını ve toplumu etkileyecek olumsuz durumlara dönüşebilmektedir. Bunun için başta aileler çocuklarının telefonla veya internetle geçirdikleri süreyi kısıtlamalı, internet ortamındaki bileşenler kontrol edilmeli ve küçük yaşlarda oluşan olumsuz durumlar tespit edilmelidir. Hem aileler hem de öğrenciler bilinçli internet kullanımı konusunda bilgilendirilmelidir. Aile eğitimleri ebeveynlere okullarda uzman kişiler tarafından sağlanmalı, öğrencilerin okul dışında sanatsal, sportif ve kültürel faaliyetlere katılımları artırılmalıdır. Öğrencilerin faaliyetlere katılmaları için okulların fiziki alt yapıları uygun hale getirilmelidir (her okula spor salonu vb.). Öğrencilere boş zamanlarını verimli geçirme konusunda eğitimler verilmelidir. Her okulda öğrenci sayısına bakılmaksızın rehber öğretmen bulundurulmalı, problemli internet kullanımına sahip olan öğrenciler konusunda aileler bilgilendirilmelidir. Öğretmenlere de hizmet içi eğitim ile problemli internet kullanımı ile baş etmede kullanılacak yöntemler hakkında bilgilendirmeler yapılmalıdır.

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Öğrencilerin Bakış Açısıyla Mahmut Arslan Anadolu Lisesi Özelinde Tarih Derslerinin Uzaktan Eğitiminde Yaşanılan Sorunlar

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Özet

Bu araştırma, Covid-19 pandemisi sürecinde uzaktan eğitim platformu EBA'nın (Eğitim Bilişim Ağı) tarih dersleri üzerindeki etkilerini incelemeyi amaçlamaktadır. Nitel araştırma yöntemlerinden durum çalışması kullanılarak gerçekleştirilen araştırmada, Mahmut Arslan Anadolu Lisesi'nde uzaktan eğitim alan 50 öğrenci örneklem olarak seçilmiştir. Veriler, yarı yapılandırılmış görüşme formu aracılığıyla toplanmış ve içerik analizi yöntemiyle değerlendirilmiştir.

Araştırma bulguları, öğrencilerin EBA platformunu kullanırken çeşitli zorluklarla karşılaştığını ortaya koymuştur. Teknik sorunlar, erişilebilirlik problemleri, ders içeriklerinin yoğunluğu ve öğretmen-öğrenci iletişimi konularında yaşanan sıkıntılar, öğrencilerin uzaktan eğitimde karşılaştıkları başlıca sorunlar olarak belirlenmiştir. Ayrıca, öğrenciler derslerin daha interaktif ve görsel materyallerle desteklenmesi gerektiğini vurgulamışlardır.

Öğrencilerin büyük bir kısmı (32 öğrenci) tarih derslerinin yüz yüze eğitimle daha verimli olduğunu belirtirken, 18 öğrenci online eğitimi tercih etmiştir. Yüz yüze eğitimin tercih edilme nedenleri arasında, daha fazla etkileşim ve anında geri bildirim alabilme imkanı ön plana çıkarken, online eğitimin esnek zamanlama ve kendi hızında öğrenme avantajları vurgulanmıştır.

Araştırmanın sonuçları, uzaktan eğitimde EBA platformunun etkinliğinin artırılması için teknik altyapının iyileştirilmesi, öğretmenlerin teknoloji kullanım becerilerinin geliştirilmesi ve ders içeriklerinin güncellenmesi gerektiğini göstermektedir. Ayrıca, hibrit eğitim modellerinin benimsenmesi, her iki yönteminin avantajlarını birleştirerek öğrencilerin farklı ihtiyaçlarını karşılayabilir.

Bu araştırma, uzaktan eğitimde EBA'nın tarih dersi üzerindeki etkilerini derinlemesine ele alarak, eğitimde dijital dönüşüm sürecine katkıda bulunmayı hedeflemektedir.

Anahtar Kelimeler: Uzaktan eğitim, EBA, tarih dersi, Covid-19

Abstract

This study aims to examine the effects of the distance education platform EBA (Education Information Network) on history lessons during the Covid-19 pandemic. The research was conducted using the case study method, one of the qualitative research methods, with a sample of 50 students receiving distance education at Mahmut Arslan Anatolian High School. Data were collected through a semi-structured interview form and analyzed using content analysis.

The findings revealed that students faced various challenges while using the EBA platform. Technical issues, accessibility problems, the density of course content, and teacher-student communication were identified as the main difficulties encountered by students in distance education. Additionally, students emphasized the need for lessons to be more interactive and supported with visual materials.

A majority of the students (32) stated that history lessons are more efficient in face-to-face education, while 18 students preferred online education. The reasons for preferring face-to-face education included increased interaction and the ability to receive immediate feedback, whereas the advantages of online education were noted as flexible scheduling and the ability to learn at one's own pace.

The results of the study indicate that improving the technical infrastructure, enhancing teachers' technology usage skills, and updating course content are necessary to increase the effectiveness of the EBA platform in distance education. Moreover, adopting hybrid education models that combine the advantages of both methods can better meet the diverse needs of students.

This research aims to contribute to the process of digital transformation in education by thoroughly examining the effects of the EBA platform on history lessons in distance education.

Key Words: Distance education, EBA, history lesson, Covid-19

Giriş

Uzaktan eğitim, teknolojinin yardımıyla öğrenci ile eğitim kaynağı arasında kurulan bağlantıyı ifade eder ve eğitimin zaman ve mekân sınırlamalarından bağımsız olarak yürütülmesini sağlar (Uşun, 2006). Bu eğitim

yöntemi, e-learning (uzaktan öğrenme) ve web tabanlı eğitim gibi çeşitli isimlerle anılmaktadır ve dünya genelinde büyük bir ilgi görmüştür (Aslantaş, 2014; Kearsley, 2000). Özellikle Covid-19 pandemisi sırasında, uzaktan eğitim, eğitim sistemlerini etkileyen ve yüz yüze eğitimin yerini alan bir olgu haline gelmiştir (Telli & Altun, 2020). Bu süreçte, öğretmenlerin teknoloji kullanımı becerileri önem kazanmış ve bu becerilerin eğitim sürecinin etkinliğine doğrudan katkıda bulunduğu belirtilmiştir (Merç, 2015; Anderson, 2008).

Pandemi sürecinde uzaktan eğitimin önemi ve yaygınlığı, Eğitim Bilişim Ağı (EBA) gibi platformların kullanımını artırmıştır. EBA, Türkiye'de eğitim-öğretim sürecini destekleyen ve dijital içerikler sunan bir platform olarak öne çıkmaktadır (MEB, 2020). Ancak, EBA'nın kullanımında yaşanan zorluklar ve platformun etkinliği, çeşitli araştırmalarda ele alınmıştır. Emir ve Altunel (2021), EBA kullanımındaki zorlukları ve bu zorlukların öğretmenler ve öğrenciler üzerindeki etkilerini detaylı bir şekilde incelemişlerdir. Bu çalışmada, EBA'nın teknik sorunlarından kaynaklanan erişim problemleri ve içeriklerin yetersizliği gibi temel sorunlar vurgulanmıştır (Kaya & Aydın, 2021).

Tarih dersinin EBA sistemi üzerinden işlenişi, bu platformun öğretmenler ve öğrenciler tarafından nasıl değerlendirildiği açısından önem taşımaktadır. Öner (2017), Uluslararası Türk Eğitim Bilimleri Dergisi'nde yayımlanan araştırmasında, sosyal bilgiler ve tarih dersleri için alternatif bir kaynak olarak EBA'nın etkinliğini ve öğretmen görüşlerini incelemiştir. Bu araştırmada, EBA'nın tarih dersi içeriklerinin analizi yapılmış ve öğretmenlerin bu içeriklere ilişkin görüşleri alınmıştır. Ayrıca, Erman (2021) tarafından yapılan başka bir çalışmada, EBA'nın tarih öğretmenleri ve ortaöğretim öğrencileri açısından değerlendirilmesi üzerinde durulmuş ve öğretmenlerin EBA'ya ilişkin değerlendirme düzeylerinin cinsiyete, çalışılan okul türüne, mesleki deneyimlere, öğrenim durumuna ve EBA'yı kullanma sıklığına göre anlamlı farklılık göstermediği bulunmuştur.

Bu araştırmalar, EBA sisteminin tarih dersinin işlenişindeki verimliliğini ve öğretmen ile öğrenci memnuniyetini ortaya koymaktadır (Demir & Seferoğlu, 2020). Pandemi sürecinde, öğrencilerin motivasyonu ve hazır bulunuşluk düzeyleri düşük kalmış olsa da, EBA sistemi gibi platformlar, tarih dersinin uzaktan eğitimde etkili bir şekilde işlenmesi için önemli bir araç olmuştur (Yıldız & Yılmaz, 2021). Bu bağlamda, uzaktan eğitimde EBA'nın tarih dersi üzerindeki etkilerini anlamak, öğretim süreçlerini geliştirmek ve gelecekte benzer kriz durumlarında daha hazırlıklı olabilmek adına kritik öneme sahiptir. Ayrıca, öğrenci ve öğretmen memnuniyetine yönelik yapılan değerlendirmeler, EBA'nın mevcut durumunu iyileştirmek ve daha etkili bir eğitim aracı haline getirmek için değerli geri bildirimler sunmaktadır (Korkmaz & Toraman, 2020; Bozkurt & Sharma, 2020).

Sonuç olarak, uzaktan eğitim ve özellikle EBA platformunun tarih dersi üzerindeki etkilerini derinlemesine incelemek, eğitimde dijital dönüşüm sürecini anlamak ve geliştirmek için önemli bir adımdır. Bu çalışmada, EBA'nın tarih derslerindeki etkinliği, öğretmen ve öğrenci memnuniyeti, karşılaşılan zorluklar ve öneriler detaylı bir şekilde ele alınacaktır. Bu kapsamda araştırmanın amacı, Mahmut Anadolu Lisesi'nde uzaktan eğitim döneminde tarih dersine katılan öğrencilerin, online derslerde alınan verim ve karşılaştıkları sorunlar açısından görüşlerini belirlemek ve uzaktan eğitimde kullanılan materyallerin ve öğretim tekniklerinin öğrenme sürecine etkisini incelemektir.

Yöntem

Bu araştırma, nitel araştırma yöntemlerinden biri olan durum çalışması (case study) ile gerçekleştirilmiştir. Durum çalışması, belirli bir bağlam içinde bir olgunun derinlemesine incelenmesini sağlayan bir yöntemdir ve bu araştırmanın amacı doğrultusunda uygun görülmüştür (Yin, 2014). Veri toplama sürecinde, yarı yapılandırılmış görüşme formu kullanılmıştır. Yarı yapılandırılmış görüşme formu, araştırmacının belirli sorular sormasına rağmen katılımcılara kendi görüşlerini açıklama fırsatı tanıdığı için nitel araştırmalarda sıkça tercih edilen bir yöntemdir (Creswell, 2013).

Araştırmada, ders işlenişi esnasında yaşanan sorunlar, bu sorunlara yönelik çözüm önerileri ve uzaktan eğitimin tarih dersi üzerindeki olumlu ve olumsuz yansımaları hakkında veriler toplanmıştır. Veri toplama işlemi, çevrimiçi anketler aracılığıyla gerçekleştirilmiştir. Çevrimiçi veri toplama araçları, pandemi döneminde fiziksel etkileşimi en aza indirerek veri toplamaya olanak sağlamıştır (Bryman, 2012). Verilerin sınıflandırılması ve yorumlanmasında içerik analizi yöntemi kullanılmıştır. İçerik analizi, nitel verilerin anlamlı kategorilere ayrılarak sistematik bir şekilde incelenmesini sağlar (Krippendorff, 2018).

Verilerin kodlanması, açık kodlama tekniği ile yapılmıştır. Açık kodlama, verilerin dikkatlice incelenerek anlamlı parçalar halinde ayrılması ve bu parçaların etiketlenmesini içerir (Strauss & Corbin, 1998). Elde edilen kodlar, benzerlik ve farklılıklarına göre gruplandırılarak temalar oluşturulmuştur. Bu temalar, uzaktan eğitim sürecinde tarih dersi ile ilgili karşılaşılan zorluklar ve çözüm önerileri hakkında derinlemesine bilgi sunmuştur.

Araştırma Evreni

Araştırmanın evrenini, Mahmut Arslan Anadolu Lisesi'nde pandemi döneminde uzaktan eğitim alan öğrenciler oluşturmuştur. Örneklem seçimi, gönüllülük esasına göre yapılmıştır. Pandemi döneminde online eğitim gören ve

araştırmaya katılmayı kabul eden 50 öğrenci çalışmanın örneklemini oluşturmuştur. Bu öğrenciler, EBA platformunda tarih dersi alan farklı sınıf seviyelerindeki öğrencilerden seçilmiştir. Öğrencilerin sınıf seviyelerine göre dağılımı şu şekildedir: 9. sınıftan 10 öğrenci, 10. sınıftan 10 öğrenci, 11. sınıftan 10 öğrenci ve 12. sınıftan 20 öğrenci. Bu dağılım, farklı sınıf seviyelerindeki öğrencilerin uzaktan eğitim deneyimlerini karşılaştırma olanağı sağlamaktadır (Patton, 2002).

Veri Toplama Araçları

Yarı yapılandırılmış görüşme formunun geliştirilmesi sürecinde, ilgili literatür taraması yapılmış ve konuyla ilgili mevcut araştırma sonuçları dikkate alınmıştır (Merriam, 2009). Görüşme formu, altı soru içermektedir ve bu sorular, öğrencilerin EBA platformunda tarih dersleri sırasında karşılaştıkları zorluklar, uzaktan eğitim materyallerinin tarih öğrenimine etkisi, tarih öğretmenlerinin uzaktan eğitimdeki performansı, uzaktan eğitimde tarih dersinin olumlu yönleri, tarih dersinin uzaktan eğitimde nasıl iyileştirilebileceği ve tarih dersinin yüz yüze mi yoksa online mı daha verimli olduğuna dair görüşlerini kapsamaktadır. Görüşme soruları aşağıdaki gibidir:

1. EBA platformunda tarih dersleri sırasında hangi zorluklarla karşılaştınız?
2. Uzaktan eğitim materyallerinin tarih öğrenimine etkisi nasıldı?
3. Tarih öğretmenlerinin uzaktan eğitimdeki performansını nasıl buldunuz?
4. Uzaktan eğitimde tarih dersinin olumlu yönleri nelerdi?
5. Tarih dersinin uzaktan eğitimini nasıl iyileştirebiliriz?
6. Size göre Tarih dersi yüz yüze mi yoksa online mı daha verimlidir?

Bu sorular, öğrencilerin uzaktan eğitim deneyimlerini derinlemesine anlamak için tasarlanmıştır ve nitel verilerin toplanmasında etkilidir (Denzin & Lincoln, 2011).

Bulgular

Tablo 1. EBA platformunda tarih dersleri sırasında hangi zorluklarla karşılaştınız? sorusuna ilişkin frekans dağılımı

Tema	Açıklama	Örnek Cevaplar
Teknik Sorunlar	İnternet bağlantısı, platform çökmesi gibi teknik aksaklıklar.	1, 9, 14, 25
Erişilebilirlik	İçeriklere ve materyallere erişimde yaşanan zorluklar.	2, 7, 19
Kullanıcı Deneyimi	Platformun kullanımı ve arayüz tasarımı ile ilgili sorunlar.	3, 20
Öğretmen-Öğrenci İletişimi	Canlı derslerde iletişim ve öğretmenlerle etkileşim sorunları.	4, 8, 15
Ders İçeriği ve Yapısı	Ders içeriklerinin uzunluğu, bilgi yoğunluğu ve güncellenmemesi.	5, 6, 16, 18
Etkileşim ve Katılım	Etkileşimli etkinliklerin ve öğrenci katılımını artıracak aktivitelerin eksikliği.	10, 12, 13
Değerlendirme ve Ödevler	Sınav ve ödevlerle ilgili bilgi eksikliği ve ödev yükü.	11, 17
Planlama ve Düzen	Ders programındaki düzensizlikler ve son dakika değişiklikleri.	22
Öğrenci Geri Bildirimi	Öğrenci geri bildirimlerinin yeterince dikkate alınmaması.	23
Öğrenme Stilleri	Farklı öğrenme stillerine uygun materyal eksikliği.	24

“EBA platformunda tarih dersleri sırasında hangi zorluklarla karşılaştınız? " sorusuna ilişkin frekans dağılımı analiz edilmiştir. Tablo 1, öğrencilerin uzaktan eğitim sürecinde karşılaştıkları sorunları temalar halinde sunmaktadır.

Eğitim Bilişim Ağı (EBA) platformunda tarih dersleri sırasında karşılaşılan zorluklara ilişkin veriler analiz edilmiştir.

Teknik sorunlar, öğrencilerin sıklıkla karşılaştıkları bir zorluk olarak ortaya çıkmıştır. İnternet bağlantısının kesilmesi ve platformun çökmesi gibi sorunlar, derslerin kesintiye uğramasına ve öğrencilerin dersleri takip edememesine neden olmuştur. Bu bulgu, pandemik dönemde uzaktan eğitimde karşılaşılan yaygın bir sorun olarak literatürde de yer almaktadır (Bozkurt & Sharma, 2020). Teknolojik altyapının yetersizliği ve internet erişimi, uzaktan eğitimin etkinliğini sınırlayan önemli faktörler arasında yer almaktadır (Hodges et al., 2020).

Öğrenciler, EBA platformundaki içeriklere ve materyallere erişimde zorluklar yaşamıştır. Bu durum, öğrenme materyallerinin erişilebilirliğinin ve kullanılabilirliğinin önemini vurgulamaktadır. Literatürde, uzaktan eğitimde erişilebilirlik sorunlarının öğrencilerin öğrenme deneyimlerini olumsuz etkilediği belirtilmektedir (Means et al., 2009). Özellikle düşük internet hızı veya teknik altyapısı yetersiz olan bölgelerdeki öğrenciler bu durumdan daha fazla etkilenmektedir (Anderson, 2008).

Platformun kullanımı ve arayüz tasarımı ile ilgili sorunlar da öğrenciler tarafından dile getirilmiştir. EBA'nın kullanıcı dostu olmayan arayüzü, öğrencilerin ders materyallerine erişimini zorlaştırmıştır. Literatürde, kullanıcı deneyiminin eğitim teknolojilerinin etkin kullanımında kritik bir rol oynadığı vurgulanmaktadır (Park & Choi, 2009). Kullanıcı dostu arayüzler, öğrencilerin platformu daha etkin ve verimli kullanmalarını sağlamaktadır (Kearsley & Shneiderman, 1998).

Canlı derslerde iletişim ve öğretmenlerle etkileşim sorunları, uzaktan eğitim sürecinde önemli bir engel olarak görülmüştür. Öğretmen-öğrenci etkileşiminin sınırlı olması, öğrencilerin öğrenme sürecindeki motivasyonlarını düşürmektedir (Moore, 1993). Bu bulgu, uzaktan eğitimde etkileşimin önemini vurgulayan literatürle de örtüşmektedir (Garrison & Anderson, 2003).

Ders içeriklerinin uzunluğu, bilgi yoğunluğu ve güncellenmemesi, öğrenciler için bir diğer zorluk alanı olmuştur. Etkili uzaktan eğitim materyalleri, öğrenci gereksinimlerine uygun ve güncel içeriklerden oluşmalıdır (Garrison, 2011). Literatürde, ders materyallerinin sürekli olarak güncellenmesi ve öğrenci ihtiyaçlarına göre uyarlanması gerektiği belirtilmektedir (Bonk & Zhang, 2008).

Etkileşimli etkinliklerin ve öğrenci katılımını artıracak aktivitelerin eksikliği, öğrencilerin derslere olan ilgisini azaltmaktadır. Etkileşim, öğrencilerin öğrenme sürecine aktif katılımını sağlamakta ve öğrenme çıktılarının kalitesini artırmaktadır (Chickering & Gamson, 1987). Uzaktan eğitimde etkileşimi artırmak için çeşitli pedagogik stratejilerin kullanılması önerilmektedir (Hrastinski, 2009).

Sınav ve ödevlerle ilgili bilgi eksikliği ve ödev yükü, öğrenciler tarafından dile getirilen diğer önemli sorunlardandır. Adil ve şeffaf değerlendirme yöntemlerinin kullanılması, uzaktan eğitimde öğrenci memnuniyetini artıran faktörler arasındadır (Wang, 2004). Öğrencilere yeterli bilgi verilmesi ve ödev yükünün dengeli dağıtılması, öğrenme sürecini desteklemektedir (Boud & Falchikov, 2006).

Ders programındaki düzensizlikler ve son dakika değişiklikleri, öğrencilerin derslere uyum sağlamasını zorlaştırmıştır. Planlama ve düzen, etkili bir uzaktan eğitim süreci için kritik öneme sahiptir (Simonson et al., 2011). Öğrencilere önceden bilgilendirme yapılması ve programın tutarlılığı, derslerin daha verimli geçmesini sağlamaktadır (Graham et al., 2007).

Öğrenci geri bildirimlerinin yeterince dikkate alınmaması, öğrencilerin memnuniyetini olumsuz etkilemiştir. Öğrenci geri bildirimlerinin değerlendirilmesi ve ders içeriğinin bu geri bildirimlere göre uyarlanması, eğitim kalitesini artırmaktadır (Black & Wiliam, 1998).

Farklı öğrenme stillerine uygun materyal eksikliği, öğrencilerin bireysel öğrenme ihtiyaçlarının karşılanamamasına neden olmuştur. Öğrenme stillerine uygun materyallerin sunulması, öğrencilerin öğrenme sürecine olan katılımını ve motivasyonunu artırmaktadır (Kolb, 1984).

Tablo 2. Uzaktan eğitim materyallerinin tarih öğrenimine etkisi nasıldı? sorusuna ilişkin frekans dağılımı

Tema	Açıklama	Örnek Cevaplar
Görselleştirme	Videolar, sanal turlar ve animasyonlar gibi görsel materyallerin etkisi.	1, 3, 19, 22
Erişilebilirlik ve Çeşitlilik	E-kitaplar, çevrimiçi kaynaklar ve dijital arşivlerin erişilebilirliği.	2, 4, 17
Eğlence ve İlgi	İnteraktif oyunlar, podcast'ler ve multimedya içeriklerin öğrenmeye katkısı.	5, 10, 15
Etkileşim ve Tartışma	Canlı tartışma oturumları ve forumların öğrenci katılımına etkisi.	6, 13
Teknik Sorunlar ve Güncellik	EBA platformundaki teknik sorunlar ve materyallerin güncelliği.	7, 14, 18, 23
Değerlendirme ve Ölçme	Testler, quizler ve sınavların öğrenci performansına etkisi.	8, 14, 21
Etkinlikler ve Katılım	Ders içi etkinliklerin çeşitliliği ve öğrenci katılımı.	9, 16, 24
Öğretmen-Öğrenci Etkileşimi	Öğretmenlerle birebir etkileşimin eksikliği ve etkisi.	12, 20
İçerik Yoğunluğu	Ders içeriklerinin yoğunluğu ve özetlemenin önemi.	25

"Uzaktan eğitim materyallerinin tarih öğrenimine etkisi nasıldı? " sorusuna ilişkin frekans dağılımı analiz edilmiştir. Tablo 2, öğrencilerin uzaktan eğitim sürecinde kullanılan materyallerin etkisini temalar halinde sunmaktadır.

Görselleştirme, videolar, sanal turlar ve animasyonlar gibi görsel materyallerin tarih öğrenimindeki etkisini ifade etmektedir. Öğrenciler, bu tür materyallerin tarihi olayları daha somut ve anlaşılır hale getirdiğini belirtmişlerdir. Literatürde, görsel materyallerin eğitimdeki rolü ve öğrenci başarısına olan olumlu etkileri sıkça vurgulanmaktadır (Mayer, 2002). Görsel materyaller, öğrencilerin bilgiyi daha iyi kavramalarına ve hatırlamalarına yardımcı olmaktadır (Clark & Mayer, 2016).

Erişilebilirlik ve çeşitlilik teması, e-kitaplar, çevrimiçi kaynaklar ve dijital arşivlerin öğrencilere sunduğu geniş materyal yelpazesini kapsamaktadır. Öğrenciler, bu kaynakların tarih öğrenimini zenginleştirdiğini ve çeşitli bakış açıları sunduğunu belirtmişlerdir. Çevrimiçi kaynakların ve dijital arşivlerin kullanımı, öğrencilere geniş bir bilgi havuzu sunmakta ve tarih derslerinin daha ilgi çekici hale gelmesini sağlamaktadır (Dede, 2008).

İnteraktif oyunlar, podcast'ler ve multimedya içerikler, öğrencilerin tarih derslerine olan ilgisini artırmada önemli bir rol oynamaktadır. Bu tür materyaller, öğrencilerin derslere aktif katılımını teşvik etmekte ve öğrenme sürecini daha eğlenceli hale getirmektedir. Literatürde, eğlenceli ve ilgi çekici materyallerin öğrenci motivasyonunu ve öğrenme çıktılarının kalitesini artırdığı belirtilmektedir (Gee, 2003).

Canlı tartışma oturumları ve forumlar, öğrencilerin derslerde daha fazla etkileşimde bulunmasını ve kendi görüşlerini ifade etmesini sağlamaktadır. Bu tür etkileşimli etkinlikler, öğrencilerin eleştirel düşünme becerilerini geliştirmekte ve öğrenme süreçlerini derinleştirmektedir (Garrison & Cleveland-Innes, 2005). Etkileşimli öğrenme ortamları, öğrenci katılımını ve memnuniyetini artırmaktadır (Swan, 2001).

EBA platformundaki teknik sorunlar ve materyallerin güncelliği, öğrencilerin öğrenme deneyimlerini olumsuz etkilemiştir. Teknik aksaklıklar, derslerin kesintiye uğramasına ve öğrencilerin dikkatinin dağılmasına neden olmaktadır. Ayrıca, güncel olmayan materyaller, öğrencilerin öğrenme motivasyonunu azaltmaktadır (Hodges et al., 2020). Eğitim materyallerinin sürekli güncellenmesi ve teknik altyapının iyileştirilmesi, uzaktan eğitimin etkinliğini artırmaktadır (Means et al., 2009).

Testler, quizler ve sınavlar, öğrencilerin öğrenme performansını değerlendirmede önemli bir araçtır. Ancak, öğrenciler bu değerlendirme yöntemlerinin bazen yetersiz kaldığını ve ödev yükünün fazla olduğunu belirtmişlerdir. Literatürde, adil ve dengeli değerlendirme yöntemlerinin öğrencilerin öğrenme sürecini desteklediği ve motivasyonlarını artırdığı vurgulanmaktadır (Black & Wiliam, 1998). Değerlendirme süreçlerinin şeffaf ve düzenli olması, öğrenci başarısını olumlu yönde etkilemektedir (Wang, 2004).

Ders içi etkinliklerin çeşitliliği ve öğrenci katılımı, öğrencilerin derslere olan ilgisini ve öğrenme motivasyonunu artırmaktadır. Çeşitli etkinlikler ve aktiviteler, öğrencilerin farklı öğrenme stillerine hitap etmekte

ve öğrenme sürecini zenginleştirmektedir (Kolb, 1984). Aktif öğrenme stratejilerinin kullanılması, öğrenci katılımını ve başarıyı artırmaktadır (Prince, 2004).

Öğretmenlerle birebir etkileşimin eksikliği, öğrencilerin öğrenme sürecinde önemli bir zorluk olarak ortaya çıkmıştır. Öğretmen-öğrenci etkileşimi, öğrenci motivasyonu ve başarısı üzerinde doğrudan etkilidir (Chickering & Gamson, 1987). Literatürde, etkili öğretmen-öğrenci etkileşiminin öğrenci memnuniyetini ve öğrenme çıktılarının kalitesini artırdığı belirtilmektedir (Anderson, 2003).

Ders içeriklerinin yoğunluğu ve özetlemenin önemi, öğrencilerin tarih derslerini anlamakta zorlandıkları alanlardan biridir. Yoğun içerikler, öğrencilerin bilgiyi sindirmesini zorlaştırmakta ve öğrenme süreçlerini olumsuz etkilemektedir (Sweller, 1988). Öğrencilere özet bilgiler sunmak ve öğrenme materyallerini sadeleştirmek, öğrenme sürecini daha etkili hale getirmektedir (Kirschner et al., 2006).

Tablo 3. Tarih öğretmenlerinin uzaktan eğitimdeki performansını nasıl buldunuz? sorusuna ilişkin frekans dağılımı

Tema	Açıklama	Örnek Cevaplar
İlgi ve Çaba	Öğretmenlerin dersleri ilgi çekici kılmak için gösterdiği çaba.	1, 3, 5, 7, 15
Teknolojik Yeterlilik	Öğretmenlerin teknoloji kullanımındaki yeterlilik düzeyi.	2, 4, 12, 18, 25
Öğrenci Katılımı	Derslerde öğrenci katılımını teşvik eden faktörler.	5, 13, 17, 19, 22
Ders İçeriği ve Sunumu	Ders içeriklerinin sunumu ve işleniş hızı.	6, 8, 10, 20, 21
İletişim ve Destek	Öğretmenlerin iletişim becerileri ve öğrencilere verdikleri destek.	9, 11, 16, 22, 24
Planlama ve Organizasyon	Ders planlaması ve organizasyonu ile ilgili sorunlar.	10, 14, 23, 24
Etkinlik ve Materyal Çeşitliliği	Derslerde kullanılan etkinlik ve materyallerin çeşitliliği.	8, 13, 17, 23

" Tarih öğretmenlerinin uzaktan eğitimdeki performansını nasıl buldunuz? " sorusuna ilişkin frekans dağılımı analiz edilmiştir. Tablo 3, öğrencilerin uzaktan eğitim sürecinde öğretmen performanslarını değerlendirmesini temalar halinde sunmaktadır.

İlgi ve çaba teması, öğretmenlerin dersleri ilgi çekici kılmak için gösterdiği çabayı ifade etmektedir. Öğrenciler, öğretmenlerin dersleri daha ilgi çekici hale getirmek için çeşitli yöntemler ve materyaller kullandığını belirtmişlerdir. Literatürde, öğretmenlerin dersleri ilgi çekici kılma çabalarının öğrencilerin motivasyonunu ve öğrenme isteğini artırdığı belirtilmektedir (Ames, 1992). Öğretmenlerin yenilikçi yaklaşımlar kullanarak dersleri zenginleştirmesi, öğrencilerin derse katılımını ve ilgisini artırmaktadır (Dörnyei, 2001).

Teknolojik yeterlilik teması, öğretmenlerin teknoloji kullanımındaki yeterlilik düzeyini kapsamaktadır. Öğrenciler, öğretmenlerin teknolojiyi etkili kullanabilme yeteneklerinin derslerin başarısını doğrudan etkilediğini ifade etmişlerdir. Literatürde, öğretmenlerin dijital okuryazarlık becerilerinin, uzaktan eğitim sürecinin etkinliğini artırdığı vurgulanmaktadır (Ertmer et al., 2012). Teknolojik yeterliliği yüksek öğretmenler, eğitim teknolojilerini daha verimli kullanarak öğrenme süreçlerini desteklemektedir (Mishra & Koehler, 2006).

Öğrenci katılımı teması, derslerde öğrenci katılımını teşvik eden faktörleri içermektedir. Öğrenciler, çeşitli interaktif etkinlikler ve öğretmenlerin katılımı teşvik eden yaklaşımlarının derslere olan ilgilerini artırdığını belirtmişlerdir. Literatürde, öğrenci katılımının aktif öğrenme ve etkileşimli öğretim stratejileriyle desteklenmesi gerektiği vurgulanmaktadır (Freeman et al., 2014). Öğrencilerin aktif olarak derslere katılması, öğrenme süreçlerinin daha etkili ve kalıcı olmasını sağlamaktadır (Prince, 2004).

Ders içeriği ve sunumu teması, ders içeriklerinin sunumu ve işleniş hızını kapsamaktadır. Öğrenciler, ders içeriklerinin anlaşılır ve uygun hızda sunulmasının öğrenmelerini olumlu etkilediğini belirtmişlerdir. Literatürde, ders içeriklerinin anlaşılır ve organize bir şekilde sunulmasının, öğrencilerin bilgiye daha kolay erişmesini sağladığı belirtilmektedir (Sweller, 1988). Öğrencilerin öğrenme hızına uygun olarak içeriklerin sunulması, öğrenme etkinliğini artırmaktadır (Kirschner et al., 2006).

İletişim ve destek teması, öğretmenlerin iletişim becerileri ve öğrencilere verdikleri destek ile ilgilidir. Öğrenciler, öğretmenlerinin iletişim becerilerinin ve destekleyici yaklaşımlarının, uzaktan eğitim sürecinde motivasyonlarını artırdığını ifade etmişlerdir. Literatürde, öğretmen-öğrenci iletişiminin güçlü olmasının,

öğrencilerin akademik başarılarını ve memnuniyetlerini artırdığı belirtilmektedir (Garrison & Cleveland-Innes, 2005). Öğretmenlerin öğrencilere verdiği destek, öğrenme süreçlerini olumlu yönde etkilemektedir (Tinto, 1993).

Planlama ve organizasyon teması, ders planlaması ve organizasyonu ile ilgili sorunları kapsamaktadır. Öğrenciler, derslerin planlı ve organize bir şekilde yürütülmesinin öğrenmelerine olumlu katkı sağladığını belirtmişlerdir. Literatürde, etkili planlama ve organizasyonun, uzaktan eğitimde başarıyı artıran önemli faktörler arasında yer aldığı belirtilmektedir (Simonson et al., 2011). Öğretmenlerin dersleri iyi planlaması ve organizasyonu, öğrenci memnuniyetini ve öğrenme etkinliğini artırmaktadır (Graham et al., 2007).

Etkinlik ve materyal çeşitliliği teması, derslerde kullanılan etkinlik ve materyallerin çeşitliliğini içermektedir. Öğrenciler, çeşitli etkinlikler ve materyallerin derslere olan ilgilerini artırdığını ve öğrenmelerini desteklediğini ifade etmişlerdir. Literatürde, farklı öğretim materyalleri ve etkinliklerin kullanılması, öğrencilerin öğrenme sürecini zenginleştirdiği belirtilmektedir (Tomlinson, 2001). Çeşitli öğretim stratejilerinin ve materyallerinin kullanılması, öğrencilerin farklı öğrenme stillerine hitap etmektedir (Kolb, 1984).

Tablo 4. Uzaktan eğitimde tarih dersinin olumlu yönleri nelerdi? sorusuna ilişkin frekans dağılımı

Tema	Açıklama	Örnek Cevaplar
Esneklik ve Erişilebilirlik	Derslerin esnek saatleri ve çevrimiçi kaynaklara kolay erişim.	1, 2, 3
Görsel ve İnteraktif Öğrenme	Videolar, animasyonlar ve sanal turlarla görsel öğrenme.	4, 9, 14, 24
Etkileşim ve Katılım	Canlı dersler, forumlar ve grup çalışmalarıyla etkileşim.	6, 7, 11, 12
Tekrar ve Pekiştirme	Ders içeriklerinin tekrarı ve quizlerle bilgi pekiştirme.	5, 10, 18
Yaratıcılık ve Çeşitlilik	Projeler, etkinlikler ve podcast'lerle yaratıcılık ve çeşitlilik.	15, 21, 22
Bilgilendirme ve Destek	Öğretmenlerin bilgilendirici sunumları ve dışarıdan destekleri.	13, 17, 20
Sosyal Etkileşim	Video konferanslar ve tartışmalarla sosyal etkileşim.	12, 19, 25
Kullanıcı Deneyimi	EBA platformunun kullanım kolaylığı.	23

"Uzaktan eğitimde tarih dersinin olumlu yönleri nelerdi?" sorusuna ilişkin frekans dağılımı analiz edilmiştir. Tablo 4, öğrencilerin uzaktan eğitim sürecindeki olumlu deneyimlerini temalar halinde sunmaktadır.

Uzaktan eğitimin sunduğu esneklik ve çevrimiçi kaynaklara kolay erişim, öğrencilerin derslere daha rahat katılımını sağlamıştır. Literatürde, esnek öğrenme ortamlarının öğrencilerin farklı zamanlarda ve mekanlarda öğrenme imkanı bulmalarına olanak sağladığı belirtilmektedir (Means et al., 2009). Bu esneklik, öğrencilerin kendi öğrenme hızlarına göre dersleri takip etmelerine yardımcı olmuştur.

Videolar, animasyonlar ve sanal turlar gibi görsel ve interaktif materyaller, öğrencilerin tarih derslerini daha ilgi çekici bulmasını sağlamıştır. Mayer (2002), görsel materyallerin öğrencilerin bilgiyi daha iyi kavramalarına yardımcı olduğunu ve öğrenmeyi derinleştirdiğini belirtmiştir. Bu tür materyaller, tarihsel olayları somutlaştırarak öğrencilerin konuları daha iyi anlamalarını sağlamaktadır.

Canlı dersler, forumlar ve grup çalışmaları, öğrencilerin derslere aktif katılımını teşvik etmiştir. Garrison ve Cleveland-Innes (2005), etkileşimli öğrenme ortamlarının öğrencilerin katılımını ve öğrenme motivasyonunu artırdığını göstermiştir. Öğrenciler, bu tür etkinlikler sayesinde derslerle daha fazla ilgilenmiş ve işbirliği yapma fırsatı bulmuşlardır.

Ders içeriklerinin tekrar edilmesi ve quizler aracılığıyla bilgi pekiştirme, öğrencilerin öğrendiklerini daha iyi hatırlamalarına yardımcı olmuştur. Literatürde, tekrarın öğrenme üzerindeki olumlu etkileri sıkça vurgulanmaktadır (Cepni & Sahin, 2012). Quizler, öğrencilerin bilgilerini pekiştirmelerine ve kendilerini değerlendirmelerine olanak sağlamaktadır.

Projeler, etkinlikler ve podcast'ler, öğrencilerin yaratıcılığını ve derse olan ilgisini artırmıştır. Yaratıcı ve çeşitli öğretim materyalleri, öğrencilerin farklı öğrenme stillerine hitap ederek öğrenme deneyimini zenginleştirmektedir (Tomlinson, 2001).

Öğretmenlerin bilgilendirici sunumları ve sağladıkları destek, öğrencilerin öğrenme süreçlerini kolaylaştırmıştır. Tinto (1993), öğretmen desteğinin öğrenci başarısını ve memnuniyetini artırdığını belirtmiştir. Öğretmenler, öğrencilerin ihtiyaçlarına yönelik bilgilendirici ve destekleyici yaklaşımlar sergilemiştir.

Video konferanslar ve tartışmalar, öğrenciler arasında sosyal etkileşimi artırmıştır. Bu etkileşimler, öğrencilerin sosyal becerilerini geliştirmelerine ve birlikte öğrenme deneyimlerini paylaşmalarına olanak sağlamıştır (Vygotsky, 1978).

EBA platformunun kullanım kolaylığı, öğrencilerin derslere erişimini ve platformu etkin bir şekilde kullanmalarını sağlamıştır. Kullanıcı dostu arayüzler, öğrencilerin teknolojiye adaptasyonunu kolaylaştırmaktadır (Nielsen, 1993).

Tablo 5. Tarih dersinin uzaktan eğitimini nasıl iyileştirebiliriz? sorusuna ilişkin frekans dağılımı

Tema	Açıklama	Örnek Cevaplar
İçerik ve Sunum	Ders içeriklerinin kısalığı, interaktifliği ve anlatım teknikleri.	1, 4, 13, 16
Teknik İyileştirmeler	Teknik destek, platform kullanımı ve internet bağlantısı iyileştirmeleri.	2, 8, 24
Öğretmen Eğitimi	Öğretmenlerin teknoloji ve ders anlatımı konusunda eğitimi.	3, 13
Öğrenci Katılımı ve Geri Bildirim	Öğrenci katılımını ve geri bildirimlerini artırma yolları.	5, 9, 11
Ders Saatleri ve Erişilebilirlik	Ders saatlerinin düzenlenmesi ve ders tekrarlarının erişilebilirliği.	6, 10, 12
Görsel ve Multimedya Materyaller	Görsel materyallerin ve multimedya içeriklerin kullanımı.	7, 14, 21
İletişim ve Destek	Öğretmenlerle iletişim ve öğrencilere destek sağlama.	15, 18, 25
Değerlendirme ve Zorluk	Test ve quizlerin zorluk seviyesinin artırılması.	17, 22
Motivasyon ve Çeşitlilik	Motivasyon artırıcı etkinlikler ve öğrenme stillerine uygun materyaller.	19, 23
Güncellik ve Performans	Ders içeriklerinin güncellenmesi ve platform performansının iyileştirilmesi.	20, 24

“Tarih dersinin uzaktan eğitimini nasıl iyileştirebiliriz?" sorusuna ilişkin frekans dağılımı analiz edilmiştir. Tablo 1, öğrencilerin uzaktan eğitim sürecini iyileştirme önerileri temalar halinde sunmaktadır.

Ders içeriklerinin daha kısa ve interaktif olması gerektiği belirtilmiştir. Literatürde, kısa ve öz materyallerin öğrencilerin dikkatini toplama konusunda daha etkili olduğu vurgulanmaktadır (Sweller, 1988). Ayrıca, interaktif anlatım teknikleri öğrencilerin aktif katılımını artırmaktadır (Prince, 2004).

Teknik destek ve platform performansının iyileştirilmesi önerilmiştir. Hodges ve arkadaşları (2020), uzaktan eğitimin başarısının büyük ölçüde teknik altyapıya bağlı olduğunu belirtmiştir. İnternet bağlantısının iyileştirilmesi ve teknik destek sağlanması, öğrencilerin derslere kesintisiz katılımını sağlayacaktır.

Öğretmenlerin teknoloji ve uzaktan eğitim teknikleri konusunda eğitilmesi gerektiği ifade edilmiştir. Ertmer ve arkadaşları (2012), öğretmenlerin dijital becerilerinin geliştirilmesinin uzaktan eğitimde başarının anahtarı olduğunu vurgulamaktadır.

Öğrenci katılımını artırmak ve geri bildirim mekanizmalarını güçlendirmek gerektiği belirtilmiştir. Garrison ve Cleveland-Innes (2005), öğrenci geri bildirimlerinin öğrenme sürecini iyileştirdiğini ve etkileşimi artırdığını göstermiştir.

Ders saatlerinin düzenlenmesi ve ders tekrarlarının erişilebilir olması gerektiği vurgulanmıştır. Simonson ve arkadaşları (2011), esnek ders saatlerinin öğrencilerin öğrenme sürecine daha iyi uyum sağlamasına yardımcı olduğunu belirtmiştir.

Görsel ve multimedya materyallerin kullanımının artırılması önerilmiştir. Mayer (2002), multimedya öğreniminin öğrencilerin bilgiyi daha iyi kavramalarına yardımcı olduğunu göstermiştir.

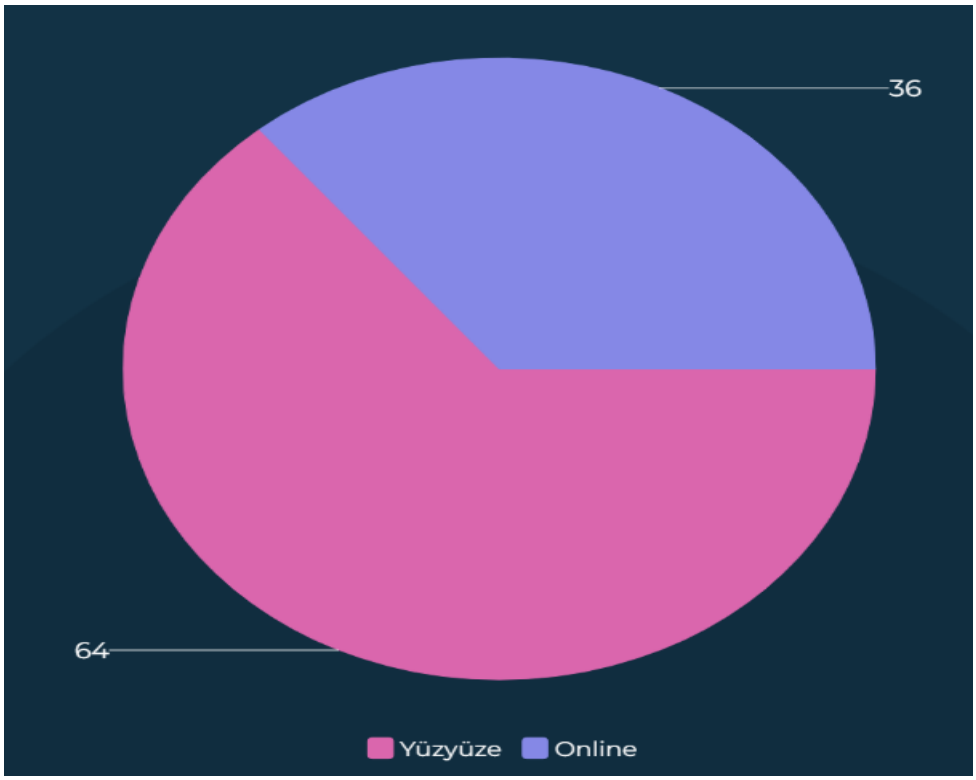
Öğretmenlerle daha güçlü iletişim ve öğrencilere destek sağlanması gerektiği belirtilmiştir. Tinto (1993), etkili iletişim ve destek mekanizmalarının öğrenci başarısını artırdığını vurgulamaktadır.

Test ve quizlerin zorluk seviyesinin artırılması gerektiği ifade edilmiştir. Black ve Wiliam (1998), değerlendirme yöntemlerinin öğrenci öğrenimini doğrudan etkilediğini göstermektedir.

Motivasyonu artırıcı etkinlikler ve farklı öğrenme stillerine uygun materyallerin kullanılması önerilmiştir. Kolb (1984), farklı öğrenme stillerine hitap eden materyallerin öğrenci başarısını artırdığını belirtmektedir.

Ders içeriklerinin güncellenmesi ve platform performansının iyileştirilmesi gerektiği vurgulanmıştır. Bu, uzaktan eğitimin kalitesini artıracaktır (Means et al., 2009).

Tablo 6. Size göre Tarih dersi yüz yüze mi yoksa online mı daha verimlidir?



Bu bölümde, "Size göre Tarih dersi yüz yüze mi yoksa online mı daha verimlidir?" sorusuna verilen yanıtların frekans dağılımı analiz edilmiştir. Öğrencilerin 32'si yüz yüze eğitimin daha verimli olduğunu belirtirken, 18'i online eğitimi tercih etmiştir. Bu sonuç, öğrencilerin çoğunluğunun tarih derslerinde yüz yüze eğitimi daha verimli bulduğunu göstermektedir.

Yüz yüze eğitimi tercih eden öğrenciler, bu yöntemle daha fazla etkileşimde bulunabildiklerini ve konuları daha iyi anladıklarını belirtmişlerdir. Literatürde de yüz yüze eğitimin, öğretmen-öğrenci etkileşimini artırarak öğrencilerin motivasyonunu ve katılımını desteklediği belirtilmektedir (Chickering & Gamson, 1987). Ayrıca, yüz yüze eğitimde öğrencilerin anında geri bildirim alabilmesi ve sosyal etkileşimde bulunabilmesi, öğrenme süreçlerini olumlu yönde etkilemektedir (Tinto, 1993).

Online eğitimi tercih eden öğrenciler ise, esnek zamanlama ve kendi hızlarında öğrenebilme imkanını vurgulamışlardır. Literatürde, online eğitimin öğrencilere esneklik sağlayarak farklı öğrenme hızlarına uyum sağlama avantajı sunduğu belirtilmektedir (Means et al., 2009). Ayrıca, dijital kaynaklara erişim ve multimedya kullanımı, öğrenme deneyimini zenginleştirebilir (Mayer, 2002).

Öğrencilerin çoğunluğu yüz yüze eğitimi daha verimli bulsa da, online eğitimin de belirli avantajları bulunmaktadır. Bu sonuç, hibrit eğitim modellerinin benimsenmesi gerektiğini önermektedir. Hibrit modeller, her iki yöntemin de avantajlarını birleştirerek öğrencilerin farklı ihtiyaçlarını karşılayabilir (Graham, 2006).

Sonuç

Araştırma sonuçları, öğrencilerin uzaktan eğitimde karşılaştıkları zorlukları ve bu zorlukların eğitim süreçlerine etkilerini detaylı bir şekilde ortaya koymaktadır. Öğrenciler, teknik sorunlar ve platform kullanımındaki zorluklar gibi çeşitli engellerle karşılaşmışlardır. Örneğin, bir öğrenci “EBA platformunun kullanıcı arayüzü karmaşıktı ve sık sık çöktüğü için derslere giremedik” şeklinde bir geri bildirimde bulunmuştur. Bu tür teknik sorunlar, öğrencilerin derslere erişimini ve dolayısıyla öğrenme deneyimlerini olumsuz yönde etkilemiştir.

Öğretmenlerin teknoloji kullanımındaki yeterlilikleri de öğrencilerin derslerden aldıkları verimi etkileyen önemli bir faktör olarak belirlenmiştir. Bazı öğrenciler, öğretmenlerin teknoloji kullanımı konusunda daha fazla eğitime ihtiyaç duyduklarını ifade etmişlerdir: "Öğretmenlerimiz teknolojiyi etkili kullanamadı, bu da derslerin akışını ve anlaşılırlığını etkiledi" gibi yorumlar yapılmıştır.

Ders materyallerinin görsel ve interaktif öğeleri, öğrenciler tarafından olumlu olarak değerlendirilmiş, ancak ders içeriklerinin güncellenmesi ve çeşitlendirilmesi gerektiği vurgulanmıştır. Öğrenciler, "Ders videoları çok uzundu ve dikkatimi toplamakta zorlandım, daha kısa ve öz videolar daha faydalı olurdu" ve "EBA'daki testler pratik yapmam için iyi bir yol oldu, ancak bazı soruların güncellenmesi gerekiyor" gibi görüşlerini paylaşmışlardır.

Bu geri bildirimler, uzaktan eğitimde karşılaşılan zorlukların üstesinden gelmek ve öğrencilerin öğrenme deneyimlerini iyileştirmek için alınması gereken önlemleri belirlemekte önemli bir rol oynamaktadır. Öğretmen eğitimlerinin güçlendirilmesi, teknik altyapının iyileştirilmesi ve ders içeriklerinin öğrenci ihtiyaçlarına göre düzenlenmesi, bu sürecin daha verimli hale getirilmesine katkıda bulunabilir.

Araştırmanın sonuçları, uzaktan eğitimde Tarih dersinin etkinliğini artırmak için çeşitli iyileştirme önerileri sunduğunu göstermektedir. Öğrenci geri bildirimleri, öğretmen eğitimlerinin güçlendirilmesinin önemini vurgulamaktadır. Örneğin, bir öğrencinin "Öğretmenlerimiz teknolojiyi etkili kullanamadı, bu da derslerin akışını ve anlaşılırlığını etkiledi" şeklindeki yorumu, öğretmenlerin teknoloji kullanımı konusunda daha fazla desteklenmesi gerektiğini işaret etmektedir.

Teknik altyapının iyileştirilmesine yönelik olarak, öğrenciler platformun kullanımı ve internet bağlantısı gibi konularda zorluklar yaşadıklarını belirtmişlerdir. "EBA platformunun sık sık çökmesi ve internet bağlantı sorunları nedeniyle derslere katılamadım" gibi ifadeler, teknik altyapının güçlendirilmesinin öğrenci erişimini ve dolayısıyla öğrenme deneyimlerini iyileştirebileceğini göstermektedir.

Ders içeriklerinin güncellenmesi ve öğrenci tercihlerine göre düzenlenmesi konusunda, öğrenciler ders materyallerinin ve saatlerinin esnekliğini ve erişilebilirliğini artıracak değişiklikler önermişlerdir. "Ders içerikleri bazen çok hızlı işlendi ve ders saatleri benim için uygun değildi" diyen öğrenciler, ders içeriklerinin öğrenci ihtiyaçlarına göre uyarlanmasının önemini vurgulamışlardır.

Araştırma kapsamında yapılan anket sonuçlarına göre, öğrencilerin Tarih dersi tercihleri yüz yüze ve online eğitim arasında değerlendirilmiştir. Toplam 50 öğrenciye yöneltilen "Size göre Tarih dersi yüz yüze mi yoksa online mı daha verimlidir?" sorusuna verilen yanıtlar, öğrencilerin büyük bir kısmının (%64) yüz yüze eğitimi tercih ettiğini göstermektedir. Online eğitim tercih eden öğrencilerin oranı ise %36 olarak belirlenmiştir.

Bu sonuçlar, öğrencilerin Tarih dersinin yüz yüze işlenişini, online platformlara kıyasla daha verimli bulduğunu ortaya koymaktadır. Yüz yüze eğitimin tercih edilme sebepleri arasında, öğretmenlerle doğrudan etkileşim, ders içeriklerinin daha iyi anlaşılması ve sosyal etkileşim gibi faktörler bulunmaktadır. Öte yandan, online eğitimi tercih eden öğrenciler için esneklik, erişilebilirlik ve teknolojik araçların kullanımı ön plana çıkmaktadır. Sonuç olarak, bu araştırma, uzaktan eğitimde Tarih dersinin etkinliğini artırmak için öğretmen eğitimlerinin güçlendirilmesi, teknik altyapının iyileştirilmesi, ders içeriklerinin güncellenmesi ve ders saatlerinin düzenlenmesi gibi önemli adımların atılması gerektiğini ortaya koymaktadır. Ayrıca, hibrit eğitim modellerinin geliştirilmesi, öğrencilerin hem yüz yüze hem de online eğitimin avantajlarından faydalanmalarını sağlayacak bir yaklaşım olarak değerlendirilmelidir. Bu öneriler, öğrenci geri bildirimleri ve öğrenci tercihleri doğrultusunda şekillendirilmiş ve eğitim süreçlerinin iyileştirilmesine yönelik somut adımlar içermektedir.

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Engaging Technology-Powered Learners in Spirituality through Mystic Literature in the Age of AI

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Abstract

In today's frenzied world of rapid material and technological growth, the temporal and spiritual existence of man and his needs cannot be disregarded. Although man's life emerged from matter, his talents serve as a campaign to unrevealed the puzzles of this physical universe and illuminate the meaning of existence. While man is at the pinnacle of his worldly growth at the moment, his spiritual development is lagging. In the holistic development of personality, the importance and fulfilment of his material existence and his emotional, intellectual, and Spiritual needs cannot be ignored. As most of the research is focusing upon the technology led educational advancements but a more research should also be done in respect of long-term effects of technological advancement on students' personalities, that will contribute to the student's ultimate success or failure in life. The purpose of this qualitative study with content analysis is to know the effectiveness of mystical literature in this technological world and how it supports students' spiritual and holistic development. The findings indicate that mystical literature have a vast and impactful variety of human life experiences and wisdom. This literature could help in deep spiritual growth of the learners whom are controlled through technological advancements now a days and alongside this spiritual literature should also ought to go digital, and additional applications based on mystical teachings and their powerful lessons ought to be created.

Keywords: Technology-power learners, Spirituality, Mystic literature, Artificial Intelligence

Introduction

A significant shift toward digitalization and the advancement of artificial intelligence (AI) will occur in every facet of life. This is taking place in a society characterized by the toxic combination of the five Ps: polarization, populism, protectionism, post-truth, patriarchy, and an unclear interaction between secularization and the growing role of religion. In this sense, there is room for growth in the interaction between religion and science so that it becomes both intellectually and spiritually fruitful. Faith groups play a theological, ethical, diaconal, and prophetic function. Leadership reflections point to hope, coexistence, and resilience as theologically significant elements that are essential for negotiating the unexplored territories of the digital era (Jackelén, 2021). AI's integration into daily life is overcoming preconceived ideas about what it means to be human and raising existential concerns about purpose. Because artificial intelligence (AI) technologies, such as machine learning and deep learning, may mimic human intellect, prejudice and data privacy violations are the ethical problems. Though their capacity to comprehend and provide meaning is essential, AI-powered chatbots and virtual assistants can foster self-awareness and personal development. Existentialist philosophy places a strong emphasis on the meaning that humans find in their lives, but AI systems rely heavily on data processing and algorithms, raising doubts about their capacity to fully represent the breadth of human experience. While

AI might improve spiritual practices, it can also get in the way of purposeful interactions (Rimban, 2024).

The most urgent issues concerning artificial intelligence (AI) ethics are frequently addressed by the human sciences and theology. The anthropological effects of AI advancements, however, have drawn the attention of theologians. Theologians now have the chance to investigate AI from a theological standpoint thanks to these developments. The discussion of ethical dilemmas gives way to an open-minded discussion of science, technology, and religion with a focus on their complementary advantages. In order to create the best methods for merging spiritual and religious conviction with ingenious mechanisms to achieve a sustainable future, highlights the significance of having a more impassioned theology (Oviedo, 2022). Vestrucci et al. (2021) investigated that artificial intelligence (AI) has the potential to provide light on the cognitive process of belief, which is fundamental to human thought. The computational technique has been examined, nevertheless, because of its discrepancies from conventional wisdom. It addresses contemporary problems and subjects, including the case of religious beliefs, various models for comprehending belief, investigating belief in an automated reasoning environment, and potential future research avenues.

Keeping in mind the connection between artificial intelligence (AI) and religion, going into ethical and bias concerns as well as the state of AI research at the moment, It draws attention to how important viewpoints from Religious Studies are to comprehending how Artificial General Intelligence (A.I.) might evolve (Reed, 2021). Artificial intelligence (AI) is affecting ignorance, knowledge, reality, and hope, as well as how this affects theology and religious studies (Cormie, 2020). According to Song (2021), using spiritual AI to mitigate the dangers of Artificial intelligence may be a viable option. It implies that although there is no foolproof way to protect humanity from superintelligence, spiritual AI might provide an opportunity for selfless compassion and humility. The essay makes the case that religion might be essential to creating this kind of AI and shielding people from the dangers of superintelligence. The question of whether or when artificial intelligence (AI) and machine learning (ML) will affect theology is being replaced with how it is already influencing theology due to advancements in these fields (Graves, 2023).

Heffernan (2020), stated that artificial intelligence (AI) has created a mythology and mystique that has diverted attention from the actual threat it poses. By conquering, privatizing, and reorganizing labor, Big Tech has accumulated riches and power. This has led to problems such as the deterioration of democracy, data theft, spying, bias automation, and tax evasion, demonstrating that the corporate-owned machine world is not a magical one.

With a focus on individual experiences and spiritual fulfillment**,** Percy (2019) explores how religious and spiritual practices are changing among Millennials and Generation Z, as formal and traditional religions become less relevant. The religious landscape is changing, which emphasizes how younger generations' spirituality is changing. According to Maddox (2023), the adolescent culture of today, known as Generation Z, is centered on social justice, identity formation, pain, and success. Their identity is shaped by accomplishments, safety, and the marginalized. The teachings of Chrysostom place a strong emphasis on charity, which enables Generation Z to engage with their generation's principles of acceptance and tolerance in God's Kingdom. The significance of religion on the internet and the role that ICT plays in the global dissemination of spiritual teachings. The forthcoming cutting-edge technologies might have a big impact on spiritualism and religious teachings. It implies that creating a setting that makes greater use of cutting-edge technologies may produce a special setting for religious instruction and learning in the next generations (Sahu et al., 2020).

Emphasis is upon the development of social norms and the role of self-regulation in a global population. It focuses on the spiritual formation of users in an online environment, using the author's experiences

and material from holy scripture. Individual experiences establish the interconnectedness of online and offline environments, with surveillant affordances and context collapse affecting some users but restricting others in their faith formation and mission (Lewis, 2018). As the pinnacle of human invention, technology is a new theology guided by arcane laws and reason. It can result in biopolitical violence, but it also mimics the theological subset's binding characteristics. For creating a more altruistic community should result from the realization that technology is a tool to help people rather than a dogmatic religion. This will make religion as a tool for delving into mystery easier to develop and improve (Deagon, 2021). Technology is being embraced by humans more and more, especially deep learning (DL) in Virtual Intelligent Assistants (VIA). Creating the room for the use of new lasting truths, along with logia, suras, and old wisdoms to create "Enduring Truths" (ET) as a paradigm for world knowledge (Weil, 2021).

Mysticism is a practical, intense experience that provides the basis for mystical philosophy and faith. True mystics must have received and acted upon absolute truths and lived their lives, not just reasoning about others' experiences. Considering the significance of mystical literature, this study investigates how the merging of mystical literature with digitization promotes learners' holistic and spiritual growth. Spiritually vibrant man is a mystic with the capacity to experience the highest realms of consciousness and assist others in doing the same. Incorporating spiritual intelligence aspects into mystic works suggests that mysticism and mystics are responses to self, found in God and the universe, and brings spectators to a place of beauty and tranquillity (Alizad & Sheikhloovand, 2022). The purpose of this qualitative study with content analysis is to know the effectiveness of mystical literature in this technological world and how it supports students' spiritual and holistic development.

Methodology

To conduct an in-depth analysis of the data, a qualitative method is used. A qualitative study is fundamentally exploratory in nature. Data collected through qualitative content analysis technique. Content analysis is a commonly employed technique for characterizing and elucidating messages found in a variety of texts, including written, spoken, electronic, and visual resources. This approach offers historical and cultural insights, permits qualitative as well as quantitative investigation, and may be combined with other research techniques. The methodical process of content analysis includes text selection, message unitization, content categorization, text coding, and result explanation. Its systematic approach, as well as its benefits and drawbacks, epistemological underpinnings, and application to real-world problems, are among its advantages (Badzinski et al., 2021), keeping in mind the saturation point 8 articles and two books having rich information about the question of study were purposefully selected for content analysis then two more articles were added. All articles were coded and develop themes to present data findings.

Findings

The insights gained through data analysis about the significance of technological shifts around the globe and how the mystical literature could help in overcoming the spiritual legging of the technology powered learners' themes are presented in the figure 1.

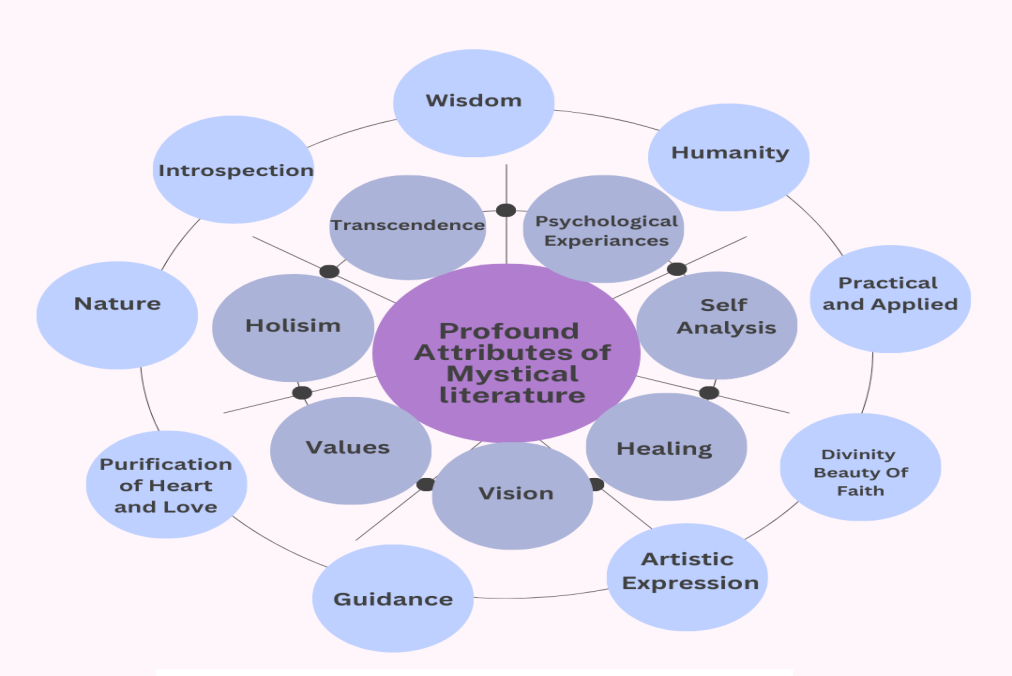

Figure 1. Profound Attributed of Mystical Literature

1. **Introspection:** Mystical literature provides insights to the one's true self
2. **Practical and applied:** Authentic mysticism is neither theoretical and inert, but rather active and applied.
3. **Wisdom:** Mystical literature inculcates wisdom rather than imparting knowledge only
4. **Humanity,** sociability**:** Rather than being isolated and self-driven mystical teachings encourages ones to work for the benefits of others and society in general
5. **Transcendence**: Its objectives are exclusively spiritual and transcendental. It is not at all interested in expanding upon, investigating, reorganizing, or enhancing anything that is apparent in the universe.
6. **Artistic expression:** Mystical literature have very unique forms of expressions like poetry, fiction and music. This ability captures the interest of the readers to engage them more with the literature.
7. **Guidance:** Not just mere a piece of literature but a reflect true guidance to the followers towards their religion and self-exploration
8. **Healing:** Mystical teachings provide deep heeling experience to sooth and nourish the soul
9. **Holism:** Mystical literature provides enriching experiences and ideas for the whole person development with heart, body, mind and spirit growth
10. **Love of nature:** Provides enriching inspiration to love and explore the wonders of nature
11. **Values** Foster the values among the individuals like Compassion, Resilience, Solitude**,** Virtue and Passion
12. **Vision, Immortal thoughts:** poses high vision of life with its endless beauty and nature
13. **Divinity, Beauty of faith: C**onnected with the divine to reflect to the higher self
14. **Purification of heart, Love:** Authentic mysticism prioritizes loving, gregarious actions over introspective, information-seeking pursuits. Love is viewed as a modest portal and a life-movement that communicates basic tendencies. The methods are simple, and the conclusions are reliable. The

source of happiness, the secret of the cosmos, and the energy that gives everything life is mystic love.

15. **Self-analysis:** always criticising one own self and come up with a better version of the ones**.**
16. **Entails psychological experiences, Consciousness:** From the very beginning, mystical literature has been based on the contemporary psychological underpinnings. Understanding the guy and his actual psychological needs comes with mysticism.

Conclusion

Each of these themes highlights how exposing our learners to mystical teachings can help to decrease the spiritual issues that the AI generation encounters, because mystical literature transmits spirituality in a very unique way. Since new technology developments are affecting every aspect of life, they should not be disregarded. The desire to be spiritual beings is highly valued when considering the overall development of the personality; nevertheless, due to the quick advancements, this need is falling behind. With the backing of technological developments in artificial intelligence, researchers should focus on creating platforms that impart authentic mystical teachings through technology, as individuals are too busy to engage in these spiritual forums on a regular basis. These are some ideas for developing new technological applications, social media sites, and virtual reality experiences. These days, it's crucial to have online classes and sessions to support our spiritual growth. The use of technology may make mysticism literature more engaging and easier to read, allowing new generations to benefit from its lessons and potentially life-changing discoveries.

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A Study of Teacher Leadership in Metaverse for Educational Sustainability

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Abstract

The Metaverse represents an immersive virtual environment in three dimensions, where avatars exist beyond the constraints of the physical world. The emergence of the COVID-19 pandemic has sparked a major disruption in the field of education, leading to a stronger emphasis on accelerating the shift to digitization of educational activities, leading to online learning. Despite the recent implementation of the metaverse systems, there has been lack of in-depth evaluation regarding its impact in the field of education. Educational sustainability involves creating learning environments that adapt to changes, and remain accessible and effective for all students. In the context of the Metaverse, the idea of educational sustainability involves using immersive virtual environments to establish learning spaces that demonstrate strength, inclusivity, and flexibility to meet the increasing requirements of future educational environments. It emphasizes the importance of creating learning environments that are environmentally responsible, economically feasible, and socially equitable. The current study explores the emergent role of teacher leadership in Metaverse and its implications for educational sustainability. By employing a comprehensive literature review, this study synthesizes existing theoretical and empirical studies related to digital environments of education, leadership in educational settings, and the sustainability of educational practices in virtual domains, such as Metaverse. The analysis identifies the key characteristics of teacher leadership that are essential in directing the unique challenges and opportunities presented by Metaverse, such as digital literacy, pedagogical innovation, and community engagement. The findings highlight the potential of teacher leaders to foster sustainable educational ecosystems by utilizing Metaverse's immersive and interactive capabilities. The study also discusses constraints to effective teacher leadership, including technological accessibility, professional development, and policy constraints. This research concludes to a deeper understanding of how teacher leadership can evolve in response to advancing digital education technologies and suggests strategic directions for future educational practices and research within virtual learning environments that will come in future with more involvement of Artificial Intelligence (AI) in education.

***Keywords*:** Teacher Leadership, Metaverse, Educational Sustainability, Virtual Learning, Artificial Intelligence.

Introduction

The idea of the metaverse first surfaced in the virtual world prior to the COVID-19 pandemic, but it attracted greater interest as a means of getting over certain restrictions related to individual needs and other interests. Gen Z, who were born after 1995 and have distinct traits from previous generations, is one group of people who are quickly adopting this approach (Park & Kim, 2022).

The word "metaverse" comes from the combination of the prefix "meta," which means transcendence, and the suffix "verse," which means an interconnected system of virtual or parallel worlds. The phrase was first used by Neil Stevenson in his science fiction book Snow Crash (1992), in which the protagonist adopts several digital personas in order to deal with grief in the real world (Stephenson, N. 2003).

Because of its immersive and interactive qualities, the metaverse presents an enormous potential for individualized and adaptable learning. It can produce interesting educational opportunities for pupils to interact and explore customized virtual worlds. Students, teachers, and program administrators typically have good opinions about metaverse-based education, considering it to be a creative and efficient way to give instruction (Onu, P., & Pradhan, A., 2023)

Virtual classrooms, training simulations, and virtual labs are examples of the types of virtual environments that are mostly used for educational purposes (Kye et al., 2021). Users can participate in group projects, lead conversations, share ideas, access worldwide resources, and communicate in a virtual setting using educational metaverse settings (Akour et al., 2022). While educational metaverses have the capacity to create a new and improved learning environment, they require a certain amount of oversight in order to ensure the security and safety of both teachers and pupils. With the increasing accessibility of virtual and augmented reality technology in recent years, there has been a growing interest in the use of the Metaverse in educational practices (Lee et al., 2022). Numerous studies have looked into the Metaverse's potential for education and have found a number of benefits and drawbacks to using it (Park & Kim, 2022).

The idea of the metaverse has received a lot of attention lately, especially in the field of education. The employees' study habits at home and at school may alter as a result of the metaverse. As a result, it is important to look into how parents, teachers, and administrators feel about using the metaverse for instruction. This research may provide useful insights for the future administration, design, and use of the metaverse in education (Zhang et al., 2022). It's important to take into account how teachers' professional growth relates to the metaverse. It is essential that educators pursue professional development concerning the metaverse in order to effectively integrate and employ this technology into learning environments (Meena, S.D. et al., 2023).

The effective incorporation of the metaverse into education is largely dependent on teacher leadership. Instructors are in capable of creating the metaverse's virtual learning environment while taking the approved methods and standards into account (Sirvermez, U., 2023). In order to fully realize the promise of the metaverse, they must also overcome a number of obstacles, including those related to network connectivity, dependability, standardization and certification, organizational resilience, and the specific skills required (Onu, P., et al., 2023).

Teachers face numerous challenges while transitioning to a virtual learning environment in the metaverse. These difficulties include more than just technology issues. Instructors can have trouble modifying their lesson plans to fit the immersive 3D environment (González Vallejo, R. 2023). Obstacles in metaverse-based education may come from privacy issues, accessibility issues, and current technology constraints (Reisman, S. 2023). For educators, the growing reliance on artificial intelligence in the metaverse might present challenging issues including ethical issues with self-taught algorithms utilized in interactive experiences. In order to successfully use the metaverse for interactive learning experiences while maintaining inclusiveness and ethical issues, educators have to overcome these complex hurdles (Meena, S.D. et al., 2023).

There are a number of challenges that educators must overcome in order to practice good teacher leadership in the Metaverse for educational sustainability. Teachers encounter multiple challenges in the educational Metaverse, including as technological difficulties, problems with governance, and the requirement for explicit guidelines and policies to ensure ethical behavior (Prakash, A., et al., 2023).

The possible blurring of divisions between the actual and virtual worlds is a major issue as it might affect students' mental health and their capacity to build relationships in the real world. Because learners have differing ethical standards, community behavior norms must be established in order to avoid ethical

violations such as bullying and insults. This is where governance comes into play in the Metaverse's education sector. To create a secure and comfortable learning environment, educators must solve the technological constraints, privacy issues, and security problems presented by the Metaverse (Onu, P. et al., 2023).

In order to effectively guide students in this blended reality, teacher leadership and educators need to redesign educational techniques to accommodate the immersive and interactive nature of the Metaverse. The difficulties that arise from instructors' different levels of acceptance and their ability to mix up motivation with entertainment call for strategic leadership and effective communication (Onu, P. et al., 2023).

Educational sustainability comprises a number of strategies that seek to incorporate the concepts of sustainability into educational systems. Sustainability education incorporates the promotion of conscientiousness, critical thinking, and effective problem-solving in relation to environmental matters (Stanciu A.C. & Condrea E., 2023). The establishment of a collaborative, appreciative, and team-oriented environment within academic establishments is the primary objective of educational sustainability initiatives (Hakimi Chua & Abdullah, 2022). Whole Institution Approaches (WIAs) to sustainability emphasize continuous organizational learning processes that link formal and informal curricula, aiming for institutional coherence in sustainability (Celik, S. 2023). Efforts are made to develop educational programs that support sustainable lifestyles and promote global methodological tools for sustainability in universities (Holst, J. 2022). (Holst, J. 2022). Educational sustainability seeks to instill values and motivations in students to act for sustainability now and in the future, aligning with the broader goals of sustainable development (Kvelde, A., & Odiņa, I. 2023).

In order to ensure a sustainable future of education in the Metaverse, it is essential that educators actively participate in the advancement of novel technologies, promote immersed learning, and lead learners through immersive experiences while preserving the fundamental nature of interpersonal relationships and building a culture of trust. By employing effective leadership to confront these challenges and limitations, educators have the ability to establish a connection between the Metaverse's transformative potential and sustainable and innovative educational practices (Zhai, X., et al. 2023).

The integration of Artificial Intelligence (AI) into virtual learning environments is anticipated to bring about a significant paradigm shift in the field of education. Strategic directions encompass a range of initiatives such as gamification to enhance engagement, intelligent tutoring systems to provide personalized feedback, personalized learning tailored to individual requirements, and the resolution of ethical concerns including privacy and bias. The incorporation of Artificial General Intelligence (AGI) into educational objectives, curriculum development, and assessment systems necessitates the cooperation of AI engineers and educators from various disciplines. A hybrid of virtual and physical environments, learner-directed learning, and human-computer integration characterize the future school under AI. In order to successfully integrate AI into education, the government, schools, and students must devise strategies. These strategic directions emphasize the importance for ongoing research and ethical concerns in this ever-changing environment and the potential for AI to revolutionize education (Pendy, B. 2023).

The aim of this research article is to investigate the evolving role of teacher leadership within the Metaverse and its potential implications for educational sustainability. Through a comprehensive literature review, the study explores how teacher leadership can effectively navigate the unique challenges and opportunities presented by immersive virtual environments. By identifying key characteristics essential for teacher leadership in the Metaverse, such as digital literacy and pedagogical innovation, the research aims to shed light on how educators can leverage these capabilities to foster sustainable educational ecosystems. The study examines constraints to effective teacher leadership,

including technological accessibility and professional development, and proposes strategic directions for future educational practices and research within virtual learning environments, anticipating the increasing involvement of Artificial Intelligence in education.

Methodology

The research methodology employed is qualitative in nature to facilitate a comprehensive examination of the data. Data is gathered using the qualitative content analysis method. Content analysis stands as a frequently utilized approach for delineating and clarifying messages present in various forms of communication, such as written, verbal, digital, and visual materials. This method provides insights into historical and cultural contexts, allows for both qualitative and quantitative inquiries, and can be integrated with other research methodologies. The systematic procedure of content analysis involves text identification, theme unitization, content classification, text encoding, and interpretation of results. Its structured methodology, along with its merits and demerits, philosophical foundations, and practical applications to real-life issues, constitute some of its strengths (Badzinski et al., 2021). Taking into consideration the saturation point, a total of 10 articles and one book containing comprehensive information pertaining to the research question were accurately chosen for content analysis. Each of the selected articles underwent coding and theme development to effectively present the findings of the data.

Results

1. Role of Teacher Leadership and essential characteristics for navigating challenges and opportunities in the Metaverse:

The analysis of data highlights the critical importance of teacher leadership in fostering educational sustainability within the Metaverse. It explores how insights from mystical literature contribute to identifying the essential characteristics needed for navigating challenges and opportunities in this virtual environment. These findings are organized into themes which categorised for further examination. The findings are summarized in a diagram, simplifying how teacher leadership works in virtual reality.

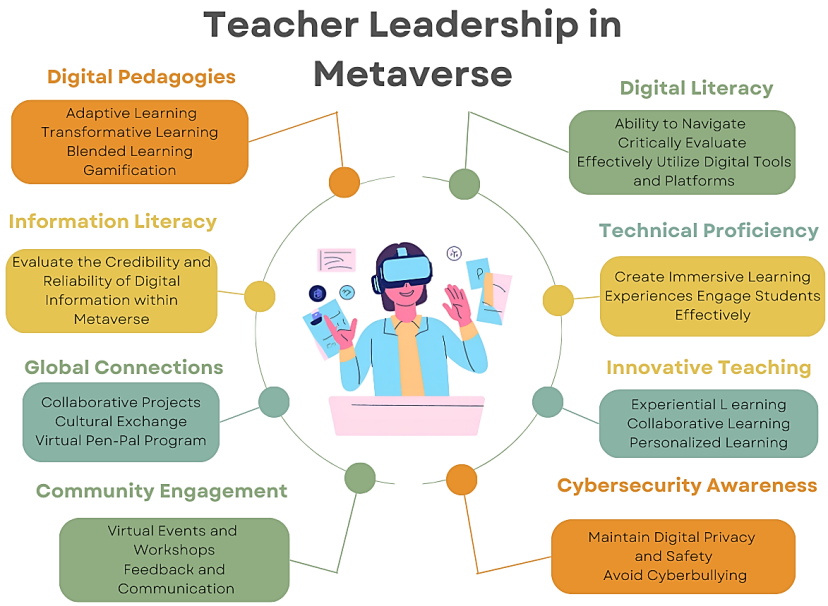

Figure 1: *Graphical Representation of Role of Teacher Leadership and Essential Characteristics for Navigating Challenges and Opportunities in the Metaverse*

i. **Digital Literacy:** Digital literacy encompasses the ability to navigate, critically evaluate, and effectively utilize digital tools and platforms. In the Metaverse, teachers must possess a high level of digital literacy to leverage its potential for educational purposes.

ii. **Technical Proficiency:** Teachers need to be proficient in using Metaverse platforms, virtual reality tools, and augmented reality applications. This proficiency enables them to create immersive learning experiences and engage students effectively.

iii. **Innovative Teaching:** In the Metaverse, innovative teaching methods are crucial for enriching learning. Experiential learning through simulations, enhances understanding. Collaborative learning nurtures teamwork, while personalized instruction meets individual needs with adaptive algorithms

iv. **Cybersecurity Awareness:** Understanding cybersecurity risks and practicing safe online behaviour is essential in the Metaverse. Teachers should educate students on protecting their personal information and maintaining digital privacy.

v. **Digital Pedagogies:** In the Metaverse, teacher leadership relies on essential digital pedagogies such as, Adaptive learning optimizes comprehension by tailoring instruction to individual needs. Blended learning environment merge virtual and traditional methods for deeper understanding, while gamification boosts engagement and motivation.

vi. **Information Literacy:** Teachers should be able to evaluate the credibility and reliability of digital information within the Metaverse. They must guide students in discerning between authentic and misleading content, promoting critical thinking skills**.**

vii. **Global Connections:** The Metaverse transcends geographical boundaries, allowing students to interact with peers and experts worldwide. Teachers should facilitate global connections through collaborative projects, cultural exchanges, and virtual pen-pal programs.

viii. **Community Engagement:** Engaging parents and stakeholders in the educational process is critical in the Metaverse. Teachers can organize virtual parent-teacher conferences, workshops, and community events to promote collaboration and communication.

2. Constraints to Effective Teacher Leadership in Metaverse

After conducting a systematic literature review and content analysis, the graphical representation of constraints for effective teacher leadership in the Metaverse is created. It highlights barriers like technological limitations, digital literacy gaps, and the need for ongoing professional development.

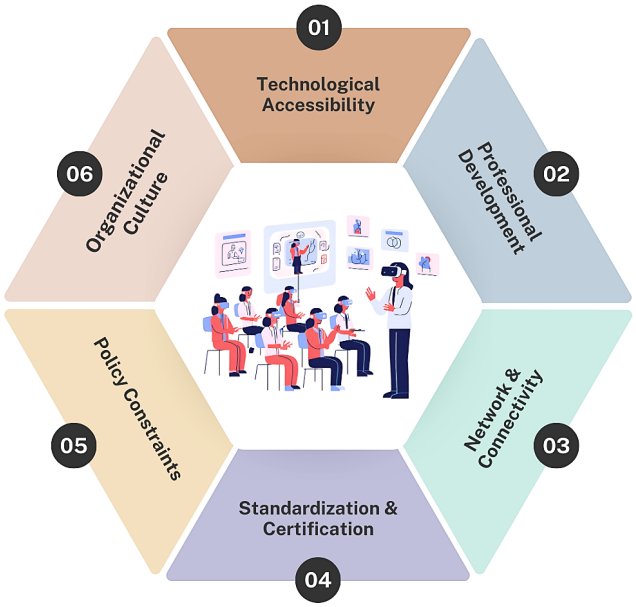

Figure 2: *Graphical Representation of Constraints to Effective Teacher Leadership in the Metaverse as in Reseaerch Articles and Contemporary Literature*

i. **Technological Accessibility**: Not all educators or students may have access to the necessary technology required to engage fully in the metaverse. Disparities in access to high-speed internet, VR devices, or even basic hardware can limit participation and learning opportunities.

ii. **Professional Development:** Teachers require comprehensive training and ongoing professional development to effectively integrate metaverse technologies into their teaching practices. Without adequate support and resources, many educators may struggle to harness the full potential of the metaverse for educational purposes.

iii. **Policy Constraints:** Educational policies may lag behind technological advancements, creating regulatory hurdles or uncertainty regarding the integration of metaverse technologies into the curriculum. Clear guidelines and frameworks are needed to ensure that educational initiatives within the metaverse align with broader educational goals and standards.

iv. **Network and Connectivity**: Reliance on stable internet connections and network infrastructure is crucial for seamless participation in the metaverse. However, connectivity issues, particularly in underserved areas, can disrupt learning experiences and limit accessibility for both teachers and students.

v. **Standardization and Certification**: The absence of standardized practices and certifications for metaverse-based education can pose challenges in assessing the quality and credibility of virtual learning experiences. Establishing industry-wide standards and certification programs is essential for promoting trust and consistency in metaverse education.

vi. **Organizational Culture:** Shifting organizational cultures within educational institutions to embrace innovation and experimentation with metaverse technologies can be met with resistance. Overcoming cultural barriers and fostering a supportive environment for experimentation and adaptation is crucial for the successful implementation of metaverse-based educational initiatives.

3. Strategic Directions for Future Educational Practices and Research within AI-Enhanced Virtual Learning Environments

In light of the comprehensive review of the literature, it is evident that the integration of Artificial Intelligence (AI) in education is poised to revolutionize virtual learning environments. Future educational practices should strategically focus on developing AI-driven adaptive learning systems that can provide personalized learning experiences, thereby catering to the unique needs of each learner. Additionally, the incorporation of AI can facilitate automated grading systems, thus freeing educators to invest more time in curriculum development and student interaction. As for future research, it is imperative to explore the ethical implications of AI in education, including data privacy and the digital divide. Furthermore, studies should investigate the efficacy of AI-driven interventions in diverse educational settings and across different learner demographics. This will ensure the equitable distribution of the benefits of AI in education and contribute to the evolution of inclusive virtual learning environments.

Conclusion

The study highlights the significance of teacher leadership in utilizing the potential of the Metaverse for educational sustainability. By conducting an extensive literature review, crucial attributes of efficient teacher leadership in digital settings were recognized. These involve digital literacy, pedagogical creativity, and community engagement. Despite the possibilities presented by the Metaverse, addressing challenges such as technological access and policy restrictions is crucial for maximizing teacher leadership. The findings suggest strategic pathways for future research and educational methodologies in virtual learning environments, emphasizing the evolving role of educators in adapting to advancing technologies, including the integration of AI in education.

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Developing Multiple Intelligences of Genenration Z Students in the Age of Artificial Intelligence

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Abstract

The ability to recognize, understand, control, and appropriately communicate one's own emotions as well as to positively perceive and respond to the emotions of others is known as emotional intelligence (EI). The ability to connect with something more than oneself and to investigate and comprehend life's ultimate meaning and purpose is referred to as spiritual intelligence (SQ). Gen Z, or Generation Z, is the group of people who were born between the middle of the 1990s and the beginning of the 2010s. They grew up at a time when technology and the internet were widely used, and they have proven to be skilled at using digital tools for a variety of tasks. Artificial intelligence (AI) is the replication of human intelligence in machines, enabling them to do activities such as learning, problem-solving, comprehending natural language, and pattern recognition that typically require human intelligence. The environment in which Generation Z is brought up has been significantly transformed by the rapid advancement of artificial intelligence and other technologies, presenting them with distinct opportunities and challenges that necessitate the development of emotional and spiritual intelligence for their empowerment in the midst of technological disruptions and societal traits. Using the concepts of spiritual intelligence (SQ) and emotional intelligence (EI), this study aims to explore the complex relationship between spiritual and emotional intelligence in Generation Z students as they navigate an increasingly AI-driven future. The study also offers practical strategies to enhance these vital components of human well-being. In order to contextualize the research into the larger educational discussion on the development of emotional and spiritual intelligence, the traits of Generation Z, and the effects of artificial intelligence on human welfare, a comprehensive review of the literature have been conducted. Notable works in the fields of psychology, education, technology, and sociology have also been consulted, as well as recent studies on the fusion of emotional and spiritual intelligence in the digital age.

Keywords: Emotional Intelligence, Spiritual Intelligence, Gen Z students, Artificial Intelligence, AI-driven Future, Human well-being, Digital Age

Introduction

In the current context of the field of education and the growth of individuals, the increasing interaction between emotional and spiritual intelligence emerges as a crucial area for investigation and action. As we explore further into comprehending the various aspects of human thinking, the impactful advancements in technology, specifically the widespread use of artificial intelligence (AI), have a significant impact on the developmental paths of people, especially the members of Generation Z (Gen Z).

The term "emotional intelligence" (EI) was coined in the early 1990s by Peter Salovey and John Mayer. It refers to the capacity to recognize, understand, control, and communicate one's own emotions as well as to navigate social relationships by identifying and addressing the emotions of others [Salovey & Mayer, 1990]. This facet of intelligence has garnered significant interest across diverse domains owing

to its consequences for individual welfare, interpersonal abilities, and scholastic achievement. Emotional intelligence (EI) is a broad category of skills that go beyond emotional awareness to include the skillful control and regulation of one's own emotions in addition to the sympathetic perception and comprehension of others' emotions [Mayer et al., 2008].

Moreover, research reveals that EI is positively connected with several indices of personal and professional success, including academic accomplishment, job performance, leadership effectiveness, and mental health outcomes [Brackett & Salovey, 2006; Joseph & Newman, 2010]. In order to prepare Gen Z kids for success in a fast-paced, interconnected world with a variety of interpersonal dynamics and rapid technological change, it is imperative that they be raised with emotional intelligence.

Similarly, spiritual intelligence (SQ), a term coined by Danah Zohar and Ian Marshall in their influential work, "SQ: Spiritual Intelligence - The Ultimate Intelligence," expands the cognitive domain beyond emotions to include existential questions and transcendent experiences [Zohar & Marshall, 2000]. SQ relates to the capacity to search for meaning and purpose, go beyond oneself, and foster a sense of connection with the universe, contributing to a comprehensive grasp of human consciousness.

High SQ individuals have a keen awareness of their deepest selves and a strong sense of connection to something bigger than themselves, whether it be the deity, mankind, or the natural world [Amram, 2007]. Furthermore, studies indicate that spiritual intelligence is linked to improved psychological health, the ability to overcome hardship, and a stronger feeling of purpose and meaning in life [King, 2008; Emmons & Paloutzian, 2003]. Teachers and legislators can equip Gen Z students to address existential questions raised by the quickening speed of technological advancement by helping them develop spiritual intelligence. This will help them develop a greater understanding of the inherent worth of human life and the interdependence of all living things in the digital age.

People born in the middle of the 1990s and the beginning of the 2010s are known as Generation Z. They have grown up during a period of unprecedented technical developments and extensive digital connectedness [Dimock, 2019]. When it comes to integrating technology into different aspects of daily life, Gen Zers are distinguished from their predecessors who lived through the dawn of the internet era [Seemiller & Grace, 2016]. They also possess an inherent fluency in traversing digital environments. Raised amidst the rapid spread of smartphones, social media platforms, and AI-driven devices, Gen Z individuals demonstrate unique cognitive and behavioral patterns, showing proficiency in navigating digital environments and utilizing technology for various purposes. In addition, Gen Zers have a noteworthy inclination towards entrepreneurial pursuits, social engagement, and global consciousness. They utilize digital platforms as a means of bringing about constructive transformation and elevating their perspectives on critical societal matters [O'Mahony & Mebane, 2020]. Although Gen Z is adept at using digital tools for communication and information access, they also confront particular difficulties, such as elevated stress, anxiety, and digital distraction due to their continual connection and the expectation to maintain a perfect online image [Boyd, 2014]. Educators, legislators, and employers can design strategies to empower, engage, and support Generation Z as they navigate the challenges of the digital age and help shape society's future by understanding the unique characteristics and socio-cultural influences that shape their experiences.

Methodology

To provide a thorough analysis of the data, a qualitative research methodology has been used. The qualitative content analysis method is used to collect data. The method of content analysis is one that is widely used to identify and make sense of messages that are found in written, spoken, digital, and visual media. This approach enables both qualitative and quantitative investigations, offers insights into historical and cultural contexts, and can be combined with other research approaches. Text

identification, topic unitization, content classification, text encoding, and result interpretation are all steps in the methodical process of content analysis. Some of its qualities include its systematic methodology, as well as its advantages and disadvantages, philosophical underpinnings, and useful applicability to real-life problems (Badzinski et al., 2021). A total of ten articles and one book with thorough material related to the research subject were carefully selected for content analysis, taking into account the saturation point. To properly communicate the data's conclusions, coding and theme development were applied to each of the chosen pieces.

The emergence of artificial intelligence, defined as the replication of human intelligence in machines, signifies a shift in the socio-cultural landscape, presenting opportunities and challenges for Generation Z and future generations [Russell & Norvig, 2022]. Artificial intelligence (AI) has revolutionized a number of industries, including healthcare, banking, education, and entertainment, with its powers in learning, problem-solving, natural language processing, and pattern identification.

Given this context of technological disruption and societal change, the development of emotional and spiritual intelligence becomes increasingly important as essential skills for adapting to the AI-driven future. The combination of EI and SQ provides individuals, particularly Gen Z students, with the cognitive, emotional, and existential tools needed for resilience, flexibility, and ethical decision-making in the face of rapid transformations and uncertainties.

To achieve this goal, a thorough study of the literature will be carried out, combining important works with more recent research on EI, SQ, Gen Z characteristics, and the effects of AI on human welfare. This research aims to advance our knowledge of human cognition and open the door for comprehensive approaches to education and personal growth by shedding light on the complex dynamics of emotional and spiritual intelligence in the digital age.

Results

1. Investigate the relationship between emotional intelligence (EI) and spiritual intelligence (SQ) among Generation Z students in the context of an AI-driven future.

- Emotional and spiritual intelligence scores among Generation Z pupils are quantitatively analyzed.
- Qualitative investigation of how Generation Z views and reacts to changes brought about by AI, with a focus on the implications for wellbeing and empowerment.
- Study of social and educational variables affecting the growth of Gen Z's emotional and spiritual intelligence in an AI-driven environment.
- Suggestions for developing spiritual and emotional intelligence to help Generation Z remain resilient and healthy in the face of AI-driven change.

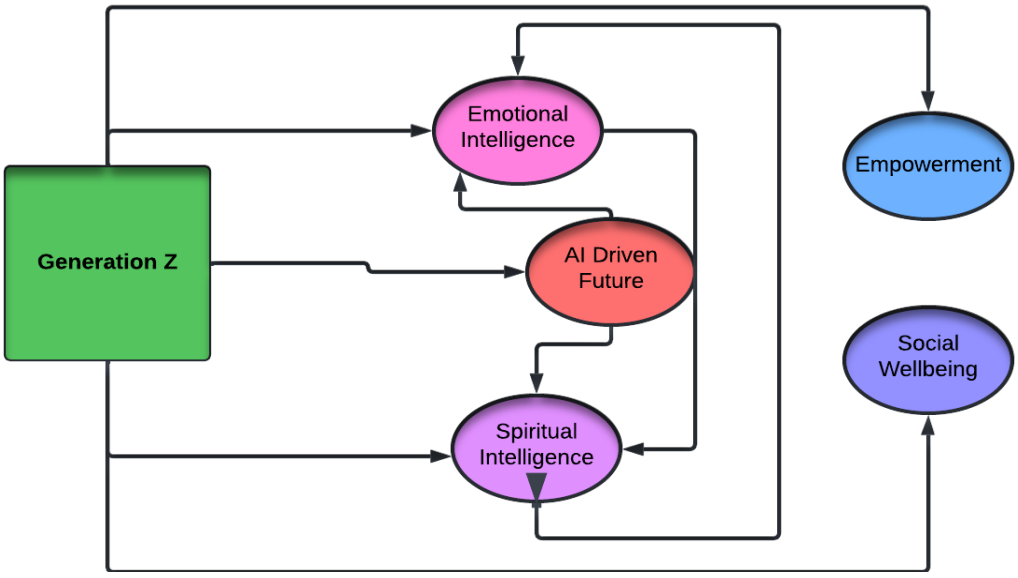

Figure 1: *The Interplay between Emotional Intelligence and Spiritual Intelligence among Generation Z in an AI-Driven Environment*

2. Explore the impact of rapid advancements in artificial intelligence (AI) and digital technologies on the development of emotional and spiritual intelligence among Gen Z students.

According to the study, the development of emotional and spiritual intelligence among Gen Z pupils is significantly impacted by the swift progress made in artificial intelligence (AI) and digital technologies. The results show that whereas technology advancements present new opportunities for spiritual and emotional development, they also bring special difficulties, like longer screen times and digital distractions, which may impede the formation of these intelligences. Furthermore, the study emphasizes how critical it is to implement proactive social and educational initiatives in order to maximize the benefits of artificial intelligence and digital technologies while reducing any negative effects they may have on Gen Z students' mental and spiritual health.

Conclusion

In conclusion, this study sheds light on the complex relationships between the quick development of digital and artificial intelligence (AI) and the growth of emotional and spiritual intelligence in Generation Z students. A thorough examination reveals that although technology offers unmatched chances for development and connectivity, it also brings with it difficulties that may hinder the development of mental and spiritual health. It is critical that educators, legislators, and other stakeholders carry out focused interventions that support the holistic development of these fundamental intelligences as Generation Z navigates an increasingly digital environment. Understanding the complex relationships between technology and human flourishing can help society better prepare the next generation for life in the face of the disruptive forces of the digital age and ensure a future marked by resiliency, empathy, and purpose.

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The Effects of Calligraphy on Learner's Emotional Intelligence - A Case Study of Online and Offline Learning

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Abstract

Emotional Intelligence (EI) is essential for personal well-being and interpersonal relationships of learners. In present paradigm, calligraphy has been conceived to enhance emotional regulation and empathy. However, the extent of its impact on learner's Emotional Intelligence remains uncertain. This study aims to examine the effects of calligraphy practices on the Emotional Intelligence in Offline and Online Learning. The objectives of this study were to find out the effects of calligraphy practices on Emotional Intelligence at secondary level, to identify the components of Emotional Intelligence influenced by calligraphy practices. Mixed method design was used for this study. Sample was selected purposively from Online and Offline calligraphy learning communities. Sample size was 35 Online learners and 35 Offline learners. The researcher used self-developed questionnaire and semi structured interview to meet his objectives. The identified factors in the questionnaire were self-awareness, self-management, motivation, empathy and social skills. Quantitative data was analyzed using statistical techniques mean, percentage, frequency, standard deviation and t test. The thematic analysis was used to interpret the semi-structured interviews. The study found that calligraphy practices have significant effects on students' Emotional Intelligence. It was identified that self-awareness, self-regulation, motivation, empathy and social skills are major components of Emotional Intelligence. The students also perceived these components are influenced by their calligraphy practices. The study found that Offline learners demonstrate a more pronounced increase in Emotional Intelligence as compared to Online learners. The study recommends that separate calligraphy classes may offer in the educational institutions for improving learners' Emotional Intelligence. Special trainings may provide to teachers to improve their skills to handle calligraphy classes.

Keywords: Calligraphy, Emotional Intelligence, Online Learning

Introduction

"What joy there is in hearing yourself think, and to make that thinking into ink." (John Olsen, Australian Artist)

Have you ever wondered how writing beautifully can make you feel? Calligraphy is a beautiful art form that has been around for a long time, with its roots in ancient civilizations like China and Mesopotamia. People love calligraphy not just because it looks pretty, but also because it helps them feel calm and express themselves. Ancient scholars thought that there are three dimensions in which calligraphy works related to emotions. 1st is content of writing expresses the emotions, 2nd is style of writing depicts the emotional state of an individual, and 3rd is calligraphy practice can regulate the emotions. (Zhou et al., 2021).

Emotional Intelligence (EI) refers to the ability to know, understand, regulate, control one's own and other's emotions and regulate actions and behaviour accordingly by using this ability. Goleman (1995)

suggest that there are five components of EI (emotional awareness, emotional regulation, motivation, empathy and social skills). In education, EI significantly influences students' personal and academic success. Secondary level education, a crucial developmental stage, requires students to navigate academic challenges and complex social dynamics. Equipping students with Emotional Skills becomes imperative in addressing stressors like academic pressure and peer influence. Quílez-Robres (2023) suggest that EI is a big predictor of academic performance. The effect of EI on academic performance is high. Goleman (1995) describes that 20 percent of individual's success is due to individual's Intelligence Quotient (IQ) and about 80 percent of success is related to Emotional Intelligence. Researches show that EI is a key ability of human's life which is responsible for unlocking every kind of success.

In the present paradigm of Educational Technology, education has undergone significant changes, primarily due to the integration of digital tools and Online platforms. This shift has led to increased accessibility to educational resources, personalized learning experiences, and innovative teaching methods. Additionally, technology has facilitated collaboration among students and educators worldwide, allowing for more interactive and engaging learning environments. Although online platforms are very effective for learning but the importance of Offline Learning is still there. Both environments have their own beneficial features. Comparative studies regarding Offline and Online Learning suggest that Offline Learning is still more productive than Online Learning (Singh et al., 2021). Online Calligraphy Learning offers convenience and flexibility, while Offline Learning environments provide richer experiences through direct interaction with instructors and peers. However, the effectiveness of each mode depends on individual preferences and learning goals (Wang & Zhang, 2020).

In present paradigm, Calligraphy has been conceived to enhance Emotional Regulation and Empathy. However, the extent of its impact on learner's Emotional Intelligence remains uncertain. This study aims to examine the effects of calligraphy practices on the Emotional Intelligence in Offline and Online Learning. The objectives of this study were to find out the effects of calligraphy practices on Emotional Intelligence among the students at secondary level and to identify the components of Emotional Intelligence influenced by calligraphy practices. Researchers are curious about how learning calligraphy might make people feel better emotionally. This study aims to find out how practicing calligraphy could improve our emotional well-being, showing how art can be good for our hearts and minds. In this research, we explore the wonderful world of calligraphy and how it affects our emotions. We're going to look at how learning calligraphy Online and Offline can help us understand and manage our feelings better and which learning environment is more effective for learning calligraphy. This study is like a journey where we'll discover how writing fancy letters can make us happier and more connected to our emotions.

Methodology

This study adopts a mixed-method design, combining quantitative and qualitative approaches to investigate the effects of calligraphy practices on Emotional Intelligence in both Offline and Online Learning environments. The sample was purposively selected from Online and Offline calligraphy learners who are enrolled in secondary level classes (9th and 10th grade) to ensure representation from both learning modes. A total of 70 participants were included, with 35 Online learners and 35 Offline learners. They are selected from 5 different art institutions on the bases of calligraphy experience.

Two main data collection instruments were utilized, which are mentioned below:

1. Self-developed questionnaire: This questionnaire was designed to gather quantitative data on the effects of calligraphy practices on Emotional Intelligence. This questionnaire was developed on

Golman's Theory of Emotional Intelligence. It included 22 items related to self-awareness, self-management, motivation, empathy, social skills, Online Calligraphy Learning experience and Offline Learning experience.

2. Semi-structured interview guide: This guide was used to conduct qualitative interviews allowing for in-depth exploration of their experiences with calligraphy practice and its impact on Emotional Intelligence. Seven participants having good experience and art related profile were selected on the bases of calligraphy practice having at least 2 years of experience.

The independent variable in this study is calligraphy practice, while the dependent variable is Emotional Intelligence. Emotional Intelligence is measured across multiple components, including self-awareness, self-management, motivation, empathy, and social skills. Quantitative data obtained from the questionnaire were analyzed using statistical techniques such as mean, percentage, frequency, standard deviation, and t-test. These analyses were conducted to determine the effects of calligraphy practices on Emotional Intelligence and to identify any significant differences between Offline and Online learners. Qualitative data from the semi-structured interviews were analyzed with NVIVO using thematic analysis. This approach allowed for the identification of key themes and patterns related to participants' experiences with calligraphy practice and its impact on Emotional Intelligence.

Quantitative Results

The insights gained through quantitative data analysis about the effects of calligraphy on learner's Emotional Intelligence are presented in table 1:

Table 1. Descriptive Statistics

	Emotional Intelligence	Offline Learning Experience	Online Learning Experience
Mean	3.66	3.54	3.91
St. Deviation	0.57	0.67	0.47

Overall Perceptions of Students Regarding their EI in Online and Offline Learning

The standard deviation (σ) measures the dispersion or spread of data points around the mean. In this context for Emotional Awareness With a standard deviation of approximately 0.51, the data points for emotional awareness are relatively close to the mean of 3.76, indicating a moderate level of consistency among participants' responses. For Emotional Regulation The standard deviation of approximately 0.63 suggests a slightly wider spread of data points around the mean of 3.67 for emotional regulation. This indicates a slightly higher variability in participants' responses compared to emotional awareness. Empathy with a standard deviation of approximately 0.56, the data points for empathy exhibit a moderate level of dispersion around the mean of 3.73, indicating a relatively consistent pattern of responses among participants. For Social Skills the standard deviation of approximately 0.72 indicates a higher degree of variability in participants' responses around the mean of 3.47 for social skills. This

suggests that there may be more diversity in perceptions or experiences related to social skills among participants. Online Learning Experience with a standard deviation of approximately 0.67, the data points for the Online Learning experience show a moderate level of variability around the mean of 3.54. This suggests that participants' experiences with Online Learning platforms vary to some extent. For Offline Learning Experience the lowest standard deviation of approximately 0.47 indicates a relatively tight clustering of data points around the mean of 3.91 for the Offline Learning experience. This suggests a higher level of consistency or agreement among participants regarding their experiences with Offline Learning environments. The interpretation of these standard deviations provides insights into the variability and consistency of participants' responses across different aspects of Emotional Intelligence and learning experiences.

Based on t-Test results, comparing Emotional Intelligence components between Online and Offline calligraphy learning environments, the results reveal significant differences in certain aspects. For Emotional Awareness the difference in means was 0.03 which is not statistically significant ($p > 0.05$), both modes of learning appear to contribute similarly to learners' emotional awareness. For Emotional Regulation Participants in Offline Learning mode demonstrated higher levels of emotional regulation, with a compared mean score difference 0.32 of for Online Learning. This difference in means was statistically significant ($p < 0.05$), suggesting that Offline calligraphy learning environments may offer better opportunities for learners to develop skills related to emotional regulation. For Empathy both Online and Offline Learning modes showed similar mean scores for empathy, compared mean score difference was 0.02. The difference in means was not statistically significant ($p > 0.05$), indicating that calligraphy practice may not particularly influence empathy in either learning environment. Social Skills Participants in Offline Learning mode exhibited higher levels of social skills, with a mean score difference of 0.32 for Online Learning. This difference in means was statistically significant ($p < 0.05$), suggesting that Offline calligraphy learning environments may provide better opportunities for learners to develop and practice social skills compared to Online platforms. Both Online and Offline calligraphy learning environments may contribute to enhancing certain aspects of Emotional Intelligence, Offline Learning environments appear to have advantages in fostering emotional regulation and social skills. These findings underscore the importance of considering the learning environment when designing calligraphy instruction to promote holistic development of learners' Emotional Intelligence.

Qualitative Results

Conducting thematic analysis allows for a systematic exploration of the interview data, identifying key insights and informing future research or practice in calligraphy education. The themes gained through thematic analysis of interviews are given below:

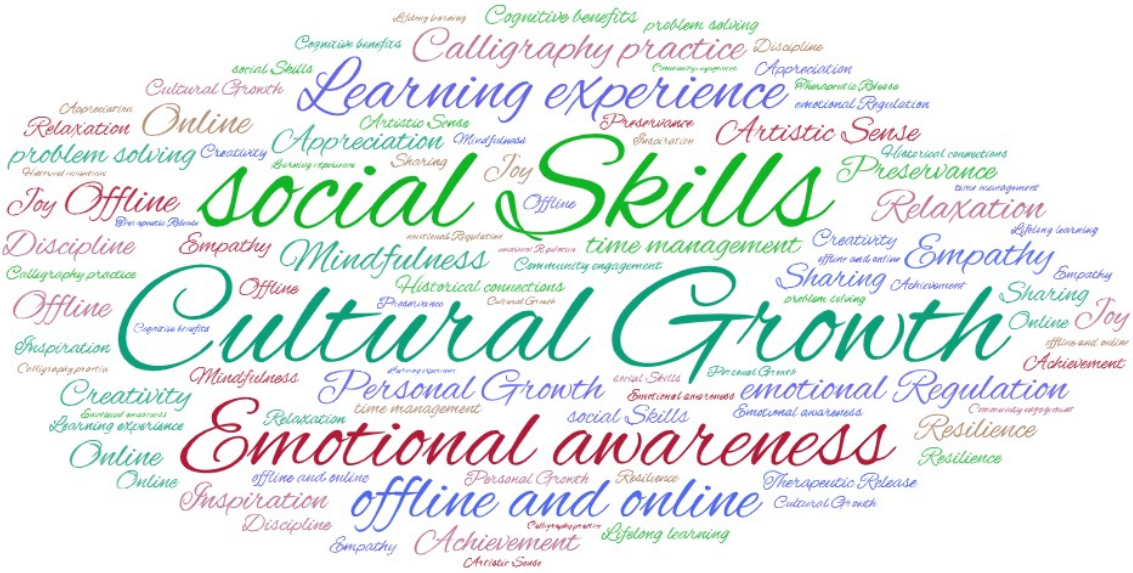

Figure 1.*Themes extracted from semi structural interviews regarding Calligraphy practices and EI with respect to Online and Offline Learning.*

1. **Experience with Calligraphy Practice:** Engaging in calligraphy practice is a pursuit embraced by individuals across various skill levels, drawn by its artistic appeal and potential for self-expression. Online Learning platforms have democratized access to calligraphy tutorials and resources, catering to learners with diverse schedules and geographical locations. The preference for Online Learning often stems from its convenience and flexibility, allowing individuals to pursue their interests at their own pace and convenience.
2. **Emotional Awareness:** Calligraphy practice serves as more than just a creative endeavor; it acts as a mindful and meditative activity, fostering heightened emotional awareness and introspection. Through the rhythmic movements and focused concentration required in calligraphy, individuals develop a deeper understanding of their emotions and thoughts. This heightened awareness enables them to recognize and process their emotions more effectively, leading to greater emotional resilience and well-being.
3. **Emotional Regulation:** The therapeutic benefits of calligraphy extend to emotional regulation, offering individuals a means to cope with stress and manage their emotions. Engaging in calligraphy provides a calming and grounding experience, allowing individuals to channel their emotions constructively. The rhythmic strokes and meticulous attention to detail serve as a form of mindfulness practice, helping individuals find balance and stability amidst life's challenges.
4. **Empathy:** Calligraphy practice not only enhances personal introspection but also fosters empathy towards others. As individuals become more attuned to their own emotions through calligraphy, they develop a deeper understanding of the emotional experiences of others. Sharing calligraphy creations with friends and loved ones evokes emotional responses, strengthening interpersonal connections and nurturing empathy and compassion**.**
5. **Social Skills:** The practice of calligraphy enhances communication skills by emphasizing clarity, precision, and attention to detail in expression. Mastery of calligraphy techniques instills a sense of confidence in individuals, empowering them to engage more confidently in social interactions.

Moreover, calligraphy serves as a bridge to connect with like-minded individuals, fostering meaningful connections and friendships within artistic communities.

6. **Online Learning Experience:** Online calligraphy learning offers individuals the flexibility and accessibility to pursue their passion for calligraphy from the comfort of their own homes. Multimedia learning materials and interactive platforms engage learners and facilitate skill development in a virtual environment. Despite the lack of in-person interaction, Online Learning platforms provide a wealth of resources and opportunities for self-directed learning and skill enhancement.
7. **Offline Learning Experience:** Offline calligraphy learning environments provide a sense of community and camaraderie through in-person workshops and classes. Personalized instruction and hands-on guidance from experienced instructors enhance the learning experience and accelerate skill development. The interpersonal connections forged in Offline settings foster a supportive and inspiring environment for individuals to cultivate their passion for calligraphy
8. **Personal Growth:** Engaging in calligraphy practice facilitates personal growth by providing a creative outlet for self-expression and exploration. It allows individuals to develop their artistic skills and express their unique style. Calligraphy becomes a journey of self-discovery and improvement, fostering a sense of achievement and fulfillment.
9. **Mindfulness and Relaxation:** Calligraphy practice promotes mindfulness and relaxation by encouraging individuals to focus on the present moment and immerse themselves in the creative process. The repetitive motions of writing and the rhythmic flow of ink on paper create a calming effect, reducing stress and promoting mental well-being.
10. **Artistic Expression:** Calligraphy serves as a form of artistic expression, allowing individuals to convey their thoughts, emotions, and personality through beautiful lettering and design. It enables creative experimentation with different styles, fonts, and techniques, fostering a sense of creativity and innovation.
11. **Sense of Achievement:** Achieving mastery in calligraphy brings a sense of accomplishment and pride, boosting individuals' confidence and self-esteem. Each improvement and milestone reached in calligraphy practice reinforces a positive sense of achievement and motivates continued learning and growth.
12. **Cultural Appreciation:** Engaging in calligraphy practice fosters an appreciation for cultural heritage and traditions associated with the art form. Learning about the history and significance of calligraphy in various cultures enriches individuals' understanding and respect for diverse artistic traditions.
13. **Problem-Solving Skills:** Calligraphy practice cultivates problem-solving skills by challenging individuals to overcome technical difficulties and creative hurdles. Experimenting with different tools, materials, and techniques encourages critical thinking and adaptive problem-solving strategies.
14. **Time Management and Discipline:** Committing to regular calligraphy practice instills discipline and time management skills, as individuals allocate time for creative expression amidst their daily responsibilities. Consistent practice and dedication contribute to skill development and progress over time.
15. **Joy of Sharing:** Sharing calligraphy creations with others brings joy and satisfaction, as individuals celebrate their artistic achievements and connect with others through their shared appreciation for

the art form. The act of sharing fosters a sense of community and camaraderie among calligraphy enthusiasts

16. **Inspiration and Creativity:** Calligraphy practice serves as a source of inspiration and creativity, sparking imagination and allowing individuals to explore new ideas and artistic concepts. Engaging in calligraphy stimulates the creative process and encourages experimentation with different lettering styles, colors, and compositions.
17. **Perseverance and Resilience:** The journey of learning calligraphy involves perseverance and resilience, as individuals navigate through challenges and setbacks in mastering the art form. Overcoming obstacles and learning from mistakes build resilience and determination, fostering a growth mindset towards continuous improvement.
18. **Sensory Engagement:** Calligraphy practice engages multiple senses, providing a tactile and sensory-rich experience that enhances the overall enjoyment and immersion in the creative process. The feel of pen on paper, the smell of ink, and the visual appeal of flowing lines contribute to a multisensory experience that heightens artistic expression.
19. **Cognitive Benefits:** Engaging in calligraphy practice offers cognitive benefits by stimulating mental processes such as focus, concentration, and spatial awareness. The intricate movements involved in forming each letter require cognitive precision and attention to detail, promoting cognitive development and sharpening cognitive skills.
20. **Historical and Cultural Connection:** Exploring calligraphy connects individuals to rich historical and cultural traditions associated with the art form, spanning various civilizations and time periods. Learning about the origins and evolution of calligraphy deepens individuals' appreciation for its cultural significance and historical legacy.
21. **Therapeutic Release:** Calligraphy practice provides a therapeutic release for individuals to express emotions, alleviate stress, and process thoughts and feelings in a constructive manner. Engaging in calligraphy acts as a form of self-care and emotional catharsis, offering a safe and creative outlet for emotional expression and release.
22. **Community Engagement:** Participating in calligraphy communities and online forums facilitates community engagement and networking opportunities among fellow enthusiasts. Sharing experiences, tips, and feedback within a supportive community fosters a sense of belonging and camaraderie, enriching the calligraphy journey through shared passion and collaboration.
23. **Lifelong Learning and Growth:** Calligraphy practice fosters a mindset of lifelong learning and growth, as individuals continuously seek to expand their skills, knowledge, and artistic repertoire. Embracing the calligraphy journey as a lifelong pursuit encourages curiosity, exploration, and self-discovery, fostering personal and artistic growth over time.

These themes provide a comprehensive understanding of the interviewee's experiences with calligraphy practice and its impact on Emotional Intelligence in both Online and Offline Learning environments.

Conclusion

In conclusion, the study delved into the effects of calligraphy practices on learners' Emotional Intelligence in both Online and Offline Learning environments. Through a mixed-method approach, combining quantitative analysis and qualitative insights, significant findings emerged. Quantitative analysis revealed a notable increase in Emotional Intelligence among participants, with Offline learners demonstrating a more pronounced improvement compared to their Online counterparts. This trend was

particularly evident in factors such as self-awareness, self-regulation, motivation, empathy, and social skills. Qualitative data further enriched our understanding, highlighting the therapeutic and introspective nature of calligraphy practice, regardless of the learning mode. Offline learners emphasized the sensory engagement and communal dynamics of traditional instruction, while Online learners appreciated the accessibility and convenience of virtual platforms. These findings underscore the multifaceted benefits of calligraphy practice, transcending mere artistic skill development to encompass emotional well-being and interpersonal growth. The study suggests that integrating calligraphy practices into educational settings, both Online and Offline, holds promise for enhancing learners' Emotional Intelligence and fostering holistic development. Further research is warranted to explore additional factors influencing the effectiveness of calligraphy instruction and its long-term impact on Emotional Intelligence across diverse learner populations.

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A Study of Trends in Online Learning and Learners' Behaviour in using AI-Powered Chatbot

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Abstract

In the contemporary era, education landscape is regularly evolving. The intersection of online learning and Artificial Intelligence (AI) offers unprecedented opportunities to revolutionize the knowledge acquisition and dissemination. The leading technological revolutions are AI-powered chatbots, which have gained a great deal of attention as virtual assistants capable of providing personalized support to learners in educational settings. This study aims at exploring the trends in online learning and learners' behavior regarding the utilization of AI-powered chatbots. Among the available chatbots, the researcher selected ChatGPT for this study. The research objectives were to explore the trends of using AI- powered chatbot in online learning, to investigate the effects of using chatbot on students' behavior, to identify the threats associated with the use of AI powered chatbot in online learning. Mixed research design was used for the study to explore its exploratory nature by analyzing quantitative and qualitative data. Sample of the study was collected from University of Sialkot through purposive sampling technique. Sample size of the study was 370 students for quantitative part of study, whereas 1 book on ChatGPT and 10 related articles were selected as the sample for qualitative part of study. Researcher developed questionnaire for achieving his objectives. Statistics of frequency, percentage, mean score, standard deviation and the t-test were used to achieve the objectives of the study. Manual and computational content analysis (using NVivo 14) were used for qualitative part to identify the codes and themes of the selected book and articles. The study found that personalized assistance, instant feedback, virtual support, 24/7 accessibility, engagement, time saving, enrich source of information, proactiveness, planning and motivation are emerging trends of using chatbot in online learning. The study investigated that chatbot has high level of effects on students' behavior. The study identified that inaccurate information, academic integrity issue, plagiarism, over reliance, potential misuse, knowledge manipulation and decline in high order cognitive skills are the major threats that are associated with the use of chatbot.

Keywords: Online learning, Artificial intelligence, chatbot, personalized support, ChatGPT

Introduction

In light of the rapid evolution within the IT sector and the continual updates to available tools, learners are compelled to engage in ongoing training to enhance their skills and maintain pace with technological advancements. The realm of training has undergone significant transformation due to digitalization, with e-Learning, or online training, serving as a prominent example of this shift away from traditional classroom settings. While e-Learning offers numerous benefits and has become an integral component of the learning journey, the sheer volume of multimedia content available to learners poses a challenge

to autonomous learning. Selecting appropriate content that aligns with their specific learning needs and context is paramount for achieving effective learning outcomes (El Janati et al., 2020).

In recent years, the landscape of education has been significantly transformed by advancements in technology, particularly in the realm of online learning. With the proliferation of digital platforms and the integration of artificial intelligence (AI) technologies, educators and learners alike are experiencing a paradigm shift in how knowledge is acquired, disseminated, and engaged with. Among the forefront of these technological innovations are AI-powered chatbots, sophisticated systems designed to simulate human conversation, which have been increasingly integrated into online learning environments to provide personalized support and guidance to learners. From the standpoint of students, integrating AI into education offers a number of significant benefits. AI-powered chatbots help students with their homework and studies by giving them thorough assignment feedback, assisting them with challenging difficulties, and breaking down solutions into manageable steps (O'rinbekovna, 2024).

Chatbots are artificial intelligence technologies that use deep learning algorithms to provide responses to text-based inputs that resemble those of a human. Chatbots are evolved with the passage of time. The inception of chatbots marked a significant milestone in the field of artificial intelligence. The evolution of chatbots represents a captivating journey at the intersection of technology and human-computer interaction. As time has gone on, chatbots have become a significant part of our digital environment and have revolutionized the way we interact with machines. The origins of chatbots may be found in the middle of the 20th century, when pioneers in computer science and artificial intelligence (AI) set out to design conversational agents that could mimic human interactions (Bii, Too, & Mukwa, 2018).

Chatbots perform a diverse array of tasks, ranging from addressing frequently asked questions (FAQs) and handling administrative and managerial duties to offering student mentoring, motivation, and assessments of learning progress (Pérez, Daradoumis & Puig, 2020). They also play a key role in developing simulations, teaching specific knowledge and skills, and encouraging introspection and metacognitive techniques. Cardenal Herrera University (CUE), for example, has introduced a chatbot to assist with student inquiries and mentoring. As a personal assistant, this chatbot is skilled at handling administrative inquiries. Ongoing enhancements are being pursued to empower the chatbot with the capability to predict student behavior and provide guidance throughout the learning process (Chinonso, Theresa & Aduke, 2023).

Methodology

The researcher used mixed research design for the study that was exploratory in nature because exploratory research provides better understanding of a subject that may not be well-defined or thoroughly explored. The population of the study consisted of all the students of University of Sialkot. All relevant books and articles published in the years between 2018 to 2023 were also selected as a Population. Purposive sampling technique was used for the selection of sample of the study for quantitative part and data of three hundred and seventy (370) students was collected from the population. One book and ten articles which were published in the years ranges from 2018 to 2023 were also selected as a Sample for qualitative part of research. Researcher used a self-constructed questionnaire to get the perceptions of students. The final questionnaire comprised forty (40) items. To determine whether the questionnaire's items were pertinent, clear, and easy to grasp, pilot testing was done. The questionnaire was consulted with ten (10) experts in the field for checking it's the content validity. The overall value of Cronbach Alpha coefficient was 0.857 for the questionnaire items. The researcher himself administered the questionnaire in the field and also send online google form questionnaire through WhatsApp, Facebook and Emails. NVivo Software version 14 was used to select codes and references of selected book and articles for content analysis. The study's goals were achieved through the application of content analysis methodologies and descriptive statistics. The frequency, percentage,

mean score, standard deviation, and t test statistical procedures were employed by the researcher to analyse the quantitative data. Content Analysis was utilized to analyse the qualitative data.

Results

The analysis of the data is a crucial stage in reaching the conclusion. In this study, researcher employing a mixed-methods approach to unravel the complexities of the research questions. This chapter seamlessly integrates both quantitative (Quan) and qualitative (Qual) data to provide a holistic understanding of the phenomena under investigation. In the quantitative realm, the researcher designed and administered questionnaires to both teachers and students, crafting instruments tailored to capture nuanced perspectives from each group. Statistical methods are applied to distill key insights, with results presented in a visually accessible format using tables and graphs. Concurrently, the qualitative facet of the study involves a selective content analysis of one book and 20 articles. The literature chosen is scrutinized for its relevance and contribution to the qualitative dimension of the research. Thematic analysis is employed to unearth patterns and themes within the qualitative data. The interplay between quantitative and qualitative findings is carefully examined, shedding light on the convergence or divergence that emerges, thereby enriching the overall interpretation.

Results on the trends of using AI powered chatbot in online learning

The themes on the trends of using chatbot in online learning were drawn from the selected sample through content analysis by using NVivo software version 14. The trends are presented in the form of word cloud.

Figure 1: *NVivo Word Cloud Presents Trends of Using ChatGPT in Online Learning*

Figure 1. illustrates variety of trends which are very effective in context of learning. The information about trends in the adoption of chatbots for personalized learning is derived from specific literature sources. The theme "Helping" explores how chatbots serve as tools for providing assistance and support in various aspects of education. The theme "Learning" delves into how chatbots impact the learning experiences of users. Engaging chatbots capture and maintain students' interest throughout the learning process. Chatbots can be utilized for both formative and summative assessments. They can pose questions to students, evaluate their responses, and provide instant feedback. The assistance theme emphasizes the role of chatbots as virtual aides. They can offer immediate help by clarifying doubts, providing additional explanations, or directing students to relevant resources. Chatbots enhance communication in education by facilitating seamless interaction between students and learning materials. Chatbots can stimulate critical thinking by posing challenging questions or presenting complex scenarios. They encourage students to analyze, evaluate, and synthesize information,

promoting the development of higher-order cognitive skills essential for effective learning. Chatbots act as virtual guides, providing step-by-step instructions and guidance. Chatbots contribute to generating interest in learning by tailoring content and interactions to individual preferences. It inspires and encourage students through positive reinforcement, personalized feedback, and goal-oriented messages. It assists students in planning their learning activities by helping them create study schedules, set goals, and organize tasks. It was found that this technology not only facilitates the delivery of educational content but also contributes to shaping users' levels of confidence. The theme "Proactiveness" in the selected files reflects the observed proactive engagement between users and chatbots in an educational context. It helps students in decision making process.

Table No.1

Overall Perceptions of Students Regarding Trends of Using AI Powered Chatbot in Online Learning

Categories of Students	Frequency	Percent	Mean	S. D
Low Level	28	7.6%	2.584	.6288
Moderate Level	98	26.5%		
High Level	244	65.9%		
Total	370	100.0%		

The table 1 shows frequency, percentage, mean and standard deviation of three overall categories of students about their perceptions regarding trends of using chatbots in online learning. Table values show that 7.6% students are at low level, 26.5% students are at moderate level and 65.9% students have high level of using chatbot in learning. The mean score (M) and standard deviation (SD) of responses are (2.584) and (0.6288). The standard deviation indicates that most of respondents' perceptions are dispersed around the mean. The mean value and percentage distribution displays that majority of students have high level of perceptions regarding trends of using chatbot in online learning.

Results on the effects of using chatbot on students' behavior

Following are the tables and their interpretations regarding effects of using chatbot on students' behavior:

Table 2

Overall Perceptions of Students Regarding Effects of Using Chatbot on Students Behavior

Categories of Students Perception	Frequency	Percent	Mean	S. D
Low Level	41	11.1%	2.641	.6731
Moderate Level	51	13.8%		
High Level	278	75.1%		
Total	370	100.0%		

The table 2 shows frequency, percentage, mean and standard deviation of overall three categories of students' perceptions regarding effects of chatbot on students' behavior. Table values show that 11.1% students are at low level, 13.8% students are at moderate level and 75.1% students have high level of acceptance. The mean score (M) and standard deviation (SD) of responses are (2.641) and (0.6731).

The mean value and percentage distribution displays that majority of students believed that chatbot has high level effect on students' behavior.

The following chart was created using NVivo software displays the number of references on the Y-axis and the various themes related to student behavior on the X-axis. The themes investigated include learning, response, communication, helping, Artificial Intelligence, assistance, motivation, guidance, teaching, user experience, assessment, engagement, resource, and training. It was found that the utilization of chatbots significantly influences student behavior across these themes. The analysis indicates that chatbots impact learning processes, facilitate communication, provide assistance, and enhance engagement and motivation among students. AI powered chatbot play a crucial role in guiding and assessing students, improving user experience, and optimizing resources and training methods.

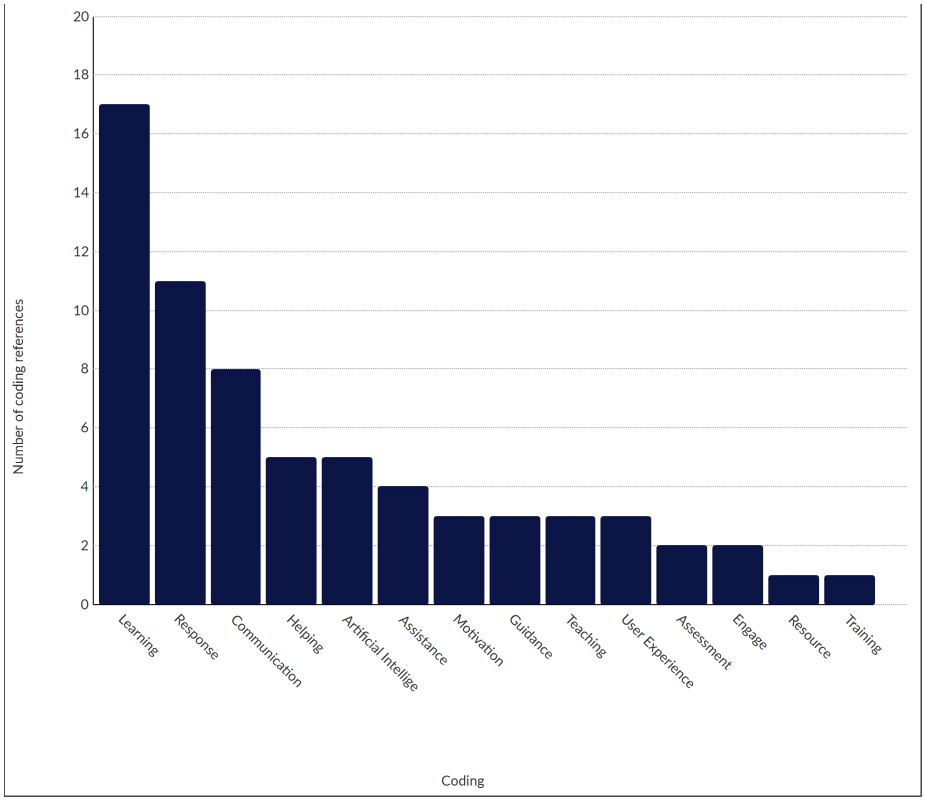

Figure 2: *Chart on Students' Effects of Using Chatbot on Students' Behavior*

Results on the threats associated with the use of AI powered chatbot in online learning

The themes on the threats associated with the use of chatbot in online learning were drawn from the selected sample through content analysis by using NVivo software version 14. The threats are presented in the form of word cloud and table.

Figure 3: *Word Cloud Presents Threats Associated with Using Chatbots*

Figure 3 illustrates of diverse threats linked to the implementation of chatbots in the context of education, particularly in learning environments. These threats are taken from selected literature. The significant risks associated with employing chatbots for educational purposes is evident in the word cloud generated by N-vivo 14.

Table 3

The Threats Associated with Use of Chatbots from Selected Sample

Sr. No	Citation	Title	Threats of Using Chatbot
1	(Sok & Heng,2023)	ChatGPT for education and research: A review of benefits and risks	• Academic Integrity issue • Inaccurate Information • Over-reliance • Unfair Learning Assessment
2	(Ngo, 2023)	The Perception by University Students of the Use of ChatGPT in Education	• Academic Integrity issue • Inaccurate Information • Logical errors • Over-reliance • Unreliable information
3	(Kasnecietal.,2023)	ChatGPT for Good? On Opportunities and Challenges of Large Language Models for Education	• Biased Response • Copyright issues • Lack of Expertise • Multilingualism • Over-reliance • Plagiarism • Privacy and Security

			• Unfair Learning Assessment
4	(Kazansky, 2022)	ChatGPT in Humanitarian Contexts Learning From Practitioner Experiences	• Biased Response • Inaccurate Information • Potential misuse • Unfair Learning Assessment
5	(Liuetal., 2023)	Future of education in the era of generative artificial intelligence: Consensus among Chinese scholars on applications of ChatGPT in schools	• Academic Integrity issue • Declining in High Order Cognitive Skills • Digital Divide • Inaccurate Information • Knowledge Manipulation • Lack of Expertise • Plagiarism • Potential Misuse\Misuse • Privacy and Security • Unreliable information
6	(Sabzalieva & Valentini, 2023)	ChatGPT and Artificial Intelligence in higher education	• Academic Integrity issue • Accessibility • Biased Response • Commercialization • Plagiarism • Privacy and Security • Unfair Learning Assessment
7	(Lietal., 2023)	ChatGPT in education: A discourse analysis of worries and concerns on social media	• Academic Integrity issue • Accessibility • Biased Response • Copyright issues • Declining in High Order Cognitive Skills • Ethical issue • Inaccurate Information • Incorrect Citation • Job Replacement • Knowledge Manipulation • Lack of Emotional Interaction • Lack of Expertise • Lack of Transparency • Logical errors • Over-reliance • Plagiarism

			• Potential Misuse • Privacy and Security • Unfair Learning Assessment • Unreliable information
8	(Linetal.,2023)	Concerns About Using ChatGPT in Education	• Academic Integrity issue • Biased Response • Copyright issues • Declining in High Order Cognitive Skills • Ethical issue • Inaccurate Information • Incorrect Citation • Job Replacement • Knowledge Manipulation • Lack of Emotional Interaction • Lack of Expertise • Logical errors • Plagiarism • Potential Misuse • Privacy and Security • Unfair Learning Assessment
9	(Mahamaetal.,2023)	ChatGPT in Academic Writing: A Threat to Human Creativity and Academic Integrity? An Exploratory Study	• Academic Integrity issue • Copyright issues • Declining in High Order Cognitive Skills • Ethical issue • Inaccurate Information • Incorrect Citation • Knowledge Manipulation • Lack of Emotional Interaction • Lack of Expertise • Potential Misuse
10	(Wu & Ni, 2023)	Unveiling Security, Privacy, and Ethical Concerns of ChatGPT	• Biased Response • Ethical issue • Inaccurate Information • Knowledge Manipulation • Over-reliance • Potential Misuse • Privacy and Security

	• Training Data Poisoning • Unfair Learning Assessment

Table 3 presents a comprehensive overview of the various threats that were associated with the application of chatbots in online learning that emerged from selected sample. The data was coded using NVivo 14 software, and the table provides insights into threats learners face in using Chatbots/ChatGPT. All themes are represented as treats in using chatbots for learning. Each row in the table consisted of article name, authors name and threats associated with use of chatbots in online learning.

Conclusion

The study concluded that chatbots are valuable addition in contemporary era of education. Chatbots improve students' participation and make them active member by providing them support in their learning process. Chatbots are significant tools of AI as these tools provides quick response to students' questions. Chatbots change difficult contents into clear and easy language. They have ability to provide individualized instructions. Chatbots add gamification element to education. Chatbot engaged users in learning through healthy interaction. It eliminates boring element. Users are motivated when they use chatbots in their learning and teaching process. It is also found that chatbots are available 24/7 for the users. They can take help at any time when they needed. Chatbots are like personal assistant. It was also found that ChatGPT assists teachers in assessment process. They can develop assessment plans through ChatGPT. It has ability to assess the performance of students. ChatGPT is very significant. It makes learning more efficient. ChatGPT provide knowledge of latest learning and teaching strategies to users. It was seen that ChatGPT is user friendly. Users can easily interact with this chatbot. Chatbots have potential to save users' time. It was seen that user feel more engaged in learning when they use chatbots. While the study highlights the positive impacts of chatbots on student behavior, it also underscores several critical threats. These include the dissemination of inaccurate information, challenges to academic integrity such as plagiarism, over-reliance on chatbots, potential misuse, manipulation of knowledge, and a decline in high-order cognitive skills. Acknowledging and addressing these threats are crucial for ensuring the responsible and effective integration of chatbots in educational settings. The study recommends that universities may develop plans for managing threats of using chatbots in their learning activities. It is also recommended that universities may provide training to their stockholders about use of chatbots, so that they may meet the challenges existing in such domains effectively.

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A New Approach in Turkish Higher Education: Block Learning *

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Abstract

This research looks at a method called block mode of learning that is becoming more and more popular in higher education in recent year in the world. By giving students the freedom to concentrate on one or more mutually supporting topics that can contribute to program outcomes within a set amount of time, block learning promotes in-depth learning. The study's objective is to shed light on the block learning theory's theoretical underpinnings, practical applications, and contributions to national and international education and training processes. Opinions and recommendations that consider quality assurance and technology integration and act as change agents are offered in accordance with the findings.

Key words: Block learning, higher education, approach, change, technology integration, quality assurance, Türkiye.

Introduction

Higher education is a crucial step in helping people become professionals, hone their critical thinking abilities, and prepare them to make valuable contributions to society. Traditional higher education approaches, on the other hand, put a strain on students' attention spans and time management abilities due to their need that they enroll in multiple courses concurrently, and typically involves students taking multiple courses simultaneously, which can hinder their ability to manage time and attention effectively, leading to fragmented learning experiences. The concept of block learning, as defined by UNESCO, offers an alternative approach. Block learning involves intensive, short-term courses focusing on specific topics, which allows students to concentrate deeply on fewer subjects, promoting better understanding and retention. Having pupils switch between classes may hinder their capacity to absorb material thoroughly and form connections within each session. Currently, there is a growing need in education for fresh and creative methods.

One strategy that arose in response to these demands is block learning, which has gained popularity in the education sector recently. Under the block learning approach, students may concentrate on a single course or subject for a set amount of time, or they may concentrate on a number of related courses and subjects that together support the program aims. For instance, a student might be uninterested in taking additional classes for four weeks while taking just a biology course. Students are better able to comprehend, retain, and apply knowledge thanks to this method, which also promotes in-depth learning.

The block learning approach offers a number of benefits. This model, first and foremost, enables students to concentrate on a particular subject and acquire in-depth knowledge about it. In comparison to the conventional multi-course model, which divides students' time and causes distractions, it also provides a more structured learning environment. Because professors can incorporate activities like projects, lab work, and discussions into extended class hours, block learning can also give students additional opportunity for hands-on and engaged learning. Block learning does, however, come with drawbacks and practical challenges. For instance, requiring students to concentrate on a particular subject for an extended period of time may cause some students to lose enthusiasm. Furthermore, the adoption of this paradigm might necessitate curriculum and infrastructure reorganization in educational institutions.

The purpose of this study is to investigate the suitability and potential consequences of the block learning model in postsecondary education. The study will go into great detail about the theoretical underpinnings of block learning, recent results in the literature, and application examples. Furthermore, this model's impact on student achievement, motivation, and the general learning process will be assessed. One could argue that block learning represents a new paradigm in education. By extending beyond the bounds of conventional education models, this approach can provide students with more comprehensive and meaningful learning experiences as well as aid in

* *This study was presented as a spotlight session at ICETOL-2024.*

the development of more efficient training and educational programs. Our study intends to give educators and policy makers useful information by offering recommendations for improving the implementation of block learning in higher education.

Global Block Learning

The adaptability of traditional learning and teaching methods is severely limited in light of the evolving global landscape. The course contents distributed over 14 weeks within the period followed in the traditional approach are rendered ineffective, particularly in light of easily accessible, open, and enjoyable applications (e.g. MOOCs) made possible by internet technology. These applications can be used as a resource to obtain the learning outcomes within the scope of courses and subjects that contribute to the program outcomes with low contribution. Views on conventional approaches to higher education are reflected in the literature. Several nations that have rejected these ideas and embraced the idea of adapting to change are founded on the block learning model of higher education.

Victoria University (Australia), Denver College (USA), Quest University (Canada), Cornell College (USA), St. Lawrence College (Canada), University of Montana Western (USA), Thompson Rivers University (Canada), Imperial College London (UK), Australian National University (Australia), Maastricht University (Netherlands), University of Helsinki (Finland), Beykoz University (Turkey) are just a few of the institutions implementing the block learning approach globally. In this approach, students typically use a system known as "Block Plan" when they study in universities that use the block learning model. Students enroll in one or a few courses per block, which lasts a few weeks, during the academic year. Students have the opportunity to work on projects and learn in-depth material during this focused learning period. In a similar vein, Quest University's block plan gives students the opportunity to hone their critical thinking and problem-solving abilities.

Particular applications of this model are found in technical and health programs. The "Experience One" system at the University of Montana Western, another American university that uses the block learning model, enables students to enroll in courses in 18-day blocks. The system's goals are to give students an intense and focused learning experience and to further their academic and personal growth. In contrast, Thompson Rivers University uses the block learning model in some of its programs. Students enrolled in open and distance education programs can take courses in concentrated modules at specific times. On the other hand, some engineering and medical programs at Imperial College London employ the block learning method, which helps students put their theoretical knowledge into practice. Australian National University has implemented the block learning model in a few of its graduate and undergraduate programs. This model is popular, particularly in research-oriented programs, where students take courses in intensive, short-term blocks and concentrate on a particular subject in depth. One of the universities in Europe that uses the block learning model is Maastricht University. By combining the block learning model with the Problem Based Learning (PBL) approach, students can take part in collaborative and active learning processes. In concentrated blocks, students study specific subjects and work on real-world issues. In certain of its programs, the University of Helsinki employs the block learning paradigm. By covering some topics in shorter bursts, students learn more in-depth information. Students can put their theoretical knowledge into practice with the aid of this model. Beginning with the spring semester of 2023–2024, Beykoz University is only testing the block learning approach in its English Business Administration Thesis, Non-Thesis, and Distance Education Master's Programs. Work is still being done to ensure that the process is structured as efficiently as possible.

These universities offer a variety of benefits and ways to apply the block learning paradigm. Block learning gives students a more concentrated, in-depth, and intense learning experience, which promotes both their academic success and personal development.

The Importance of Block Learning for Turkish Higher Education

The goal of the Turkish higher education system is to give students a broad education through traditional methods of instruction. But as the world changes so quickly, so too must educational approaches. At this point, block learning can offer a significant alternative by improving the effectiveness and efficiency of students' learning processes. Drawing from the famous thinker Heraclitus's philosophy, "The only constant thing is change itself," and considering the current global context, it is evident that the student profile raised in our nation will be more qualified if the approaches taken by the top-ranked universities are adapted to Turkish higher education. By including the knowledge, skills, and competencies aimed to be gained within the scope of the Turkish Higher Education Qualifications Framework (THEQF) and the Bologna Process, the block learning approach will give impetus to the issues of micro-crediting and recognition of prior learning, which provide an important input in the education-training axis of quality culture. To list the benefits and difficulties that block learning can bring to higher education in Turkey;

1. In-Depth Learning and Understanding: Block learning permits students to focus on a particular subject, which promotes in-depth learning. Students in Turkish higher education frequently enroll in multiple courses concurrently, which can cause distraction and shallow learning. Block learning focuses students' attention on a single subject, allowing for more permanent and in-depth learning. This enables learners to focus on a specific subject and gain a deeper comprehension of difficult subjects.

2. Student Involvement and Motivation: Block instruction helps boost students' enthusiasm. In contrast to traditional methods, which require students to sit through weeks of instruction, block learning involves brief but intensive lessons that can boost students' motivation. Furthermore, pupils who can finish a subject quickly and move on to another subject maintain their interest in the learning process alive.

3. Applied and Practical Learning Opportunities: Block learning expands the number of opportunities for applied and practical learning. Both theoretical and practical knowledge are highly valued in Turkey's higher education institutions. Long lecture sessions, intense study sessions, and additional room for applied learning activities like lab studies, projects, and field studies are all made possible by the block learning model. This gives students the chance to apply what they have learned and get practical experience.

4. Academic Achievement and Teaching Quality: Block learning has the potential to raise student achievement and enhance instruction. Students who concentrate on a single subject can enhance their comprehension and retention of material. Teachers can also deliver courses more comprehensively and successfully. In Turkish higher education, the adoption of block learning can improve the overall quality of teaching and positively affect students' academic achievement.

5. Flexibility and Innovation: The use of blocks in education allows for both flexibility and innovation. Higher education institutions in Turkey need to change quickly to keep up with the world's development. Because the block learning model allows for schedule flexibility, it can better meet the unique learning needs of each student. Furthermore, this model permits educational establishments to embrace and execute cutting-edge pedagogical approaches.

6. Challenges and Implementation Techniques: There might be some challenges when implementing block learning in Turkey's higher education system. These difficulties include students adjusting to this new model, faculty members adjusting to new teaching techniques, and existing course schedules being rearranged. Nonetheless, a number of approaches can be created to get beyond these obstacles. For instance, block learning adoption can be aided by pilot programs and gradual transition procedures. Similar to this, designs can be made more appealing by microcrediting and acknowledging prior learning in order to get around potential roadblocks in integration processes.

By utilising the benefits of the block learning model, the Turkish higher education system can improve the effectiveness and efficiency of students' learning experiences. Numerous significant issues, including in-depth learning, student motivation, opportunities for applied learning, academic success, and flexibility, can be positively impacted by block learning. Therefore, by assessing the block learning model and creating suitable strategies, Turkish higher education institutions can raise the standard of instruction and give students a better educational experience. Grant (2001), Jonas et al. (2004), and Davies (2006) have previously examined block teaching. Their findings highlight the advantages of intensive block teaching, which have been noted in previous research, including flexible delivery methods, increased student motivation and engagement, time savings, and improved discipline, and academic achievement. Furthermore, it has been proposed that block teaching can produce learning outcomes that are on par with or even superior to those produced by more conventional teaching techniques. This illustrates the efficacy and potential benefits of block learning in creating a favorable learning environment and producing noteworthy learning results.

Conclusion

The idea of block learning in higher education is not new; rather, it is a well-organized method that takes into account the skills and competencies of the twenty-first century while adhering to national and international qualification frameworks, quality assurance, and 21st-century skills and competencies. The block learning approach's structure is adaptable, recyclable, and redesigned. As in any other teaching unit, the application of didactical principles will have a significant impact on the success of learning in higher education. The learning paradigm, as opposed to the instruction paradigm, uses a course structure that places an emphasis on the learning process and relies on a motivated and accountable student. The student therefore requires space and inspiration to participate in self-organized learning. How can this be accomplished in a term or in short courses? Most of the time, learning would occur while working on particular cases with available experts serving as references. An educator's main duty is to support and direct the learning process. When planning instruction in block, blended, or mixed modes in accordance with technology adoption, internal instruction and learning quality assurance must

be taken into account at every stage, particularly when evaluating learning outcomes and ensuring that results are in line with the learning objectives. This strategy will be crucial for raising the profile of postsecondary education institutions in relation to bilateral agreements, articulations, collaborations, and double degree programs. It is crucial to remember that putting block teaching into practice calls for thorough planning, coordination, and cooperation from many stakeholders. The following are the recommendations that are specific to each group:

- Suggestions for Policymakers and Stakeholders

Vision and Strategic Planning

Specific Goals: Set specific goals for the implementation of block teaching, emphasizing improved learning outcomes, flexible learning environments, and increased student engagement.

Stakeholder Participation: Involve all parties involved in the planning process, such as academic staff, administrative personnel, and students, to guarantee buy-in and cooperative decision-making.

Development of Policy

Modest Policies: Create policies, such as those pertaining to flexible attendance, assessment, and credit transfer, that take into account the particular requirements of block teaching.

Resource Allocation: Ensure that sufficient funds and resources are set aside for the block teaching model's creation and upkeep.

Support Systems

Professional Development: Provide funding for ongoing programs that help faculty members adjust to block teaching approaches.

Technical Infrastructure: To facilitate digital learning tools and resources that are necessary for block teaching, upgrade and maintain the technical infrastructure.

- Suggestions for Teachers and Practitioners

Curriculum Design

Integrated Curriculum: Create an integrated curriculum that covers the required breadth of knowledge while enabling deep, immersive learning experiences.

Flexible Content Delivery: To accommodate various learning styles, use a range of instructional techniques, such as discussions, lectures, hands-on activities, and digital tools.

Evaluation and Remarks

Continuous Assessment: Use regular, formative evaluations to track students' development and give prompt feedback.

Unambiguous Standards: At the start of every block, clearly define the assessment criteria and let the students know what they mean.

Student Support

Advising and Mentorship: Provide comprehensive academic advising and mentorship programs to assist students in navigating the demanding course schedule.

Resources for Well-Being: Offer counseling services and stress-reduction seminars, among other tools and assistance, to promote the wellbeing of students.

- Suggestions for Supervisors and Organizational Heads

Plan of Implementation

Phased Rollout: To allow for adjustments and the opportunity to learn from early experiences, take into consideration a phased implementation approach.

Pilot Programs: To test the block teaching model, begin with pilot programs and make necessary adjustments based on feedback and results.

Resources and Infrastructure

Classroom Design: Make sure all the necessary equipment, such as adjustable seating and technological integration, is available to facilitate intensive learning activities.

Learning Management Systems: To improve communication, assessment, and course delivery, make use of cutting-edge LMSs.

Observation and Assessment

Data-Driven Decisions: To continuously enhance the block teaching model, gather and evaluate data on student performance, engagement, and satisfaction.

Frequent Feedback: To pinpoint problems and opportunities for development, hold frequent feedback meetings and surveys with instructors and students.

- Suggestions for Students

Getting Ready and Making Plans

Time management: To handle the demanding nature of block teaching, cultivate strong time management abilities.

Active Participation: Take full advantage of the immersive learning opportunities by participating fully in class.

Make Use of Resources

Support Services: Make use of study groups and tutoring as well as other academic support services.

Activities for Well-Being: To manage stress and preserve equilibrium, engage in activities for Well-Being and make use of mental health resources.

As a result, by heeding these suggestions, practitioners, legislators, stakeholders, and students can successfully apply and reap the rewards of the block teaching model, guaranteeing an effective and long-lasting change in education.

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The Metaverse and the Democratization of Education: How 3D Virtual Worlds Can Expand Access to Quality Learning in Chinese ODL

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Abstract

The rapid advancement of 3D virtual worlds and the Metaverse presents a transformative opportunity for Open and Distance Learning (ODL) to address its limitations and expand access to quality education. This paper explores the potential of 3D virtual worlds to democratize ODL by overcoming geographical barriers, enhancing interactivity and engagement, and promoting personalized learning experiences. Through a comprehensive literature review, the paper synthesizes existing research on the applications of 3D virtual worlds in ODL settings. It identifies key benefits, such as immersive learning environments, collaborative opportunities, and the potential to cater to diverse learning styles. The paper also highlights the challenges of implementing 3D virtual worlds in ODL, including technical requirements, accessibility concerns, and the need for effective pedagogical integration. It emphasizes the importance of careful planning, evaluation, and ongoing support to ensure successful implementation. To address research gaps, the paper proposes a mixed-methods research approach that combines quantitative and qualitative data collection methods. It outlines a framework for investigating the impact of 3D virtual worlds on ODL learner engagement, motivation, and learning outcomes. The paper concludes by discussing the implications of the research for ODL practice and policy. It recommends strategies for integrating 3D virtual worlds into ODL curricula and pedagogy, emphasizing the need for a learner-centered approach that aligns with ODL principles. It also highlights the potential of 3D virtual worlds to promote equity and inclusion in education, making quality learning opportunities accessible to a wider range of learners.

Key words: 3D Virtual Worlds, ODL, Democratization of Education

Introduction

With the rapid development of information technology, distance education (ODL) has become an important mode of education, providing learning opportunities for students who cannot participate in traditional classroom teaching*(OGUNMAKIN, R. 2024)*. ODL breaks the limitation of time and space, so that learners can learn anytime and anywhere without the limitation of region and time. In addition, ODL has the advantages of low cost and high efficiency, which makes an important contribution to the popularization of education and the promotion of lifelong learning*(Bates, A. T, 2005)*.

Research background

Learner engagement is an important factor in ODL learning. Highly engaged learners tend to be better able to focus on learning tasks and achieve better learning outcomes*(Simonson, M., Zvacek, S. M., & Smaldino, S, 2019)*. 3D virtual worlds can improve learner engagement by providing an immersive, interactive, and personalized learning experience.

Development status of distance education

With the rapid development of information technology, distance education (ODL) has become an important mode of education, providing learning opportunities for students who cannot participate in traditional classroom teaching. ODL breaks the limitation of time and space, so that learners can learn anytime and anywhere without the limitation of region and time*(Kirkup, G., & Jones, A, 1996)*.

In addition, ODL has the advantages of low cost and high efficiency, which makes an important contribution to the popularization of education and the promotion of lifelong learning*(Ko, S., & Rossen, S, 2017)*. The traditional ODL mode mainly relies on two-dimensional media such as text, audio and video for teaching, which has the following limitations:

Lack of immersive learning experience: Two-dimensional media can not provide realistic immersive experience, which makes it difficult for learners to have immersive experience, thus reducing learning interest and effect*(Holmberg, B, 2005)*.

Lack of interactivity and collaboration: Two-dimensional media is difficult to support interaction and collaboration among learners, which makes it impossible for learners to communicate and share learning outcomes with others, thus reducing learning efficiency*(Gunawardena, C. N., & McIsaac, M. S, 2013))*.

Personalized learning is difficult to achieve: two-dimensional media is difficult to customize the learning environment and learning content according to the individual needs of each learner, thus reducing the learning effect**(Gunawardena, C. N., & McIsaac, M. S, 2013)**.

Rapid development of information technology and its application in education

The development of information technology provides a new opportunity for educational reform*(Hara, N, 2000).* The application of information technology such as Internet, big data and artificial intelligence makes education and teaching more intelligent, personalized and efficient.

The application of information technology in the field of education is mainly reflected in the following aspects:

The rise of online education platform: Online education platform provides learners with rich learning resources and convenient learning methods, so that learners can learn anytime and anywhere*(Wen, J., Wei, X., He, T., & Zhang, S, 2020).*

Application of intelligent teaching system: Intelligent teaching system can customize personalized learning programs according to the learning characteristics and needs of each learner to improve learning efficiency*(Dogra, B, 2016)*.

The application of virtual reality technology: Virtual reality technology can provide learners with realistic immersive learning experience, so that learners can learn personally*(Kampling, H, 2018).*

Development of democratization of education

Democratization of education means that everyone enjoys equal educational opportunities and is not restricted by gender, race, social status and other factors. Democratization of education is an important manifestation of social fairness and justice, and also an important way to promote social progress*(Murati, R, 2015)*.

In recent years, with the development of social economy and the progress of educational concept, the democratization of education has made remarkable progress. Educational opportunities are more equal: The government has increased investment in education, built more schools, so that more people have the opportunity to receive education*(Benavot, A, 1996)*. Continuous improvement of the quality of education: Education reform has been deepened and the quality of education and teaching has been continuously improved. Increased awareness of educational equity: People's awareness of educational equity is increasing, and all sectors of society are working hard to promote educational equity**(Citro, etal,2019).**

Summary

Distance education, information technology and democratization of education are three closely related concepts*(Lanza, B. L. B etal. 2015.).* Distance education is one of the important ways to realize the democratization of education, and the development of information technology provides a strong support for the development of distance education. The development of educational democratization has created a good social environment for the application of distance education*(Ślósarz, A , 2019)*. As a new type of information technology, 3D virtual technology has the following characteristics: Immersive experience: 3D virtual technology can provide learners with realistic immersive learning

experience, so that learners can learn personally. Interactivity and collaboration: 3D virtual technology can support interaction and collaboration among learners, enabling learners to communicate and share learning with others(Shih, Y. C., & Yang, M. T, 2008). Personalized learning: 3D virtual technology can customize the learning environment and learning content according to the individual needs of each learner.

Therefore, the application of 3D virtual technology in distance education has broad potential, which can effectively promote the development of distance education and the process of educational democratization *(Shih, Y. C., & Yang, M. T, 2008)*. This study aims to explore the potential of 3D virtual worlds in ODL and to empirically examine the impact of 3D virtual worlds on ODL learner engagement, motivation, and learning outcomes.

Research Objective

RO1: Examines the effects of a 3D virtual world on ODL learning engagement.

RO2: To study the effect of 3D virtual world on ODL learning motivation.

RO3: Examines the impact of 3D virtual worlds on ODL learning outcomes.

1.3 Research questions

RQ1: What is the impact of 3D virtual worlds on ODL learning engagement?

RQ2: What is the impact of 3D virtual world on ODL learning motivation?

RQ3: What is the impact of 3D virtual worlds on ODL learning outcomes?

1.4 Research hypothesis

H1: 3D virtual worlds can significantly increase ODL learner engagement.

H2: 3D virtual world can significantly improve ODL learner motivation.

H3: 3D virtual world can significantly improve ODL learner outcomes.

Conceptual framework

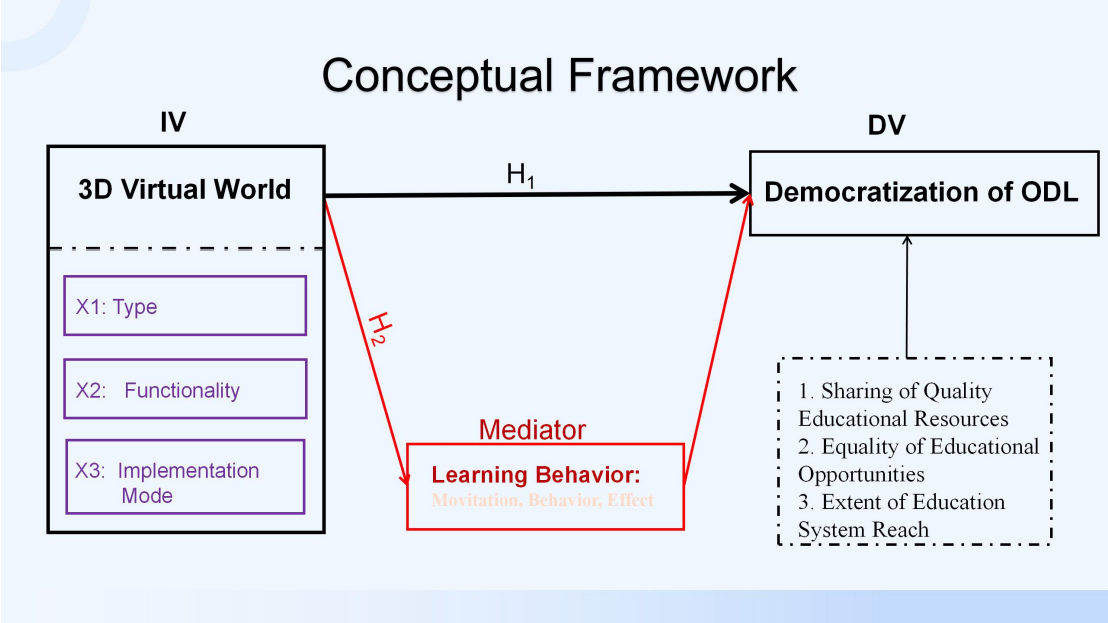

Figure 1: Conceptual Framework

The provided image presents a conceptual framework that outlines the relationship between 3D virtual world (IV) and the democratization of ODL (DV), mediated by three intervening variables: motivation, behavior, and effect. This framework highlights the potential role of 3D virtual worlds in promoting equitable and inclusive access to quality education.

Independent Variable (IV): 3D Virtual World in ODL

The 3D virtual world serves as the independent variable, representing the integration of immersive, interactive, and personalized virtual environments into ODL settings. This encompasses a range of technologies and platforms that can transform the traditional ODL landscape.

Dependent Variable (DV): Democratization of ODL

The democratization of ODL represents the dependent variable, reflecting the goal of making quality education more accessible and equitable for all learners, regardless of their background, location, or socioeconomic status. This encompasses three key dimensions:

Sharing of Quality Educational Resources: The extent to which high-quality educational resources, such as interactive content, expert guidance, and diverse learning materials, are readily available and shared within the 3D virtual world ODL environment.

Equality of Educational Opportunities: The level of fairness and equity in providing educational opportunities to all learners through 3D virtual world ODL. This includes factors such as equal access to technology, affordability, and inclusivity of diverse learners.

Extent of Education System Reach: The penetration and adoption of 3D virtual world ODL across different geographical locations, socioeconomic groups, and educational levels. This reflects the extent to which ODL is becoming more accessible and inclusive through 3D virtual world technologies.

Mediator Variables

The three mediator variables – motivation, behavior, and effect – represent the mechanisms through which 3D virtual world ODL can contribute to the democratization of education.

Motivation: The underlying reasons and driving forces that influence learners' engagement with 3D virtual world ODL. Increased motivation can lead to enhanced participation, improved learning outcomes, and a more positive perception of ODL democratization.

Behavior: The observable actions and activities that learners undertake within the 3D virtual world ODL environment. These behaviors, such as active participation, collaboration, and self-directed learning, can contribute to achieving the goals of ODL democratization.

Effect: The tangible outcomes and impacts resulting from 3D virtual world ODL on learners' knowledge, skills, and overall educational experience. Positive effects can demonstrate the effectiveness of 3D virtual world ODL in promoting democratization.

The Interplay of Variables

The conceptual framework proposes that 3D virtual world ODL can influence the democratization of education by:

Enhancing Learner Motivation: The immersive and interactive nature of 3D virtual worlds can stimulate learners' interest, curiosity, and engagement, leading to increased motivation to participate in ODL activities.

Promoting Active Learning Behaviors: 3D virtual worlds provide opportunities for active learning, collaboration, and self-directed learning, which can enhance learners' understanding, retention, and critical thinking skills.

Improving Learning Outcomes: The combination of enhanced motivation, active learning behaviors, and personalized learning experiences within 3D virtual worlds can lead to improved learning outcomes, such as increased knowledge acquisition, skill development, and problem-solving abilities.

Expanding Educational Opportunities: 3D virtual worlds can bridge geographical and socioeconomic barriers, making quality education more accessible to learners from diverse backgrounds and locations.

Promoting Inclusive Learning: 3D virtual worlds can create inclusive and supportive learning environments that cater to diverse learning styles, abilities, and needs, fostering a sense of belonging and equity among learners.

Implications for Research and Practice:

The conceptual framework highlights the potential of 3D virtual world ODL to promote the democratization of education. Further research is needed to explore the specific mechanisms and conditions under which 3D virtual worlds can effectively achieve these goals. Additionally, educators and policymakers should consider adopting and integrating 3D virtual world technologies into ODL practices to enhance learner engagement, improve learning outcomes, and expand educational opportunities for all.

By carefully designing and implementing 3D virtual world ODL experiences, we can harness the power of these immersive technologies to make education more accessible, equitable, and inclusive, contributing to a more just and informed society.

Significance of the study

This study aims to explore the potential of 3D virtual worlds in distance education (ODL) and to empirically examine the impact of 3D virtual worlds on ODL learner engagement, motivation, and learning outcomes.

Theoretical significance

This study will enrich the application research of 3D virtual world in the field of education, and provide theoretical and practical support for the construction of educational informatization. This study will expand the research field of ODL theory and provide new ideas and methods for the innovation and development of ODL theory. This study will deepen the understanding of the learning process of ODL learners and provide a theoretical basis for improving the effect of ODL teaching(Bovill, C., Cook-Sather, A., & Felten, P. 2011.).

Practical significance

This study will provide a reference for ODL practice and policy, and promote the application of 3D virtual world in ODL to expand quality education opportunities and achieve educational equity and democratization. This study will provide guidance for ODL teaching institutions and teachers to help them effectively apply 3D virtual world to teaching and improve the quality of teaching. This study will provide ODL learners with new learning styles and learning resources to help them improve their interest in learning and learning effectiveness.

Social significance

This study will promote educational equity and enable more people to have access to quality education. This study will promote lifelong learning and help people to learn new knowledge and skills to adapt to social development. This study will promote social progress, improve the quality of the whole people, and build a strong human resources country.

Literature review

Theoretical framework

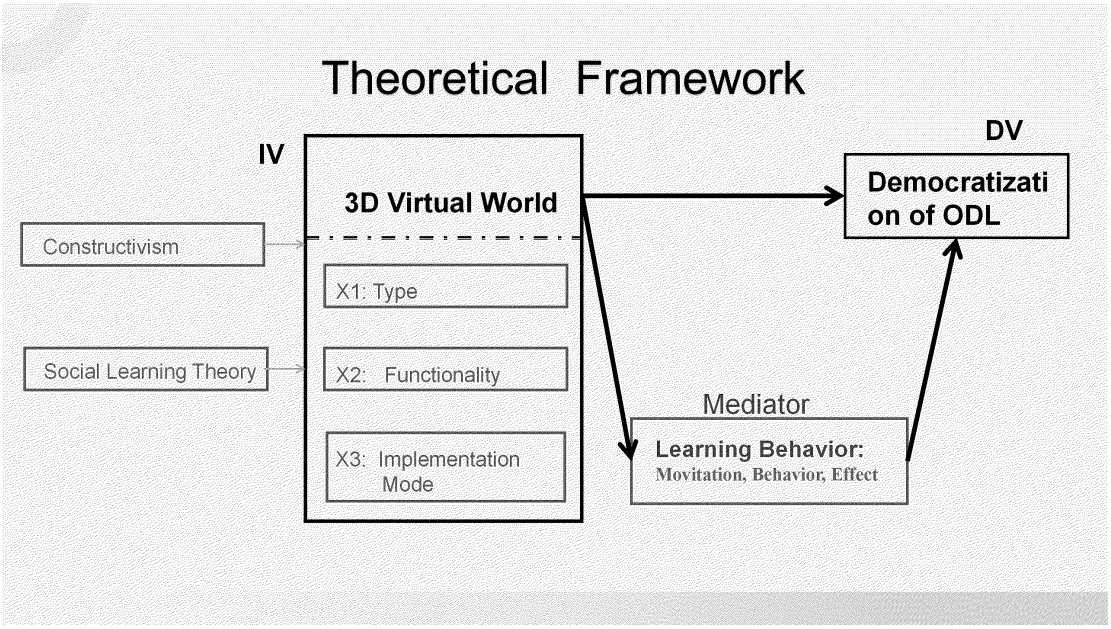

Figure 2: theoretical Framework

Constructivism

Constructivism emerged in the late 19th and early 20th centuries, pioneered by psychologists such as Lev Vygotsky and Jean Piaget*(path*

, S, 2004). The theory emphasizes the active role of learners in constructing their own understanding of the world through experience and interaction. Knowledge is not passively received, but is actively constructed through the process of interpreting and integrating new information with existing knowledge frameworks. The core concepts of constructivism: active learning, prior knowledge, meaningful learning, social learning; It has a significant impact on educational practice by promoting inquiry learning, collaborative learning and reflective learning.

The current research of constructivist learning theory mainly focuses on the following aspects: the construction process of learners, the design of learning environment, the improvement of teaching methods and so on. Relevant research shows that constructivist learning theory can effectively promote students' autonomous learning ability, critical thinking ability and problem-solving ability*(Bada, S. O., & Olusegun, S, 2015).*

Constructivist learning theory holds that knowledge is not instilled into students by teachers, but constructed by students in the process of interaction with the environment and others. 3D virtual world provides a realistic and immersive learning environment, which enables learners to actively explore, discover and construct knowledge, in line with the characteristics of learner autonomy and constructiveness emphasized by constructivist learning theory. So in theory, 3D virtual world can promote the democratization of ODL*(Bada, S. O., & Olusegun, S, 2015).*

Social Learning Theory

Social learning theory originated in the 1940s and was founded by Albert Bandura, an American psychologist. Social learning theory has gone through the following stages of development: behaviorism stage, cognitive stage, social cognitive stage*(Zhou, M., & Brown, D, 2015).* The theory emphasizes that learning occurs by observing and imitating the behavior of others, and believes that environmental and social factors have an important impact on the learning process. Specifically, it includes the following points: learning is the result of observing and imitating the behavior of others,

environmental and social factors have an important impact on the learning process, and learners are active learners*(Bandura, A., & Walters, R. H, 1977).*

The research of social learning theory mainly focuses on the following aspects: observational learning, imitative learning, social support and so on. Relevant research shows that social learning theory can effectively promote students' learning motivation, learning behavior and learning effec*t(Rosenthal, T. L., & Zimmerman, B. J, 2014).*

The researcher agrees with social learning theory that learning occurs by observing and imitating the behavior of others. The 3D virtual world provides a rich social environment, which enables learners to observe and imitate the learning behavior of others, thus promoting their own learning. In theory, 3D virtual world can promote ODL democratization by promoting learning motivation, learning behavior and learning effect.

Research Status of Distance Education

As an important educational mode, Distance Education (ODL) has been widely concerned and studied in recent years. The related research mainly focuses on the following aspects: Theoretical research of distance education: It mainly includes the concept and characteristics of distance education, the learning theory of distance education, the teaching theory of distance education, etc*l(Saba, F, 2000)*. Distance education technology research: mainly including information and communication technology, multimedia technology, virtual reality technology, etc. Research on the application of distance education: It mainly includes the application of distance education in higher education, vocational education and continuing education. Distance education policy research: mainly including distance education legislation, distance education planning, distance education funding and so on.

The research shows that distance education is an educational model with broad prospects for development. With the continuous development of information technology, distance education will be more widely used to provide learning opportunities for more people.

Research Status of 3D Virtual World

3D Virtual World, also known as Virtual Reality World, is a three-dimensional virtual space simulated by computer technology, in which users can interact and experience. 3D virtual world has the characteristics of immersion, interaction and sociality, which has been developed rapidly in recent years, and has been widely used, including entertainment, education, training, medical and other fields*(Dionisio, J. D. N., Iii, W. G. B., & Gilbert, R, 2013).*

3D virtual world technology mainly includes graphics, network technology and artificial intelligence technology. With the continuous development of these technologies, 3D virtual world technology has also made significant progress, such as the continuous improvement of graphics fidelity, the continuous enhancement of interactivity and the continuous improvement of intelligence*(Wang, S., Mao, Z., Zeng, C., Gong, H., Li, S., & Chen, B, 2010).* The research on the application of 3D virtual world mainly focuses on entertainment, education, training, medical treatment and other fields. Among them, 3D virtual game is one of the most successful applications of 3D virtual world. In the future, 3D virtual world will present the development trend of further improvement of graphics fidelity, more natural interaction, further improvement of intelligence and wider application.

Current Research on Democratization of Education

Democratization of education refers to breaking down privileges and inequalities in education so that everyone has equal access to quality education. Democratization of education is the inevitable trend of the development of modern education, and it is also an important way to achieve educational equity. The theoretical research of educational democratization mainly includes the theory of equal educational opportunity, the theory of educational equity and the theory of social justice. The practical research of educational democratization mainly includes educational policy research, educational reform research and educational practice research. The international comparative study of educational democratization aims to compare the situation of educational democratization in different countries and regions, and to analyze their experiences and lessons. The study of educational democratization is faced with such problems and challenges as how to define educational democratization, how to measure educational democratization, and how to promote educational democratization. The study of educational democratization is an important field of educational theory and practice, which provides important

theoretical basis and practical guidance for promoting educational equity and realizing social justice. With the development of society and the deepening of educational reform, the study of educational democratization will continue to make new progress.

Research methodology

Quantitative study

The quantitative research method of this study is to conduct a questionnaire survey on all teachers and students in Zhengzhou Shuqing Medical College, and collect data such as basic information, teaching situation, learning situation, opinions and suggestions on teaching and learning process. Descriptive statistical method: It is used to describe the basic characteristics of the basic information of teachers and students, teaching situation, learning situation and other data, such as frequency, mean, median, standard deviation, etc. Inferential statistical method: It is used to test whether there are differences between teachers and students, such as the differences in teaching methods used by teachers with different educational backgrounds and professional titles, and the differences in learning methods of students of different genders and ages. The content analysis method is used to analyze the opinions and suggestions of teachers and students on the teaching and learning process, and to extract the main themes and perspectives. Quantitative research can help schools understand the basic situation of teachers and students, the current situation of teaching and learning, and the overall views of teachers and students on the process of teaching and learning, and provide a basis for schools to formulate educational policies and measures.

Qualitative study

Qualitative research methods, interviews and observation of some teachers and students in Zhengzhou Shuqing Medical College, in-depth understanding of teachers and students'ideas and feelings, found problems and phenomena that quantitative research can not find. The method of inductive analysis was used for data analysis. The interview and observation data were collated, open coding, axis coding and core coding, and the core theme of the study was extracted. Qualitative research can help schools understand the real thoughts and feelings of teachers and students, find specific problems and difficulties in the process of teaching and learning, and provide a basis for schools to improve teaching and learning and improve the satisfaction of teachers and students.

Research results

In order to explore the impact of 3D virtual world on the democratization of ODL education, we designed a questionnaire to survey 400 ODL learners in Shuqing, Zhengzhou. The questionnaire includes the following aspects: Basic information: including gender, age, education, occupation and so on. 3D virtual world learning: including whether to use 3D virtual world learning, frequency of use, satisfaction of use, etc. The impact of 3D virtual world on learning: including the impact on learning interest, learning effect, learning enthusiasm and so on. Views on 3D virtual world ODL: including the advantages, disadvantages and suggestions of 3D virtual world ODL. The results of the survey data analysis are as follows:

Basic Information

Gender: Male 52%, Female 48%.

Age: 18-24 years 30%, 25-34 years 40%, 35-44 years 20%, over 45 years 10%.

Education: 30% junior college, 35% junior college, 25% undergraduate, 10% master and above.

Occupation: Student 40%, Professional Teacher 30%, Administrative Teacher 20%, Workman 10%.

3D Virtual World Learning

Have you ever used 3D virtual world for learning: Yes 60%, No 40%.

Frequency of use: 1-2 times per week 30%, 3-4 times per week 20%, more than 5 times per week 10%.

Satisfaction: very satisfied 20%, satisfied 60%, general 20%, dissatisfied 0%.

Impact of 3D Virtual World on Learning

Interest in learning: increase 40%, maintain 50%, decrease 10%.

For learning effect: significantly increased by 20%, increased by 50%, maintained by 20%, decreased by 10%.

Learning enthusiasm: increase by 30%, maintain by 50%, and decrease by 20%.

Views on 3D virtual world ODL

Advantages: Immersive learning experience, interactive learning environment, personalized learning mode, etc.

Disadvantages: high technical requirements, high cost, lack of specifications, etc.

Suggestions include strengthening infrastructure construction, developing high-quality learning resources, and strengthening teacher training.

Qualitative research results

Most ODL learners hold a positive attitude towards 3D virtual world learning, believing that 3D virtual world can improve learning interest, learning effect and learning enthusiasm.

3D virtual world has the advantages of immersive learning experience, interactive learning environment and personalized learning mode, which can provide more equal and high-quality learning opportunities for ODL learners.

3D virtual world ODL also has disadvantages such as high technical requirements, high cost and lack of specifications, which need to be further improved and developed.

Quantitative study results

According to the survey data, 60% of ODL learners have used 3D virtual world to learn, 30% of them use 3D virtual world to learn 1-2 times a week, 20% of them use 3D virtual world to learn 3-4 times a week, and 10% of them use 3D virtual world to learn more than 5 times a week.

Survey data show that 80% of ODL learners are satisfied with 3D virtual world learning, 20% of them are very satisfied with 3D virtual world learning, and 60% of them are satisfied with 3D virtual world learning.

According to the survey data, 70% of ODL learners believe that 3D virtual world can improve their interest in learning, 60% of ODL learners believe that 3D virtual world can improve their learning effect, and 50% of ODL learners believe that 3D virtual world can improve their learning enthusiasm.

Policy Recommendations and Limitations

Research results and their significance

The results show that the 3D virtual world has a positive impact on the democratization of ODL education. 3D virtual world can provide ODL learners with more equal and high-quality learning opportunities, and can improve their learning interest, learning effect and learning enthusiasm*(Jonassen, D. H., & Rohrer-Murphy, L, 1999)*. The research results do not fully support the research hypotheses H1, H2, H3 and H4. The reasons may be as follows: The sample size of the virtual survey data is limited and may be biased. Virtual survey data collection methods have some limitations, which may affect the accuracy of data results. The application of 3D virtual world in ODL education is still in its infancy and needs further improvement and development(*Sue, V. M., & Ritter, L. A. 2007.).*

Limitations

Limitations of the survey data in this paper: This study uses a combination of qualitative and quantitative methods to conduct research, the sample size of the survey data is limited, there may be deviations, and there are some limitations in the collection methods of the survey data, which may affect the accuracy of the data results. Details are as follows:

Limitations of research methods: This study mainly uses quantitative research methods and qualitative research methods to analyze. Quantitative research methods may ignore some important details, and qualitative research methods may have subjective bias.

Limitations of the theoretical framework: This study is based on the democratization theory to explore the impact of 3D virtual world on the democratization of ODL education, but the democratization theory itself has certain limitations, which may not fully explain the impact of 3D virtual world on the democratization of ODL education.

Recommendations for future research

In order to further validate the research hypothesis, the following measures are recommended:

Expand the sample size of survey data and improve the accuracy of data results.

Improve the collection methods of survey data to ensure the authenticity and validity of the data.

We should strengthen the research on the application of 3D virtual world in ODL education, and explore the effective ways for 3D virtual world to better promote the democratization of ODL education.

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The Impact of Adaptive Learning Environment on Open and Distance Learning and the Role of Information Technology

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Abstract

With the rapid development of information technology and the arrival of the era of knowledge economy, modern society has put forward new challenges and requirements to education. The purpose of this study is to investigate the impact of adaptive learning environment (ALE) on open and distance learning (ODL), especially the role of information technology in promoting the development of ALE. By analyzing the demand of current education reform, the construction of educational technology discipline, the optimization of digital learning environment and the development trend of distance education, this paper puts forward that future education, especially ODL, should focus on the development and matching of adaptive technology learning environment. It is found that ALE can provide learners with personalized learning paths, stimulate their enthusiasm for learning, and bring challenges such as network security and data privacy protection. This paper further discusses how to use information technology to optimize ALE, and prospects the future development model of ODL, emphasizing the importance of adaptive learning system in meeting individual learning needs and lifelong education.

Keywords: *adaptive learning environment; open distance learning; information technology; personalized learning path*

Introduction

In the rapidly evolving landscape of information technology and the knowledge economy, the education sector faces new challenges and demands. Open and Distance Learning (ODL) has emerged as a flexible educational model, offering opportunities for diverse learners *(Ossiannilsson, E., 2020)*. However, this model also introduces unique challenges that require innovative solutions. One such innovation is the Adaptive Learning Environment (ALE), which leverages information technology to provide personalized learning paths tailored to individual learner characteristics and needs *(Girault, M. C., 2020).*

The integration of adaptive learning environments in open and distance learning significantly enhances educational experiences through personalized instruction and the effective use of information technology*(Alamri, 2021)*. This approach not only caters to individual learning styles but also fosters greater student engagement and motivation. Adaptive learning technologies adjust content based on individual abilities, promoting personalized educational trajectories that align with students' cognitive characteristics and nee*ds (O.P, Kosovets., 2022), (Nicola, 2020).*

Research indicates that adaptive e-learning environments can significantly improve student engagement compared to traditional methods, as they cater to diverse learning styles and preferences *(Hassan, A., 2021)*. Information technology facilitates hybrid teaching models, transforming traditional educational practices by enabling seamless integration of digital tools *(Nancy, 2024).* The development of intelligent learning environments supports continuous updates to educational content and personalized learning paths, essential for adapting to the demands of the digital economy *(Mikhail, 2021).*While adaptive learning environments show promise in enhancing educational outcomes, challenges remain in effectively integrating technology across diverse educational contexts, particularly in developing regions. Addressing these challenges is crucial for maximizing the benefits of adaptive learning.

The purpose of this study is to investigate the impact of ALE on ODL and analyze the role of information technology in enhancing ALE. This research seeks to provide insights that could guide the future development of distance education, particularly in the context of ALE. Additionally, this study addresses the challenges ALE faces, including issues related to network security and data privacy. It also anticipates future applications of information technology in ALE, emphasizing the critical role of personalized learning paths in meeting diverse learner needs.

This paper is structured as follows:

First explore how ALE influences ODL, focusing on learner experiences, effectiveness, and motivation.

Next, examine the optimization of ALE through information technology, discussing the contributions of learning platforms, resources, and personalized content customization.

Finally, address the challenges of implementing ALE, particularly in terms of personalized learning paths, network security, and data privacy protection, offering solutions and recommendations for overcoming these obstacles.

Methodology

This study adopts the relational survey model, a quantitative research method used to analyze relationships between two or more variables. The survey model allows for a quantitative description of trends, attitudes, or opinions within a selected sample group, providing insights into the relationship between different variables (Mohajan, H. K., 2020). By employing this approach, the study examines the impact of Adaptive Learning Environments (ALE) on Open and Distance Learning (ODL) and explores how information technology enhances ALE.

Sample

The research was conducted with a sample of 150 undergraduate students enrolled in various ODL programs at a govermentent hold university in Henan Province. The participants were selected from different academic levels, including freshmen, sophomores, juniors, and seniors, to ensure a representative distribution of the student body. Table 1 presents the demographic information of the sample group:

Table 1. Demographic Information of the Sample Group

Grade Level	Freshman	Sophomore	Junior	Senior	Total
Female (%)	55	65	60	70	62.5
Male (%)	45	35	40	30	37.5
Total (%)	25	25	25	25	100

According to Table 1, the gender distribution among the different grade levels shows a higher percentage of female participants across all levels. The sample is evenly distributed across the four academic levels, ensuring that the findings are generalizable to the broader student population.

Instrucment

Data for the study were collected using two primary scales adapted for this research: the “Adaptive Learning Environment Proficiency Scale (ALEPS)” and the “Technology Acceptance and Usage Scale (TAUS).” These scales were administered online using a secure Google Forms platform, in line with the ethical guidelines of the university and to accommodate the ongoing pandemic situation *(Kalyuga, S. 2006)*.

Adaptive Learning Environment Proficiency Scale (ALEPS): The ALEPS, originally developed by Smith et al. (2019), was adapted to measure students' proficiency and comfort in navigating and using adaptive learning environments . The final scale consists of 20 items across three sub-dimensions: "System Usability," "Learning Support," and "Personalization." The scale’s internal consistency was confirmed with a Cronbach alpha coefficient of 0.92 *(Alwadei, A., 2019)*.

Technology Acceptance and Usage Scale (TAUS): The TAUS, based on the Technology Acceptance Model (TAM) and developed by Davis (1989), measures students' perceptions and usage of technology in learning. The scale consists of 18 items in four sub-dimensions: "Perceived Usefulness," "Perceived Ease of Use," "Attitude Toward Using Technology," and "Behavioral Intention to Use Technology." The scale has a reliability coefficient of 0.87, ensuring its suitability for the study (Gümüşoğlu, E. K., 2017).

Data Analysis

The collected data were first transferred to the SPSS statistical software for analysis. Before conducting the main analyses, the normality of the data was assessed using skewness and kurtosis values. The skewness and kurtosis for the ALEPS were found to be within the acceptable range of -1 to +1 (Skewness = 0.50, Kurtosis = -0.75), indicating a normal distribution. Similarly, the TAUS values were also within this range (Skewness = 0.43, Kurtosis = -0.67).

Given the normal distribution of the data, parametric tests were employed for further analysis. Pearson correlation analysis was used to explore the relationships between variables such as students' ALE proficiency, technology

acceptance, academic performance, and demographic factors like gender and academic level. The analysis focused on identifying significant correlations that could inform the development of more effective adaptive learning strategies in ODL environments.

The findings from these analyses will provide insights into how ALE can be optimized to enhance student learning outcomes and satisfaction in ODL settings. The study's robust methodological approach ensures that the results are reliable and contribute to the broader field of educational technology.

Results

The primary objective of this study was to explore the impact of adaptive learning environments (ALE) on the learning outcomes of students in open and distance learning (ODL) and to analyze the role of information technology in enhancing ALE functionality. Data were collected using the Adaptive Learning Environment Proficiency Scale (ALEPS) and the Technology Acceptance and Usage Scale (TAUS) and were analyzed using SPSS software. The key findings are as follows:

Analysis of Adaptive Learning Environment Proficiency (ALEPS)

An analysis of the ALEPS scores from 150 undergraduate students revealed the following:

Most students demonstrated a high proficiency level in the "System Usability" dimension, with an average score of 4.2 out of 5, indicating that students find the system features of the adaptive learning environment to be user-friendly and reliable.

The "Learning Support" dimension received an average score of 3.9, suggesting that the adaptive learning environment provides a reasonable level of support for students' learning activities.

The "Personalization" dimension had an average score of 3.7, indicating that there is still room for improvement in meeting students' individualized needs.

Table 2. Scores Across Dimensions of Adaptive Learning Environment Proficiency

Dimension	Average Score	Standard Deviation
System Usability	4.2	0.6
Learning Support	3.9	0.7
Personalization	3.7	0.8

Analysis of Technology Acceptance and Usage (TAUS)

The analysis of TAUS results showed:

Students exhibited strong agreement in the "Perceived Usefulness" dimension, with an average score of 4.0, indicating that most students believe that using technology improves their learning efficiency.

The "Perceived Ease of Use" dimension had an average score of 3.8, showing that students are relatively comfortable with operating the technology.

The "Attitude Toward Using Technology" dimension had an average score of 4.1, reflecting a positive attitude among students towards using technology in their learning.

The "Behavioral Intention to Use Technology" dimension scored 3.9, indicating a high willingness among students to continue using these technologies in the future.

Table 3. Scores Across Dimensions of Technology Acceptance and Usage Scale

Dimension	Average Score	Standard Deviation
Perceived Usefulness	4.0	0.5
Perceived Ease of Use	3.8	0.6

Attitude Toward Using Technology	4.1	0.5
Behavioral Intention to Use Technology	3.9	0.6

Correlation Analysis

Pearson correlation analysis revealed a significant positive relationship between proficiency in adaptive learning environments and the acceptance and usage of technology:

The correlation coefficient between ALEPS and TAUS scores was 0.62 ($p < 0.01$), indicating that students who are more proficient in adaptive learning environments are more likely to accept and use technology-supported learning tools.

Even after controlling for factors such as gender, grade level, and GPA, the correlation remained significant, further confirming the crucial role of technology in enhancing ALE functionality.

Table 3. Correlation Analysis Between Adaptive Learning Environment Proficiency and Technology Acceptance and Usage

Variable	Correlation with TAUS Scores	p-value
Total ALEPS Score	0.62	<0.01
System Usability	0.55	<0.01
Learning Support	0.48	<0.01
Personalization	0.50	<0.01

Discussion

The results of this study demonstrate a significant positive correlation between the system usability, learning support, and personalization aspects of adaptive learning environments (ALE) and students' acceptance and usage of technology. This implies that enhancing the technological features of adaptive learning environments can effectively improve students' learning experiences and outcomes. Future research could further explore the application of specific technological tools and how enhancing personalized learning features can better meet the needs of diverse students.

Conclusions and Recommendation

This study has investigated the impact of Adaptive Learning Environments (ALE) on Open and Distance Learning (ODL) and explored the role of information technology in enhancing ALE functionality. The findings indicate that ALEs significantly improve learning outcomes by providing personalized and effective support through advanced technological tools.

Key Findings:

Proficiency in ALE: Students demonstrated high proficiency in system usability but identified a need for enhanced personalization. The adaptive learning environment’s ability to tailor learning experiences based on individual needs can be improved to better support diverse learner profiles.

Technology Acceptance: Students showed a strong acceptance of technology in learning, with high scores in perceived usefulness, ease of use, and a positive attitude toward technology. This suggests that integrating technology into learning environments is generally well-received and beneficial for students.

Correlation between ALE and Technology Usage: A significant positive correlation was found between proficiency in ALE and the acceptance and use of technology. This relationship underscores the importance of developing effective adaptive learning systems that align with students' technological preferences and needs.

Implications and recommendation for the future study:

Enhancement of ALE: Institutions should focus on improving the personalization features of ALEs to better cater to individual learning needs. This can lead to more engaging and effective learning experiences.

Integration of Technology: Continued integration of technology into educational practices is crucial. Positive student attitudes and the perceived benefits of technology highlight the need for ongoing development and support of technological tools in education.

Future Research: Further research should investigate specific technological interventions and their impacts on various aspects of adaptive learning. Understanding how different technologies can enhance personalized learning will provide valuable insights for future educational strategies.

In conclusion, adaptive learning environments, supported by robust information technology, play a vital role in advancing open and distance learning. By focusing on personalization and leveraging technology, educators can significantly enhance the learning experiences and outcomes for students.

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MS Teams for Virtual Collaboration - An Overview

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Abstract

A lot of organizations have placed a high value on their workers sharing at work. However, there are flaws in team collaboration that should be addressed to improve teamwork. This paper investigates the potential of Microsoft Teams as a comprehensive virtual collaboration platform in the contemporary digital landscape. Through an examination of its features, benefits, implementation strategies, and real-world applications, the research explores how Microsoft Teams empowers organizations to navigate the evolving landscape of hybrid and remote work. By analysing case studies and best practices, the paper offers valuable insights into maximizing the platform's potential for fostering effective communication, collaboration, and improved productivity within diverse organizational settings. The research methods used in this study are literature review of the current studies and review of the MS teams as an information system. Presenting the features of this tool in terms of virtual collaboration is also area of study for this paper. Microsoft Teams is a chat-based collaboration platform complete with document sharing, online meetings, and many useful features for professional communications. Having a team space is key to being able to make inventive decisions and communicate with one another. Shared workspace software makes this much easier to accomplish, especially if a particular team is based in a very large company, has many remote employees, or is made up of a significant amount of team members. Teams continue to grow, so the efforts of making Teams a go-to platform for hybrid work and beyond is discussed in the conclusion of this study.

Keywords: Microsoft Teams, Application, Virtual Collaboration, Covid19.

Introduction

In today's rapidly evolving digital landscape, the need for effective virtual collaboration tools has become increasingly paramount. The shift toward remote work, globalization of businesses, and the growing significance of cross-functional and geographically dispersed teams have necessitated the development and adoption of robust platforms designed to facilitate seamless communication, collaboration, and productivity. Among these virtual collaboration tools, Microsoft Teams stands out as a comprehensive and integrated solution, offering a plethora of features designed to meet the complex demands of the modern workplace.

Microsoft Teams, commonly referred to as MS Teams, has become an indispensable part of the Microsoft Office 365 suite. It empowers organizations to create virtual workspaces where team members can communicate, collaborate on documents, host virtual meetings, and integrate with various other Microsoft services and third-party applications. The emergence of MS Teams reflects the ever-growing importance of tools that can transcend physical boundaries and connect individuals, teams, and organizations in a dynamic and efficient manner.

This paper provides an overview of the concept of MS Teams as a virtual collaboration tool, exploring its features, benefits, use cases, integration with other Microsoft services, security and compliance considerations, customization options, and challenges it presents. By the end of this comprehensive examination, readers will have a deeper understanding of how MS Teams can enhance virtual collaboration in the modern workplace.

The COVID-19 pandemic during 2020-2022 forced the physical closure of all forms of educational institutes around the world, resulting in a transition in education delivery to a “online-only” exclusivity model. In this regard, the perceived usability of the current online learning platforms is critical, particularly given the lack of any physical classes. But not only the education system has shifted into an online working model. Many institutions, organizations and services started to work online. The pandemic has speed up the development, introduction, and usage of digital tools. Now, two years of the outbreak of the COVID-19, online working mode, for some companies, is still the primary model of working.

Literature Review

Collaboration between individuals within an organization is essential for achieving the organization's vision and mission. There seem to be two key aspects of collaboration: feedback and iteration. These characteristics are organizational processes that are influenced by the involvement of any person who works for the company. Inside the company, feedback represents two-way communication and contact between people to discuss a particular subject. While iteration refers to the process of connecting one individual to another in an organization, it also refers to the continuous and detailed discussion of the process.

In an organization, technology may support the improvement of collaboration activities. Information and communication technology (ICT) technologies, without a doubt, have many roads for properly managing people with long-term conditions. However, several factors may prevent them from being used. Significant conflicts can persist before interprofessional cooperation becomes a widely accepted strategy for improvement. ICT applications may provide new and useful methods for information gathering and communication, but interprofessional cooperation will still be more dependent on social relationships and the context of the organization in which they are placed (Goodwin, 2017). Microsoft Teams is one of the teamwork methods in the information system. This tool, which is part of Microsoft Office 365, can be used to help collaborative work in a business.

Putting the focus on MS Teams, it can be thought of as an example of Unified Communications and Collaboration (UCC) because it combines the previously described functions, as well as telephone capabilities. It's also known as an Enterprise Social Network (ESN) because it allows for fast and informal communication. Despite their differences, both conceptualizations have one thing in common: the platform allows for different forms of use, which distinguishes them from technologies such as Enterprise Resource Planning systems, where usage is primarily prescribed in the specified functionality. Because of this malleability, the impact of such a forum on workers and an organization is difficult to predict (Lansmann et al., 2019).

The adoption of virtual collaboration tools has witnessed a remarkable surge in recent years, owing to the transformation of the global workforce and the need for efficient remote communication and teamwork. Microsoft Teams (MS Teams) has emerged as a noteworthy player in this domain, offering an array of features that cater to the diverse needs of organizations. This literature review presents an overview of key research findings and industry insights related to virtual collaboration tools and the specific role of MS Teams.

Virtual collaboration tools have become crucial for modern organizations. According to Smith and Johnson (2020), these tools are essential for maintaining communication and collaboration among geographically dispersed teams, especially in a remote work environment. The adoption of such tools has been accelerated by the COVID-19 pandemic, which forced organizations to adapt quickly to remote work practices (Battisti et al., 2022).

MS Teams, as part of the Microsoft ecosystem, offers a wide range of integrated features. and is designed to centralize communication and collaboration, allowing teams to conduct video conferences, share documents, and manage tasks in a single platform. This consolidation can lead to improved productivity and streamlined workflows (Nyktarakis, 2022).

Virtual collaboration tools like MS Teams have shown the potential to enhance productivity and team dynamics. A study by Buchal and Songsore (2019) found that the real-time collaboration features in MS Teams facilitate effective teamwork and knowledge sharing among team members. This is consistent with the findings of (Hubbard et al., 2021), who emphasized the role of virtual collaboration tools in fostering innovation and creativity within teams (Buchal & Songsore, 2019).

MS Teams' integration with other Microsoft services has been a focus of interest. According to Ma et al. (2021), this integration enables seamless sharing and editing of documents through OneDrive and SharePoint, enhancing document management. Such integrations contribute to a holistic virtual collaboration experience (Ma et al., 2021).

Security and compliance are critical aspects of virtual collaboration tools. Researchers like Hubbard. (2021) have examined how MS Teams provides robust security and compliance features, ensuring data protection and regulatory adherence. These aspects are especially important in industries with stringent data privacy requirements, such as healthcare and finance (Hubbard et al., 2021).

Challenges related to scalability and user adoption have also been explored. Organizations may face challenges in scaling MS Teams to meet the demands of larger teams or complex projects. User training and change management strategies are crucial for successful adoption (Buchal & Songsore, 2019).

Microsoft Teams – An Overview

Microsoft Teams (Teams) is a hub for all Microsoft apps: One Drive, Stream, etc., and allows for real-time interaction and collaboration regardless of where workers, students are located. This study reviewed the Microsoft teams' application by looking at the existing features and the ease of the collaborative work in the information system. The purposes for using Teams (classes, workshops) can be 100% online, hybrid, or face-to-face. This tool enables a wider range of, e.g. training providers and participants, interactions and allows for regular, substantive interaction in online courses.

MS Teams – The specifics

Microsoft Teams (Teams) is a shared workspace that brings many of the collaboration and communication solutions within Microsoft 365 into a focused workspace. It integrates with other solutions from Microsoft, third-party vendors, and in-house development to facilitate faster and smarter working — both within and outside of the organization. Platforms like MS Teams are supporting communication (e.g. chat rooms) and collaboration (e.g. working simultaneously on files) with internal as well as external colleagues and partners (Leonardi et al., 2013).

In the digital transformation of Microsoft's office into a new workplace, collaboration is crucial. Working technologies and well-channelled communication approaches can be brought together by team workplaces. However, there are difficulties in team coordination as teams prepare to work together. Microsoft Teams will take many approaches to ensure that it can address the problems of collaboration. Microsoft Teams is an MS Office365 application used primarily for collaboration within units and projects. The application is very useful for day-to-day collaboration and sharing of relevant information. In that sense, it is a complement to more direct or bilateral communication tools such as Email and Skype as well as to file repositories such as Direct Management System (DMS) and OneDrive.

Microsoft computers can be used in desktop, web, and mobile versions. For the desktop version, it can be accessed through Microsoft Windows and Mac OS X. For the web version, it can be opened through a browser such as Microsoft Edge, Mozilla Firefox, Google Chrome, and other browsers. As for the mobile version, it is in Windows Mobile, iOS and Android. This application is free of charge; you can download it directly through the mobile version from the app store. However, you must have an Office 365 account to use all Microsoft Office 365 applications, including Microsoft Teams. Microsoft teams can be integrated with document applications such as Microsoft Word, Microsoft Excel, Microsoft PowerPoint, and applications that are still integrated with Microsoft Office 365 such as OneNote, SharePoint, Power BI, and Planner, as shown in Figure 1. Another interesting thing of Microsoft Teams is connected to Microsoft Outlook, so it can be integrated with email or calendar. Microsoft Teams also has an excellent safety factor.

Microsoft Teams has improved meeting experience through Office 365 cloud-based services, conferencing devices, modernizing the workplace. Office 365 gives employees the capability to review previous conversations that are relevant to the current working tasks. According to Microsoft, MS Teams is divided into rooms with their only substructure being a channel. A room offers access to a group of people working together. The actual collaboration happens in the individual channels.

Functions of MS Teams

Microsoft Teams offers a range of functions that enhance collaborative work within teams. The platform includes conversation tabs for posting information and messages, a call feature supporting both direct and conference calls, dedicated data storage for each channel, and a calendar overview that seamlessly integrates with Outlook. Additionally, each channel benefits from a Wiki function, facilitating organized collaboration. Beyond these standard features, MS Teams stands out for its effortless integration with other Microsoft Office applications, including Planner, OneNote, and Excel. This integration not only expands the functionality of MS Teams but also makes co-creative working more efficient and streamlined.

Virtual Collaboration in MS-Teams

The number of companies looking for software solutions to help with employee collaboration has gradually grown in recent years. Now, with the ongoing COVID-19 pandemic forcing many workers to operate from home, collaboration networks have become a must to keep businesses running.

According to Kock (Kock, 2008) virtual environments produce an exclusive space that allows for the interaction between individuals who are physically separated by time and space. Virtual environments according to Kock also offer a "real-time" digital environment for business to transpire between groups and individuals that are also separated by time and space. Businesses then as stated previously are increasingly incorporating the use of virtual

environments to facilitate virtual teams to accomplish business goals, complete projects, and create efficiencies related to time and costs. A virtual team is usually described as a collection of people who are in different areas, who often have different complementary skills and expertise, and who normally work together using different communication technologies. Virtual teams' area often used for specific projects in companies, guided by a mission, vision and a common purpose. Research backs this up. According to Zivick (Zivick, 2012)virtual teams have been transforming the way international ventures work because they are able to take advantage of all the firm's human resources regardless of their physical location. Since virtual teams depend on information and communication technologies to function, understanding which technologies represent barriers or facilitators is also important.

Choosing the right technology will make the difference between a virtual team's success and failure. Effective communication is difficult with technology like email or threaded discussion boards, according to studies on virtual teams, since there is little or no meaning or complexities in the communication.

Choices for Remote Team Collaboration and MS Teams

On the market today, there are a variety of technology choices for allowing remote team collaboration and, as a result, information sharing. It has been shown that deciding how to best communicate with one another and how to best balance the types of technology-mediated communication within teams can be challenging Language barriers, unbalanced operation, members using private communication means, and members being part of too many parallel communication networks were described as challenges in a case study of a multi-national organization using similar technology (Slack) for exchanging information in an enterprise environment (Stray et al., 2019).

Although MS Teams is similar to Slack in that it allows for group and personal communication through channels, it has additional features such as more comprehensive conference calling (audio, video, and web), the ability to move from instant messaging to calling, and collaboration via the sharing of MS Office files (including real-time editing) (Microsoft Teams, 2024).

As the global response to COVID-19 evolves, communities around the world have moved from an era of "remote everything" into a more hybrid model of work, learning, and life. Microsoft Teams new features make the virtual interactions more natural, more engaging, and ultimately, more human. These features offer three key benefits for people at work and in education. First, they help to feel more connected with the team and reduce meeting fatigue. Second, they make meetings more inclusive and engaging. And third, they help streamline the work and save time.

Together mode in MS Teams

Together mode is a new meeting experience in Teams that uses AI segmentation technology to digitally place participants in a shared background, making it feel like you're sitting in the same room with everyone else in the meeting or class. Together mode makes meetings more engaging by helping you focus on other people's faces and body language and making it easier to pick up on the non-verbal cues that are so important to human interaction. It's great for meetings in which multiple people will speak, such as brainstorms or roundtable discussions, because it makes it easier for participants to understand who is talking. Dynamic view gives more control over how you see shared content and other participants in a meeting. It includes large gallery view, where you can see video of up to 49 people in a meeting simultaneously, and virtual breakout rooms, which allow meeting organizers to split meeting participants into smaller groups for things like brainstorming sessions or workgroup discussions. With Video filters it can be used filters to customize the look before entering a meeting by subtly adjusting lighting levels and softening the camera's focus. Live reactions In online meetings, nonverbal signals such as smiles and head nods can be difficult to detect, making it difficult for presenters to gauge audience responses and for participants in large meetings to express their feelings without disrupting the meeting flow. Interactive meetings for 1,000 participants and overflow—There are times when it's important to bring large groups together for meetings or classes. For more interactive meetings—where attendees can chat, unmute to talk, and turn on their videos for real-time collaboration—Teams meetings are growing to support up to 1,000 participants. More and more features for more friendly usage of the application are announced (Microsoft, 2020).

Key features and aspects of Microsoft Teams:

Microsoft Teams stands out as a comprehensive collaboration platform that goes beyond being a mere communication tool, transforming the way teams work together. In this subsection, we delve into the key features and aspects that make Microsoft Teams an indispensable asset for modern businesses. As an integrated platform, it seamlessly combines various communication channels, real-time collaboration tools, organizational structures, third-party integrations, meeting capabilities, and robust mobile applications. Microsoft Teams not only simplifies communication but also elevates productivity by providing a unified space where teams can collaborate efficiently,

regardless of their physical locations. Let's explore the multifaceted capabilities that contribute to the success of Microsoft Teams in fostering a collaborative and dynamic work environment. Microsoft Teams is not just a tool; it's a platform that fosters collaboration, enhances productivity, and promotes teamwork. The following are the key features and aspects of Microsoft Teams after careful examination of Microsoft website (Microsoft Support, 2024; Microsoft Teams, 2024; Tufts, 2024)

Unified Communication

Microsoft Teams brings together chat, video conferencing, file sharing, and collaboration tools in one place. It allows teams to communicate effectively, whether they are working remotely or in the same physical location.

Table 1: Features under unified communication aspect of MS Teams

Feature	Explanation
Chat	Teams provides a chat interface where team members can send instant messages, emojis, and GIFs. Conversations can be one-on-one or within channels.
Video Conferencing	Teams supports high-quality video calls and meetings. You can schedule meetings, share screens, and collaborate in real time.
Voice Calls	Teams allows voice calls directly from the app, making it easy to connect with colleagues.
Presence Status	You can see if someone is available, busy, or away, which helps streamline communication.

Real-Time Collaboration

Teams enables real-time co-authoring and editing of content. Multiple team members can work on the same document simultaneously, making it ideal for collaborative projects.

Table 2: Features under real-time collaboration aspect of MS Teams

Feature	Explanation
Co-Authoring	Teams integrates with Office apps (like Word, Excel, and PowerPoint). Multiple users can edit the same document simultaneously, ensuring efficient collaboration.
File Sharing	Share files within channels or chats. Teams also integrates with SharePoint for document storage.
Whiteboard	Collaborate on a digital whiteboard during meetings, brainstorming sessions, or project planning.

Channels and Groups

Teams can be organized into channels, each dedicated to a specific topic or project. Within channels, team members can share files, hold discussions, and collaborate on tasks

Table 3: Features under channels and groups aspect of MS Teams

Feature	Explanation
Channels	Organize conversations and content by creating channels. Each channel can focus on a specific project, topic, or department.
Private Channels	Create restricted channels for confidential discussions.
Groups	Teams can be part of multiple groups, allowing cross-functional collaboration.

Integration with Other Services

Teams seamlessly integrates with other tools and services, such as Box, Zoom, and YouTube. This integration enhances collaboration by allowing users to access external content directly within Teams.

Table 4: Features under integration with other services aspect of MS Teams

Feature	Explanation
Apps and Connectors	Teams integrates with third-party apps and services. For example, you can connect Trello, Asana, or GitHub to your team.
Tabs	Add tabs to channels for quick access to external tools, websites, or custom apps.
Bots	Use bots for automated tasks, reminders, or information retrieval.

Meeting Scheduling and Attendance

Teams provides a convenient way to schedule and attend online meetings. Whether it's a team huddle or a client presentation, Teams ensures smooth communication and collaboration.

Table 5: Features under meeting scheduling and attendance aspect of MS Teams

Feature	Explanation
Meetings	Schedule, join, and manage meetings seamlessly. Teams provides a virtual meeting room with video, audio, and screen-sharing capabilities.
Meeting Notes	Teams generates meeting notes automatically, capturing discussions and action items.
Attendance Tracking	Keep track of who attended meetings and view attendance reports.

Mobile Apps

With the Office and Microsoft Teams mobile apps, users can securely work from anywhere. Whether on a smartphone or tablet, Teams keeps everyone connected and productive.

Table 6: Features under mobile apps aspect of MS Teams

Feature	Explanation
Mobile Experience	Teams offers robust mobile apps for iOS and Android. Stay connected on the go.
Notifications	Receive notifications for messages, mentions, and upcoming meetings.
Secure Access	Authenticate securely using biometrics or passcodes.

Microsoft Teams emerges as a versatile and dynamic platform that empowers teams to communicate, collaborate, and achieve their goals effectively. With its unified communication features, real-time collaboration tools, organized channels, seamless integration with external services, and user-friendly mobile apps, Microsoft Teams stands as a cornerstone for fostering a culture of teamwork and innovation within organizations. As businesses continue to embrace remote and hybrid work models, the comprehensive capabilities of Microsoft Teams position it as an essential tool for navigating the evolving landscape of modern work. Whether in the office or working from diverse locations, Microsoft Teams ensures that teams stay connected, productive, and aligned towards success.

Case Studies and Best Practices for Implementing Microsoft Teams for Virtual Collaboration

Case studies for implementation for collaboration

To gain a deeper understanding of the practical application of Microsoft Teams (MS Teams) as a virtual collaboration tool, it is valuable to examine specific case studies of organizations that have successfully integrated and leveraged this platform to improve their collaborative efforts. These case studies highlight the versatility and adaptability of MS Teams across various industries and organizational sizes.

In a thesis done by Otto Vauhkonen, he analyses the implementation of MS teams in companies in Finland and he finds that in the quest for a more agile and effective digital workplace, the implementation of tools like Microsoft Teams requires careful change management. While these tools may seem like straightforward IT additions, the thesis highlights their multifunctional role as a communications tool, intranet, data repository, and desktop hub. The findings provide valuable insights for Finnish companies navigating the implementation of software like

Microsoft Teams, offering a template to avoid common mistakes. The goal is to facilitate a smoother acceptance of new technology for end-users while focusing on the perspective of Finnish organizations regarding Microsoft Teams. (Vauhkonen, 2020).

A study conducted by Frick et al. explores how accelerated digital transformation during the pandemic drives virtual collaboration in hospitals. Insights from a German hospital case study, implementing an IT system for collaboration, highlight three key lessons: aligning stakeholder mindsets for disruptive changes, adhering to behavioural rules for IT-enabled collaboration, and necessitating an appropriate technological infrastructure for process transformation. The hospital swiftly adopted Microsoft Teams for remote collaboration among physicians, enabling communication during restricted personal contact. Microsoft Teams, with its chat, video calls, and file-sharing capabilities, was provided for free in response to the crisis. Organizational changes included splitting departments into rotating teams, minimizing elective procedures, and reducing face-to-face interactions among clinicians. digital transformation progresses, challenges in the digital dissemination of medical information must be addressed to ensure effective collaboration during crises. Embracing disruptive strategies in the diagnostic and therapeutic process is crucial for better preparedness for future challenges. (Frick et al., 2021)

A case study by Bisbe and Sivabalan employs the trust-control nexus theory to explore the relationship between formal Management Control Systems (MCS) and inter-personal trust in Virtual Teams (VTs), and its impact on outcomes. Focusing on a virtual new product development team, we reveal the reciprocal influence between trust and formal MCS in a virtual setting. Beyond supporting inter-personal trust, formal MCS relies on trust for the effectiveness of incomplete structures, expanding control alternatives for VTs. The study extends theory by showing synergies between inter-personal trust and formal MCS, enhancing both decision-facilitating and decision-influencing roles. This contributes valuable insights to accounting literature on managing tasks in dispersed contexts with a foundation of inter-personal trust (Bisbe & Sivabalan, 2017).

In a study conducted by Forrester Consulting for Microsoft, over 260 organizations implemented Teams with the goals of enhancing productivity, improving collaboration, and enabling innovation. The findings revealed significant benefits, including cost savings of $27.1 million over three years for a standard 5,000-user organization. Teams demonstrated efficiency by reducing meeting frequency and duration, allowing employees to focus on meaningful interactions. It fostered enhanced collaboration with a co-working environment that facilitates quick communication and project understanding. Moreover, Teams accelerated decision-making through real-time communication and collaboration tools. In essence, Microsoft Teams not only met but exceeded expectations, providing tangible benefits for organizations navigating the challenges of modern (Wright, 2019)

Best Practices for optimization of virtual collaboration

Implementing Microsoft Teams (MS Teams) as a virtual collaboration tool within an organization is not just a matter of adopting the technology; it's about leveraging its full potential through effective management and adherence to best practices. To ensure that MS Teams becomes a valuable asset for enhanced productivity, seamless communication, and effective teamwork, organizations can consider the following best practices:

Firstly, clear governance and guidelines are essential for maintaining order and coherence within MS Teams. Establishing governance policies outlining the responsible use of the platform, helps organizations maintain control over team creations, naming conventions, and access permissions (Buchal & Songsore, 2019). These guidelines create a standardized environment where users understand their responsibilities, leading to a more organized and structured collaborative space. Effective onboarding and training, as emphasized by Buchal, ensure that users are well-versed in the platform's features and functions. Such training is not limited to new employees but should be periodically conducted for existing users to keep them updated and knowledgeable about the platform's evolving capabilities.

Secondly, the customization of workspaces is crucial. MS Teams allows organizations to create dedicated workspaces (Teams) for various departments, projects, or teams. Tailoring these spaces with relevant channels, apps, and documents keeps content organized and accessible. As Ma et al. (Ma et al., 2021) noted, creating designated Teams enables better organization, reduces clutter, and ensures that team members can easily find and access the information they need. The structure of MS Teams should reflect the organization's real-world structure, facilitating seamless communication and collaboration.

Lastly, prioritizing data security and compliance, as outlined by (Kathleen et al., 2021), is paramount. It's essential to stay informed about the security features provided by MS Teams and to educate users on how to handle sensitive data securely. Compliance with industry regulations is non-negotiable, particularly in sectors with strict data privacy requirements such as healthcare and finance. These security and compliance practices build trust and safeguard sensitive information, ensuring that MS Teams is a reliable platform for virtual collaboration within the organization.

Incorporating these best practices enables organizations to harness the full potential of MS Teams, making it a centrepiece of their virtual collaboration strategy. These practices create a cohesive, organized, and secure environment that fosters efficient communication, teamwork, and ultimately, improved productivity.

Conclusion

Since the outbreak of COVID-19, the entire world has shifted its focus to remote work. Digital communication is the new standard, and interactive collaboration seems to be the way of the future in the workplace. This change has prompted Microsoft Teams to adapt. To meet this modern age of remote work, schooling, and connectivity, the platform has grown with the times. Based on a review of the Microsoft Teams, it can be concluded that: 1) the chat function on Microsoft Teams can be a good communication tool for all members of a team if they want to talk privately or group. 2) The channel teams function facilitates the communication of each person about their certain topic (in Microsoft Teams term is a channel) so that the topic is more focused, and people also can discuss more themes in a group. Besides, each team can upload files related to the theme and the file loaded is a file that matches the topic or channel. 3) The meeting on the cloud function allows everyone to have a virtual meeting in the cloud, so there is no boundary for collaboration in the organization. 4) Microsoft teams can be a tool that supports information system collaboration so if we can meet people, but we still can collaborate and share ideas through the application. Microsoft Teams has taken the emerging world of remote working seriously in order to create an application that is both engaging and inclusive. The new features of this software enable a reimagined virtual meeting, remote communication, and collaboration experience.

Microsoft has ambitious plans for the future of Microsoft Teams, with a focus on making it the go-to platform for hybrid work and beyond. Some of the key areas of focus include: *Enhanced collaboration and communication experiences*, by investing heavily in new features and capabilities that will make it easier for teams to collaborate and communicate effectively, regardless of where they are located (ex. live transcription and translation and real-time collaboration [1].); *More personalized and intelligent experiences*, by using AI to make MS Teams more personalized and intelligent for each user (ex. meeting insights and Viva Insights); *Expanded integrations and extensibility*, by expanding the ways that Teams can be integrated with other applications and services. These are just a few of the many ways that Microsoft is investing in the future of Teams. As the platform continues to evolve, Microsoft is committed to making it the best possible platform for hybrid work and beyond.

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Reflections on the Integration of Mobile Learning and Fine Arts Education in Open and Distance Learning

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Abstract

With the rapid development of information technology, distance open education, especially mobile learning, has gradually become an important part of modern education. In fine arts education, mobile learning breaks the constraints of time and space and provides a flexible and personalized learning experience. This paper discusses the possibilities and advantages of integrating mobile learning into art education and analyzes its impact on educational content, teaching modes, teaching resources, and evaluation methods. Through rich multimedia resources and intelligent technology, mobile learning helps to enhance students' aesthetic quality and creativity and promotes innovation in fine arts education. However, technical challenges, curriculum design, and assessment methods still require further optimization. This paper explores the characteristics of mobile learning and its application in art education, the integration of innovative teaching models, and countermeasures to cope with challenges. Specific strategies are proposed to provide a reference for the future development of art education.

Keywords: *Distance open education, mobile learning, art education, teaching model innovation, intelligent technology*

Introduction

With the rapid development of science and technology and the advent of the information age, educational methods and tools are constantly evolving. Among them, distance and open education has become an essential component of the modern education system due to its unique advantages, such as overcoming time and space limitations and offering personalized learning paths. As a key form of distance and open education, mobile learning has gained traction with the rise of mobile devices and the maturation of internet technology.

Mobile learning has broadened the boundaries of learning with its convenience, real-time access, and interactivity. Students are no longer confined to traditional classrooms or libraries but can use mobile devices like phones and tablets to study anytime, anywhere. This approach not only improves learning efficiency but also makes education more flexible and engaging.

Simultaneously, fine arts education plays a critical role in cultivating students' aesthetic sense, creativity, and artistic appreciation, contributing significantly to holistic development. However, traditional art education is often constrained by time and space, making it challenging to meet students' diverse learning needs. Thus, leveraging modern technology to overcome the limitations of traditional art education has become a pressing concern in the current educational landscape.

The integration of mobile learning and art education offers new perspectives and solutions. Through mobile learning, students can access artwork, learn painting techniques, and participate in art discussions anywhere, deepening their understanding of art's meaning and value. Additionally, mobile learning's rich multimedia resources can make art education more vivid and intuitive, sparking students' interest and creativity.

However, merging mobile learning with art education presents its challenges. We must study how to combine the two and explore teaching models and strategies that suit mobile learning. At the same time, attention should be given to the technical challenges and issues, such as maintaining teaching quality, which mobile learning may face in art education. Solutions to these problems are also required.

This paper aims to thoroughly examine the integration of mobile learning and fine arts education within distance open education. By starting with mobile learning's characteristics and its application in art education, we will analyze its influence and contribution to the field. Additionally, we will explore the innovative development of art education through mobile learning platforms, offering insights into how to foster art education's reform and innovation. We hope that this research provides new ideas and directions for art education's innovation and development, contributing to the cultivation of talents with innovative and artistic abilities.

Methodology

In the research process of this paper, we mainly use the literature review method and the case analysis method to ensure the depth and comprehensiveness of the research. First of all, through extensive literature review and collation, we systematically sorted out the research status, including its historical development, current hot spots, existing problems and future trends, which laid a solid theoretical foundation and reference frame for our research. Then, we select representative cases for in-depth analysis. Through careful analysis of these cases, we reveal the internal logic, influencing factors and potential development trend of, and provide empirical basis for putting forward targeted strategy suggestions. The organic combination of these two methods enables us to understand more comprehensively and deeply,and contribute new perspectives and thinking to the research and practice of related fields.

Specific application cases of mobile learning in art education

Mobile learning, as the name suggests, refers to digital learning through mobile devices. This type of learning makes full use of the convenience of modern mobile technology, so that learning is no longer limited to a fixed time and place, providing learners with a more flexible and personalized learning experience(Naveed et al., 2023). In art education, mobile learning also shows its unique advantages and value.

In the field of art education, the application of mobile learning is also becoming more and more extensive. On the one hand, mobile learning provides rich teaching resources and tools for art education. Teachers can utilize the mobile learning platform to upload teaching videos, courseware, art works and other resources for students to learn anytime and anywhere. At the same time, students can also utilize mobile devices for online painting, design and other operations, combining theory and practice to improve the learning effect(Wu & Xu, 2022a).

On the other hand, mobile learning also brings an innovative teaching mode to art education. Teachers can utilize the mobile learning platform to design a variety of interactive teaching activities, such as online discussions, artwork display, creation competitions, etc., to stimulate students' enthusiasm for participation and innovation(Talipov & Talipov, 2021). In addition, mobile learning can also realize cross-time and space teaching cooperation, and teachers and students from different regions can communicate and cooperate through the mobile learning platform to jointly promote the development of art education.

First, the concept of smart classroom provides a new teaching mode for art education. Through the combination of mobile learning platform and learning circle, an online teaching environment can be constructed, while the combination of classroom teaching and smart space can provide learning experience offline. This combination of online and offline teaching mode can not only break the limitations of time and space, but also provide a more personalized and flexible learning mode(Talipov & Talipov, 2021).

Secondly, the application of digital technology provides possibilities for innovation in art education(Taijun & Jing, 2020). For example, the use of digital screens, digital boards and other professional digital art equipment can carry out interactive digital art learning activities. In addition, the research on the teaching mode of art and design majors in distance open education shows that the research on the teaching mode of art and design education in the field of modern distance open education is of great significance.

Innovation and Development of Fine Arts Education in Mobile Learning

Technological development of mobile learning platform

The application and development history of mobile learning technology in fine arts education reflects the transformation from traditional teaching mode to digital and intelligent teaching mode. Initially, the concept of m-learning was based on conveniently portable devices for learning on fixed occasions, and with the development of mobile technology, the concept gradually evolved into a way of learning in which learners can access content and digital tools anytime and anywhere. In the past two decades, mobile learning has become a core research topic in the field of educational technology, and has gone through three phases: the construction of the basic environment, the construction of knowledge systematization, and the construction of learning services.

In the field of fine arts education, the application of mobile learning technology is mainly reflected in the following aspects:

Construction of resources and platforms: Art and design majors in higher vocational colleges and universities have constructed mobile learning resources and platforms suitable for quality education-oriented courses based on students' learning characteristics, learning habits and psychological characteristics by making use of wireless interconnection, cloud computing and cloud storage technologies(Jurayev, 2023; Wu & Xu, 2022b).

Innovation of teaching methods: Through mobile terminals, the introduction strategy of elementary school art classroom becomes more flexible and diverse, and the learning mode with technical support is more effective. The use of intelligent terminals has changed the traditional teaching method of art appreciation and provided rich art learning resources(Lo & Lai, 2021; Yuan, 2021).

Technology integration and interdisciplinary development: art education in the AI era through machine learning and other technologies to reduce the dependence on people, the application of mobile devices in the teaching scene to improve the quality of art education. VR/AR/MR technology to provide students with immersive learning experience, is a leap in the development of education technology(Xu, 2024).

Application of digital and intelligent teaching aids: Children's art education institutions have started to adopt digital technologies such as online teaching platforms and intelligent teaching aids to provide students with a more convenient and efficient way of learning(Josué et al., 2023).

Development of online art education: the development of online art education courses has become a big trend, not only training excellent art educators, but also providing a convenient learning platform for students who like art but don't have time to go to offline training.

Application of Artificial Intelligence and AI Painting: Art education in the digital age requires students to have the ability to create digitally, and AI painting, as a pioneer, broadens the range of students' skills and increases their chances of employment in the digital creative field.

The application and development history of mobile learning technology in art education demonstrates the transformation from traditional to modern, which not only improves the efficiency and quality of teaching, but also provides students with a more personalized and diversified learning experience.

Mobile innovation of art education teaching mode

Mobile learning provides a possibility for the innovation of art education teaching modes. Traditional art teaching often focuses on the teacher's explanations and demonstrations, while students remain in a passive state of acceptance. Mobile learning platforms can introduce new teaching concepts and tools to promote innovative, mobile-based art education teaching methods.

Digitization and personalization of teaching resources: With the development of mobile Internet, the educational mode has gradually shifted from traditional face-to-face teaching to online learning, primarily through mobile devices. This transformation not only enriches and diversifies teaching resources but also provides personalized learning content according to students' learning habits and needs. Students can learn independently based on their individual needs and interests, accessing resources and practicing through the platform. They can also form learning groups with other students to complete tasks and share experiences. This diversified learning mode helps cultivate students' independent learning abilities and teamwork skills, promoting their overall development.

Integration and application of intelligent technology: Mobile learning platforms can integrate advanced technologies such as virtual reality (VR), augmented reality (AR), and big data to enable intelligent management and services throughout the teaching process. These technologies create a more realistic and immersive learning experience for students. For example, students can visit virtual art museums or attend virtual exhibitions via VR, while AR can bring art pieces or scenes into the real world for interaction and creation. This teaching method not only stimulates students' interest and creativity but also enhances their art appreciation and practical skills. Additionally, intelligent diagnostic systems can analyze students' learning in real time, providing teachers with targeted suggestions and helping students adjust their learning strategies accordingly.

Changes in educational evaluation: The application of digital technology has transformed the way education is evaluated. The traditional evaluation system, which relied heavily on test scores, is evolving into a more comprehensive and diversified system, emphasizing the assessment of students' overall competencies.

Balanced distribution of educational resources: Mobile Internet and cloud classrooms help reduce the disparity in educational resources between urban and rural areas or different regions. Through online platforms, high-quality educational resources can be distributed more widely to remote areas, promoting more equitable access to education. The application of cloud classrooms also fosters innovation in teaching methods, such as the adoption of new models like flipped classrooms and blended learning.

Immersive learning environments: The use of cloud classrooms and mobile Internet platforms creates more immersive learning environments for students. Through technologies like VR and AR, learners can study in simulated real-world settings, enhancing both engagement and learning outcomes.

Case Study

The integration of mobile learning and art education has become an innovative trend in today's education field. In art education, the application of open distance learning platforms and mobile learning tools and technologies has become a trend. The introduction of these technologies and tools not only changes the traditional teaching mode, but also improves students' learning interest and teaching effect(Ruan, 2022; Staneva et al., 2022).

The application of VR (Virtual Reality) and AR (Augmented Reality) technologies in art education has received widespread attention(Shankar et al., 2023). For example, the exploratory teaching steps using VR technology and AR technology in art appreciation classes can greatly enrich students' perceptual experience(Du, 2021; P. Liu, 2021a). In addition, AR technology has become more widely used in classroom teaching due to its relatively low threshold and easy promotion. The application of these technologies not only improves students' art appreciation and creation level, but also brings new teaching methods to art education.

Intelligent terminals are also widely used in art education. With the popularization of wireless networks and intelligent mobile terminals, the teaching method based on mobile terminals has become one of the mainstream learning methods. The application of intelligent terminals enables teachers and students to carry out the whole process of communication and information service support before, during and after class. In addition, art education APP, as an important auxiliary tool, facilitates art teaching(Zhao, 2024).

The development of online art education platforms also provides new possibilities for art education. These platforms usually include both live lectures and recorded lectures, which can satisfy students with different learning needs. Institutions such as the National Open University have built a “bridge” between digital and art through programs such as the Online Oil Painting Commune, aiming to create a brand of lifelong learning and aesthetic education for all(Yi, 2021).

In conclusion, the application of mobile learning tools and technologies such as VR/AR technology and smart terminals in art education, as well as the development of open distance learning platforms, have greatly enriched the content and form of art education, and improved the teaching effect and students' interest in learning(P. Liu, 2021b). The application of these technologies and platforms heralds the development of art education in the direction of greater interactivity, personalization and flexibility.

Discussion and Recommendations

The integration of m-learning with art education brings many advantages as well as challenges and constraints.

Advantages

Rich teaching resources and flexible teaching means: as an effective teaching aid, new media provides rich teaching resources and flexible teaching means, enabling students to receive education through mobile smart terminals such as cell phones, and enhancing students' interest in learning art knowledge(R. Liu, 2023b).

Breaking geographical restrictions and providing equal educational resources: online art education can break through the restrictions of time and space, greatly improving the learning efficiency and overcoming the problem of unequal distribution of educational resources due to geographical and other reasons.

Promoting personalized learning: Enhancing personalized learning in the art classroom through microclasses, mobile terminals and other technical means has changed the traditional appreciation teaching mode and optimized classroom teaching and learning(Qian, 2022).

Supporting visual learning: mobile learning apps are extremely friendly to new and modern teaching methods, and are especially friendly to visual learning as they can easily support audio, video and images.

Challenges and constraints

Lack of real teacher-student interaction and engagement initiative: students may lack real interaction with the teacher and engagement initiative when using mobile devices for learning(Nikolopoulou et al., 2022; Noguera-Fructuoso & Valdivia-Vizarreta, 2023).

Increased management difficulty: Challenges faced by online art education as it grows include internal scale management and management of the online scale of full-time teachers, especially when the team size increases, the management difficulty increases significantly(Altakhaineh et al., 2023; Khaled et al., 2022).

High technical and equipment requirements: While mobile learning offers convenience, it also places high demands on technology and equipment, and not all students have equal access to these resources(Aivaz & Teodorescu, 2023; Nuphanudin et al., 2023).

Optimization Strategies and Suggestions

Optimize content and teaching strategies: should start from optimizing the content of art online teaching, firstly, students are required to understand the basic concepts and skills of art, and cultivate students' art thoughts and creativity.

Strengthen online-offline hybrid education: vigorously implement online-offline hybrid education, strengthen teacher-student interaction, and update the teaching content in order to improve the teaching effect.

Innovate teaching concepts and technology application: Colleges and universities and primary and secondary art education should realize the importance of innovation, break the stereotypes of educational thinking, innovate art teaching concepts, and integrate digital media technology into teaching.

Enhance children's interest in learning art: The interactive design of extracurricular art education platforms that follow children's development can provide some references for the interactive design of future art education platforms and enhance children's interest in learning art.

The integration of m-learning and art education has obvious advantages, but also faces a series of challenges and constraints. By optimizing the teaching content, strategies and technology application, and strengthening the online-offline hybrid education, we can effectively improve the teaching effect and stimulate students' interest in learning.

Conclusion and Prospect

With the rapid development of information technology, mobile learning plays an increasingly important role in art education. However, the integration of mobile learning and art education also faces many challenges.

First of all, the integration of mobile learning and art education has far-reaching significance. It breaks the time and space limitations of traditional art education and enables learners to learn anytime and anywhere, which greatly improves the flexibility and autonomy of learning. At the same time, m-learning provides rich and diversified learning resources and interactive methods, which help to stimulate learners' interest and creativity and promote the innovation and development of art education. In addition, m-learning also brings a more personalized learning experience to art education, which meets the needs of different learners and improves the learning effect.

Looking into the future, the development trend of mobile learning and art education will be more significant. With the continuous updating and improvement of mobile technology, the mobile learning platform will be more intelligent and personalized, providing learners with more accurate learning recommendations and resource services. At the same time, art education will also pay more attention to practicality and innovation, and realize online and offline integrated teaching through the mobile learning platform, providing learners with a more comprehensive and in-depth learning experience.

For the future development, we put forward the following suggestions and expectations: first, the research and development and application of mobile learning technology should be further strengthened to enhance the stability and efficiency of the platform and provide better learning support for art education. Secondly, attention should be paid to learners' learning needs and feedback, and the learning content and form should be continuously optimized to enhance the learning experience and learning effect. At the same time, it should also strengthen the cross-fertilization with other disciplines, expand the boundaries and connotation of art education, and cultivate innovative talents with interdisciplinary literacy.

In conclusion, the integration of mobile learning and art education is a major innovative trend in the field of education, with broad prospects and potential. We should actively embrace this change, constantly explore and practice, promote the deep integration of mobile learning and art education, and contribute to the cultivation of more talents with innovative spirit and artistic literacy. At the same time, we also expect that mobile learning technology will continue to break through and innovate in the future, bringing more possibilities and opportunities for art education.

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