# ICETOL

*2023 Cunda*

## 3rd INTERNATIONAL CONFERENCE ON EDUCATIONAL TECHNOLOGY AND ONLINE LEARNING

[ **FULL PAPER PROCEEDINGS** ]

## 3. ULUSLARARASI EĞİTİM TEKNOLOJİLERİ VE ÇEVRİMİÇİ ÖĞRENME KONFERANSI

[ **TAM METİN BİLDİRİ KİTABI** ]

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# Project as a tool to support more adaptive educational ecosystems

## Danuta Kaźmierczak [1]

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## Abstract

Development of new technologies and AI blurs the line between cyberworld and the real one. We change our status offline/online very easily, gradually learn how to interact with cobots, create new knowledge with the information in the global communication networks. Global network structure is also a characteristic of an educational environment or more precisely educational ecosystem. This relatively newly coined term indicates the dynamic nature of the system, complex interactions between live and inanimate elements in the given geographical or cyber sphere with all its political, economic, cultural and social influences. Both concepts project management and project-based learning can be successfully adopted to support interactions within the ecosystem and its outside environment - consequently making the ecosystems more flexible, integrated and adaptive. The paper discusses the adaptive value of project management and presents the original solution of integrated project management to support adaptive educational organizations. The findings of empirical study (expert interview) provide the insight into the problems of project management and basis for developing the new solutions.

**Keywords**: integrated project management system, educational ecosystem, adaptivity of education.

## Introduction

Digital transformation dramatically changes the environment of learning, working, generally living. We are experiencing gradual merge of the virtual and real worlds, which Ray Kurzweil (2006) calls *Singularity* – the time "when we will multiply our effective intelligence a billion-fold by merging with the intelligence we have created […] By 2029, computers will have human-level intelligence" and we will become a cybernetic society (https://futurism.com/kurzweil-claims-that-the-singularity-will-happen-by-2045). This process affects also educational ecosystems which is becoming a dynamically evolving and interconnected network of educational spaces, with individual and institutional providers, that offer a variety of learning experiences to individual and collective learners across the learning lifecycle (Luksha et al., 2018, https://edtech.worlded.org/what-is-a-learning-ecosystem/ ).

The environment and consequently educational ecosystems will be even more volatile, unpredictable, complex, ambiguous (VUCA) (Bennett and Lemoine 2014). The environment is volatile because the challenges are unstable, unpredictable and of uncertain duration: natural or human driven disaster changes the situation and market unexpectedly. It is also uncertain because of the lack of knowledge, although the basic cause and effect pattern still works. The competitors' innovations (products or services) stir the market. The world is complex as it has many interconnected parts and variables: teaching or doing research in various countries with different regulations and culture. The information itself is available yet its amount and nature can be difficult to process. It is also ambiguous because the relationships are unclear, no patterns or precedence applicable. The educators move into new and unknown (outside) markets. The predominant feature of the world is change (Axon, Friedman, Molly, 2020). The change is about how products and services are designed, manufactured, sold, delivered, and serviced, and how the business and private relationships are built (also the relationships the socially responsible and entrepreneurial university builds with the local communities). 75 million current jobs will be displaced as AI takes over routine tasks. New jobs demanding new skills will be created at the same time. A business will suffer a shortage of 85.2 million skilled workers. Organizations will be forced to use more contractors and contingent and part-time arrangements. The United States, Europe, and India already had roughly 77 million formally identified freelancers in their labor pools in 2018.

This situation forces universities/schools to rethink and reengineer their organizational structures and management practices as well as teaching, learning and research and development practices and culture to provide the dedicated educational offer including continual upskilling the workforces which should be committed to values, have a global mindset and the set of skills and competencies enabling them to transform new challenges into opportunities (Axon, Friedman, and Molloy, 2020). This trend requires that textbooks cover theoretical concepts within a flexible framework that enables teachers/instructors to use interactive tools such as case studies, exercises, and projects

(project-based teaching/ design-thinking) using a digital collaborative workspace (Griffin, 2016, Kowalkowski, 2017).

## Methodology

The aim of the paper is present the organizational solution which could support and improve project management – the integrated project management structure. The discussion is based on the results of Polish and international literature analysis as well as the empirical study: the interviews with experts on project management in education. The interview in Google Forms application (https://forms.gle/1miPNemi1vEqJYpPA) was administered to 17 expert of project management, who are academic teachers and researchers in five universities in Poland: War Study University in Warsaw,  Fire Services State School in Warsaw, Jan Kochanowski University in Kielce, Andrzej Frycz Moderzewski Krakow University, Kazimierz Wielki University in Bydgoszcz (Fig.1).
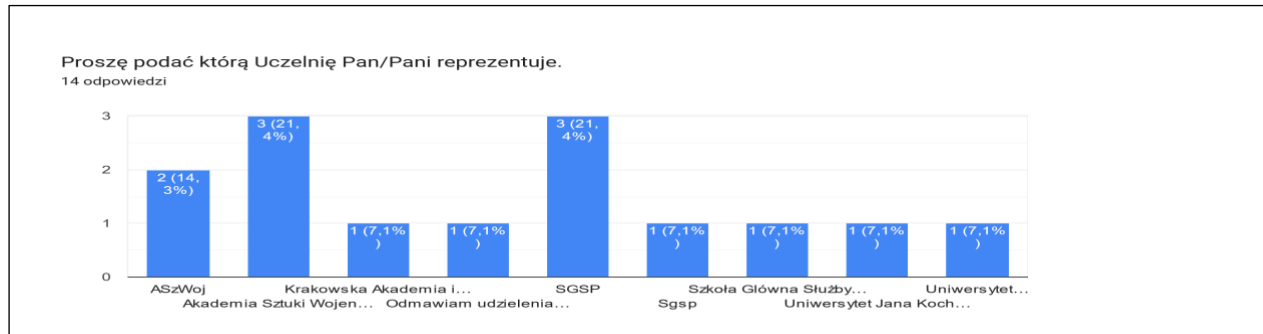


Figure 1. The Universities in which the respondents are employed.

The universities are also of different nature: the civil ones as well as military and for uniformed services ones, which provides more comprehensive picture of project management practices in Poland.  The purposeful selection of respondents guaranteed the expert quality of the information received. They have held managerial position on the high organizational levels throughout their career, thus they possess extensive experience not only as an academics but also managers, not to mention their engagement in international and national projects.

The questions aimed at identifying obstacles throughout the process of project realization. The respondents were asked to answer open, semi-opened and closed questions as well as mark the steps in managing projects at which they encounter any obstacles in the chart.  The key results are presented in the paper and allow to build the author's integrated project management solution for educational organizations.

## Results

The project management in the Authors' empirical studies
Seventeen security education project management experts from 5 Polish universities in the interview addressed to them in 2022 identified the following areas they experienced difficulties in:
- managing the scope of the project (planning and realization) (8 respondents);
- overlapping and consequently abundance of research, teaching and project tasks to be realized at the same time (6 respondents)
- time management (9 respondents);
- cost management (7 respondents);
- quality management (3 respondents);
- human resources management (6 respondents);
- team building (7 respondents);
- weak coordination of information flow and sharing (2 respondents)
- lack of knowledge and support with current information from the administrative units (4 respondents);
- procurement procedures (2 respondents), e.g., unclear formal requirements for the projects (which aspects of the projects are the most important to focus on);
- weak coordination (3 respondents), e.g., parallel fulfilling of several tasks from the schedule, a project
- manager left on their own or weak collaboration and postponing or prolonging tasks fulfillment (Fig.2);
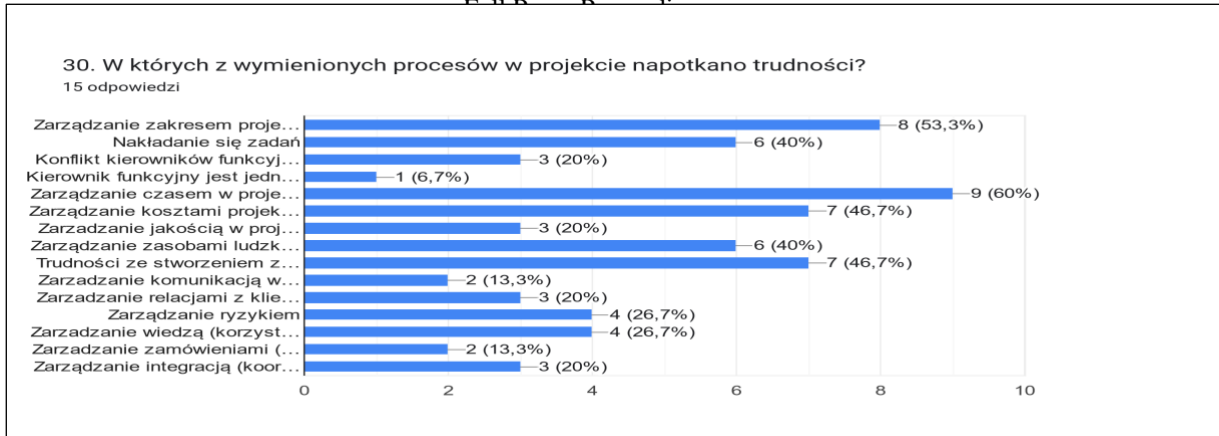
Figure 2. The answers to the question: In which areas of project management have you encountered difficulties. (The answers are translated above).

Generally, bureaucracy generating organizational and time combined with mundane system of public procurement often hinders flexible assets management. The identified problems occurred at the junction of project management and organizational structure, which leads to the conclusion that introducing organizational changes in universities could eliminate or at least, minimize these problems fostering agile management and adaptive capacity of the whole organization.

When asked what improvements to the project management could you suggest? the respondents provided the following suggestions (Fig.3):

- Designing separate project management process (7 respondents);
- Designing separate project management unit (4 respondents);
- Adjusting the organizational structure to the needs of project management (8 respondents);
- Developing the organizational culture of knowledge sharing and team working (10 respondents);
- Integrating management of selected processes (8 respondents).
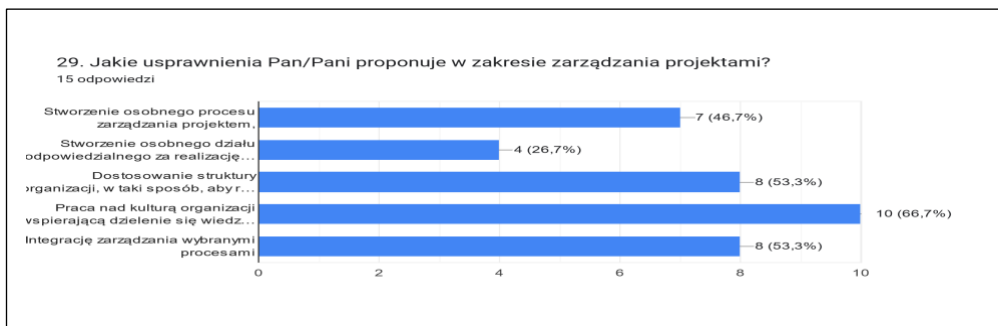


Figure 3. The Respondents' answers to the question what improvement to the project management could you suggest? (The answers are translated above).

*Author's solution - The integrated project management for educational organizations*

Building the integrated project management structure for the educational organization, the Author considered the features that could represent the optimal solution.

The optimal organizational structure for educational organization (university):

1. Should support the vision, mission and strategy of the universities (defined in the framework above): teaching students the skills and competencies required by the labor market and research and development enterprises. The method wildly and successfully applied is project-based learning. The quality of research and development defines university as entrepreneurial and socially responsible. And in this area also project is a prevalent form of collaboration with business, public and social entities.
2. The highly qualified human resources (academic staff) are sine qua non of professional and high-quality performance. Human resources capacity can be developed only in a relatively stable environment, regular employment conditions which allow planning and realizing career path, training and development. This must be stretched over time and be financially seen as an investment to be cost effective.
3. The stability is also the necessity to build academic community and its culture.

Above-listed considerations still leave open the questions: how to combine stable functional structure with dynamic project management structures and how to support internal integration and adaptability to the outside environment requirements?

The concept of process management and assumption that common and similar elements of the process - based structure can serve as a foundation for implementation and development of project-based structures (Lichtarski, 2009).

In a process-based organization all activities are perceived and arranged in a system of processes. Process can be seen as "a collection of activities that takes one or more kinds of input and creates an output that is of value to the customer (Hammer & Champy, 1993, p.35).

In organization one can identify primary *processes,* supporting *processes* and management processes (Stecyk, 2012). In educational organization there are:

- Primary *Processes*: teaching and training, research and development;
- Supporting *Processes*: administration, human-resources, technical support;
- Management Processes: defining mission, vision and strategy, assessing efficiency and quality of processes, defining processes and their borders.

The process management structures and project management structures are usually implemented on the basis of functional structures. Matrix structure discussed above combines functional, process and project management structures. Considering the nature of educational ecosystem, especially career development, employment and financial issues the basic functions as administration, accounting, legal or IT support should be realized by regular, dedicated (functional) units for all projects, which definitely reduces costs (Lichtarski, 2009).

These reflections are critical for designing the integrated project management structure for educational organization which could eliminate or minimize problems occurring during process realization.

This structure is built of:

1. Functional units responsible for support of projects and processes such as: accounting, administration, legal and IT services, assets (SUPPORT);
2. Selected experts units: Senate, University Council, Disciplines Council;
3. Project Management Office (PMO) a managerial - expertise unit directly reporting to the Chancellor but building also direct but superior relations with subsystems and units;
4. The processes:
    - Managing processes with the Rector as its owner
    - Main process of teaching and training with the vice- Rector as its owner and main process of research and development with another vice-Rector as its owner
5. Units in line organizational structure: departments and institutes which serve as source of potential members of project teams (Figure 4)
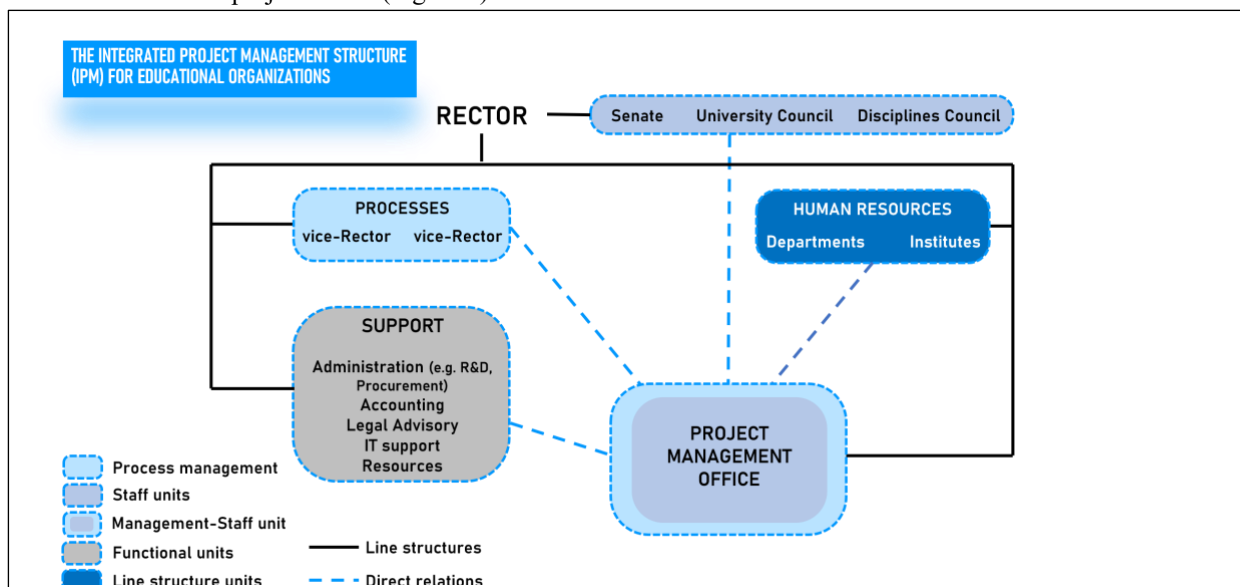


Figure 4. The integrated Project Management Structure for Educational Organization

The PMO in the proposed integrated project management structure directly reports to the Rector and has the managerial and staff nature i.e., it includes project managers and specialists who have the roles and responsibilities assigned in a following manner:

Manager of PMO ensures the support of the organization for the projects;

Manager of project portfolio designs the portfolio, assigns assets, resources and aligns them with the strategy of organization, conducts financial analysis and works out alternative scenarios;

Manager of resources portfolio creates the balanced project portfolio in cooperation with project portfolio manager, divides in an optimal way the resources among the functional units (defines the workload for the project members

Mentor supports project recovery, improve delivery of project products, advise on problems, assesses a project

Coordinator of PMO tools – provides technical support with tools including IT tool box

Technician responsible for customer service and technical support

Project management Expert – cooperates with project managers to implement proper methodology for a particular project

Coach – provides training on project management for project members, functional units and other stakeholders

Personal data controller – administers project documentation, designs workplans and develops forecasts (ref. Wyrozębski, 2009).

Project Management Office having the superior position may practically influence the effectiveness of the projects, streamline the processes by allocating the right assets to realize the goals of the project and the organization, delivering customized products and services.

Controlling the workload of the project manager and project team is one of the most difficult tasks. The Rector can design the hours grid with limits under the health and safety regulation. Yet, this document can be rather a referral one not obligatory – the project members make final decision and organize their own workplan. The proportions of teaching hours and project hours should ensure the high quality of teaching and teacher-student relations.

Integrated project management for educational organizations enhances the adaptive capacity of organization in the following manner:

- Supporting building the project-oriented organizational culture. It contributes to the success of the projects, efficient utilization of resources and ultimately, achieving strategic objectives.
- Project culture makes organization (university/school) sensitive and responsive to the needs of the organization itself as well as its outside stakeholder and local community (especially changeability of the market)
- Combining routine with project work and better time management;
- Superior position of a project manager helps minimize conflicts about reporting, responsibilities of project managers and lines mangers;
- Flexible building of a project team with experts, students and outside stakeholders;
- Requires flexibility and self-organization skills;
- creates the opportunity of career development and additional income from projects;
- stable employment system creates the environment for development and building proper teacher-student relation as well as academic community as a whole.

**Limitations of the solution**

The elements that certainly require further analysis and improvements in that solutions are:

- Controlling (building the mechanism) the level of employment for teachers, researchers and administration personnel;
- Controlling and defining the workload for project team members;
- Development of Project Management Office, which is complex and time-consuming process involving assets on all organizational levels;

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## Conclusions

Digital technology and tools: big data analytics, artificial intelligence (AI), and automation make the educational ecosystem of two natures (digital and real) increasing its complexity and unpredictability.

Operating successfully in these conditions requires high responsiveness and adaptability, which can be gained by applying appropriate tolls supporting project-based collaboration and learning.

The integrated project management structure with Project Management Office as the managerial and staff unit helps minimize conflicts about reporting, responsibilities of project managers and lines mangers and more minor obstacles identified in the process of project realization in functional and matrix structures. PMO also makes the structure more flexible and outside-in oriented by creating the conditions for building a (research or learning) project team with experts, students and outside stakeholders.

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# 21st Century Skills in Early Childhood: What Do Preschool Pre-service Teachers Think? What Skills Do Children Consider Important?

## Cansu Tutkun [1]

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## Abstract

The aim of this study is to examine the views of preschool pre-service teacher on 21st century skills and which skills they consider important for preschool children. In this study, case study, one of the qualitative research methods, was used. The study group of the research consisted of 37 preschool pre-service teachers studying in the 4th grade of a university's preschool education department. As a data collection tool in the research, "Interview Form for 21st Century Skills" was used. In the analysis of the data, the data obtained from the focus group interview were analyzed by the content, and the data obtained from the parts where the pre-service teachers rated the subjects they deemed important were analyzed by descriptive analysis method. As a result of the research, it was determined that pre-service teachers' views on 21st century skills were gathered under three themes. In this context, it has been determined that the first of the themes is the skills that children should have in terms of 21st century skills, the second theme is teaching roles in the 21st century and the third theme is family roles in the 21st century. In terms of 21st century skills that children should have, it was revealed that pre-service teachers mostly emphasized learning and innovation skills, then life and career skills, and least information, media and technology skills. In terms of teachers, it was determined that they often emphasized information, media and technology skills including media literacy. Another result obtained from the research is that families have a very important and key role in supporting children in terms of 21st century skills in early childhood. It has been revealed that the most important subjects for preschool children are learning and innovation skills such as creativity, cooperation and communication. In the light of the results obtained from the research, it is thought that it is important to provide the necessary support and training to children, families and teachers in terms of 21st century skills.

**Keywords**: 21st century skills, preschool, preschool pre-service teacher.

## Introduction

One of the most discussed, researched and held conferences in the field of education all over the world in recent years is 21st century skills and the acquisition of these skills through education (Turkish Industry & Business Association [TÜSİAD], 2012). This contributes to the identification of skills considered important in the context of the 21st century; points out that there is a strong interest in including these skills in education systems in general and in making changes in education programs to support the development of these skills (Çetin & Çetin, 2021). In this context, it is necessary to prepare schools and educational institutions to raise children who can compete in the dynamic global market in the 21st century. It should aim to transform teachers' pedagogical skills with innovative strategies in the global classrooms of the 21st century (Tuğluk & Özkan, 2019).

Unfortunately, most schools cannot keep up with today's needs in terms of 21st century skills and have difficulties in helping children develop as creative thinkers (Resnick, 2007). Preparing children for successful work, citizenship and life in the 21st century is a complex process. In particular, the fact that an education system that does not comply with the conditions of the day, when teacher-centered knowledge transfer is carried out, continues to be adopted predominantly during the compulsory primary education period in most of the world can be shown as the main reason why children cannot acquire 21st century skills (Organisation for Economic Co-operation and Development [OECD], 2009). Future students need to make a very good start in the preschool period in order to overcome the challenges they will face in the 21st century. Teaching 21st century skills that will help children reason, think creatively, analyse data and work collaboratively in the future should start at an early age, especially in the preschool period. Indeed, neuroscientists, educators, and early childhood development experts agree that early experiences have a huge impact on brain development and learning. The brain has the greatest flexibility from infancy to age five to adapt to a wide variety of experiences, interactions, and social environments. Therefore, it is critically important to develop 21st century skills such as social, emotional, cognitive and language skills at an early age (P21-A Network of Battelle for Kids, 2019b). It is the responsibility of the school and teachers to equip children with the necessary skills and prepare all children for the educational demands of life and work in a rapidly changing world (Cretu, 2017). In this context, most of the studies on 21st century skills in our country are studies on primary and post-secondary education levels (Gürel, 2022; Karakaş, 2015; Kotluk & Kocakaya, 2015; MEB, 2011; Yayla, 2022), parents who have children in the preschool period (Karaarslan & Gültekin Akduman, 2022), preschool children (Dinler, Simsar & Yalçın, 2021; Elçi, 2021; Güngör, 2021; Kol & Tunçeli, 2022) studies

were conducted, but studies for preschool pre-service teachers were limited. Therefore, in this study, it is aimed to examine the views of preschool pre-service teachers on 21st century skills and which skills they consider important for preschool children. For this purpose, answers to the following questions were sought:

- What are preschool pre-service teachers' views on 21st century skills?
- What are the issues that preschool pre-service teachers consider very important regarding children's 21st century skills?

# Methodology

### Research design

In this study, case study, one of the qualitative research methods, was used. A case study is a method that is based on how and why questions and allows the researcher to examine, explain and analyze a phenomenon or event in depth (Best & Kahn, 2017; Yıldırım & Şimşek, 2013).

### Participants

The study group of the research consisted of 37 preschool pre-service teachers studying in the 4th grade of a university's preschool education department. Ten (27%) of the pre-service teachers are male and 27 (73%) are female. In terms of ages of pre-service teachers, 30 pre-service teachers are in the age group of 20-25 (81.1%), 4 pre-service teachers are in the age group of 26-30 (10.8%) and 3 pre-service teachers are in the age group of 31-35 (8.1%). The average age of pre-service teachers is 23.6.

### Data collection tools

As a data collection tool in the research, "Interview Form for 21st Century Skills" was used. The "Interview Form for 21st Century Skills" consists of three parts. The first part is about the personal information of pre-service teachers such as age and gender. In the second part of the form, "What are the opinions of preschool pre-service teachers about 21st century skills?" question is included. In the third part of the form, there are 14 topics related to the 21st century skills of preschool children. In this section, preschool pre-service teachers were asked to rate the subject or subjects that they consider important for children's 21st century skills as "1-Extremely Important", "2-Very Important" and "3-Important".

### Procedures

At the stage of data collection, first of all, preschool pre-service teachers were interviewed and information about the content, purpose of the research, the voluntary basis of the research, the interview process and confidentiality were given. Then, 3 different focus group interviews were conducted by determining the days and hours that would be suitable for the pre-service teachers to be interviewed. The focus group interview is a technique that aims to collect data by creating a polyphonic environment where the participants do not need to hide their true thoughts, usually carried out with 4-12 participants with some common characteristics and a moderator (Gülcan, 2021). Among the main rules of focus group interviews, there are certain common characteristics between individuals, the number of participants in the group should be between 6 and 12, and the interview should be conducted with at least 3 different groups for each research (Morgan, 1997). In this context, the students who volunteered to participate in the current research are in the same program and at the same grade level. Three different focus group interviews were conducted with 12 students in the first and second focus group interviews, and with 13 students in the last group. At the end of the interview, the 21st Century Skills Interview Form was distributed to the pre-service teachers and they were asked to fill in the first part containing their personal information and the third part in which the children rated the subject or subjects that they consider important regarding 21st century skills.

### Data analysis

In the analysis of the data, the data obtained from the focus group interview were analyzed by content analysis. For this purpose, it is necessary to conceptualize the collected data first, then categorize them logically according to the emerging concepts and determine the themes that explain the data accordingly (Tavşancıl & Aslan, 2001; Yıldırım & Şimşek, 2013). In this context, the notes obtained by the researcher were read several times and divided into meaningful sections. The sections that have similar meanings in themselves were brought together to form categories. Then, numbers were given to the data set obtained from the pre-service teachers and S-1, S-2, S-3…..S-37 coding was made. After these coding, the gender of the pre-service teachers was coded as "F" for female students and "M" for male students, and age information was added to the coding. The disaggregated data is supplemented with direct quotations where necessary. These citations are in italics and the data number from which the citation is made is given in parentheses.

In addition, descriptive analysis method was used in the analysis of the quantitative data obtained from the sections in which the pre-service teachers rated the subject or subjects that they considered important. Descriptive analysis is a qualitative data analysis approach that includes the steps of processing qualitative data, defining the findings, and interpreting the identified findings, depending on a predetermined framework. In this approach, data in written form obtained through observation, interview or examination of documents can be digitized with the help of simple percentage calculations and frequency in order to increase the reliability of the study, reduce bias, make comparisons between themes/categories in the study, and increase the repeatability of a small-scale study with a large sample later on (Yıldırım & Şimşek, 2013). As a matter of fact, frequency and percentage distributions were used in the analysis of the subjects that the pre-service teachers considered important, tables were created and explained and interpreted.

## Results

In the research, "What are the opinions of preschool pre-service teachers about 21st century skills?" The data obtained from the focus group interview for the question revealed that the opinions of the pre-service teachers were gathered under three themes. In this context, it has been determined that the first of the themes is the skills that children should have in terms of 21st century skills, the second theme is teaching roles in the 21st century and the third theme is family roles in the 21st century.

*Results on the skills that children should have in terms of 21st century skills*

In the research, it was determined that the first theme obtained from the analysis of the data in the focus group interview was the skills that children should have in terms of 21st century skills. The "21st Century Skills Framework" put forward by the P21- 21st Century Learning Partnership was used to determine the categories for this theme.



| Life and Career Skills | • Responsibility, productivity, early learning, leadership, social and intercultural skills |
| Learning and Innovation Skills | • Creativity, critical thinking, problem solving, communication, collaboration |
| Information, Media, and Technology Skills | • Media literacy |
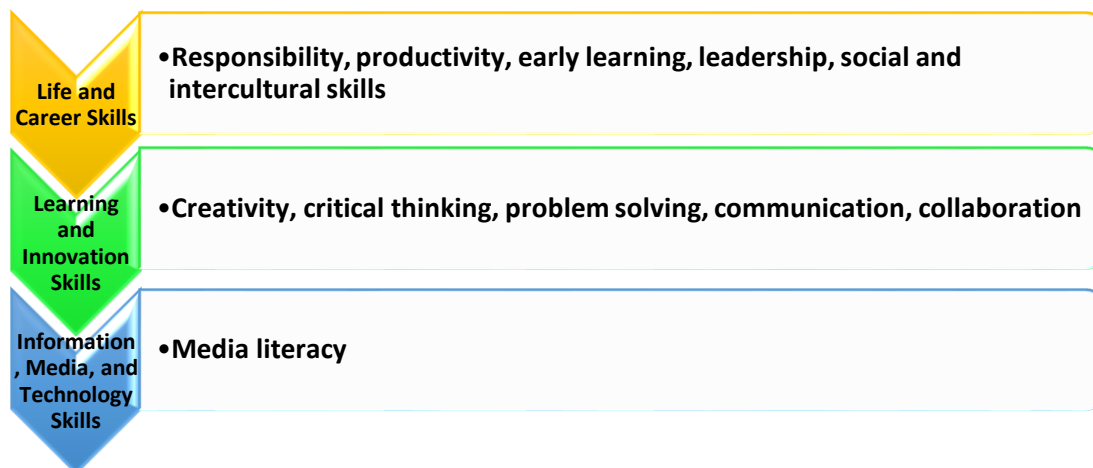
Figure 1. 21st century skills children should have.

In terms of 21st century skills that children should have, it was revealed that pre-service teachers mostly emphasized learning and innovation skills, then life and career skills, and knowledge, media and technology skills the least. Regarding the learning and innovation category, it was determined that pre-service teachers emphasized that children's creativity, critical thinking, problem solving, communication and collaboration are important in terms of 21st century skills. The statements of some pre-service teachers regarding this are as follows:

*"I think it is important for children to have 21st century skills such as creativity, critical thinking and problem solving skills. Because uncreative children will not be able to show their creativity in the future, and they will not be able to solve many problems they encounter from different perspectives because they are not creative"* (S-1, F, 21). *"Advanced cognitive processes (analysis, critical thinking, ……………………. being able to evaluate events and phenomena from different aspects) in short, cover the skills of children who move away from the traditional world view and develop and lead in today's world order"* (S-15, M, 23). *"I think critical thinking, communication and collaboration are very important among preschool children's 21st century skills. Naturally, children cannot cooperate when they cannot communicate with their environment. This situation causes them to isolate themselves from their environment and not be able to reveal themselves in the 21st century"* (S-9, M, 22). *"Critical thinking skills bring along the ability to produce solutions to problems in case of a problem and the ability to be creative. Without these skills, no child can be sufficient in the 21st century"* (S-16, M, 21). *"Without communication, critical*

*thinking, problem solving and ..., no child today can live happily, successfully. Because in the future he cannot fulfil what is asked of him. For example, he cannot be successful in the university exam…………..”* (S-11, F, 21).

Another issue that pre-service teachers focus on in terms of 21st century skills that children should have is "life and career skills." Accordingly, it was determined that preschool pre-service teachers emphasized responsibility, productivity, early learning, leadership, social and intercultural skills. Some of the statements of the pre-service teachers are as follows: *“In the 21st century, children's ……………, responsibility, leadership and ……………. skills are the most important, actually………..”* (S-12, F, 21). *“I think the 21st century skills for preschool children are ……………, responsibility, self-expression and leadership”* (S-4, F, 23). *“…………………………, in terms of treating every human being equally and fairly, respecting human rights and acting effectively empathetically, and ……………………….”* (S-14, F, 20).

It was revealed that pre-service teachers emphasized information, media and technology skills the least in terms of 21st century skills that children should have. The statements of some pre-service teachers regarding this category are as follows: *“In this century, children's skills such as …………, technology literacy are developing quite a lot. I think that the other 21st century skills are media literacy and ……………..”* (S-3, F, 20). *“Now, technology is more effective in activities with children, but children do not need to use these tools all the time to support their technological skills. In the lecture ……it was mentioned that in a place where there are technology companies, administrators send their children to non-technology schools. I think it is more important for children to learn how to produce technology rather than to use them”* (S-8, F, 20). *“………………….. is to form the basis of children who can use technology consciously. Because, no matter how good the spread of technology is, it can also be seen as a threat that can cause children to move away from their own culture”* (S-2, F, 22).

*Results on teaching roles in the 21st century*
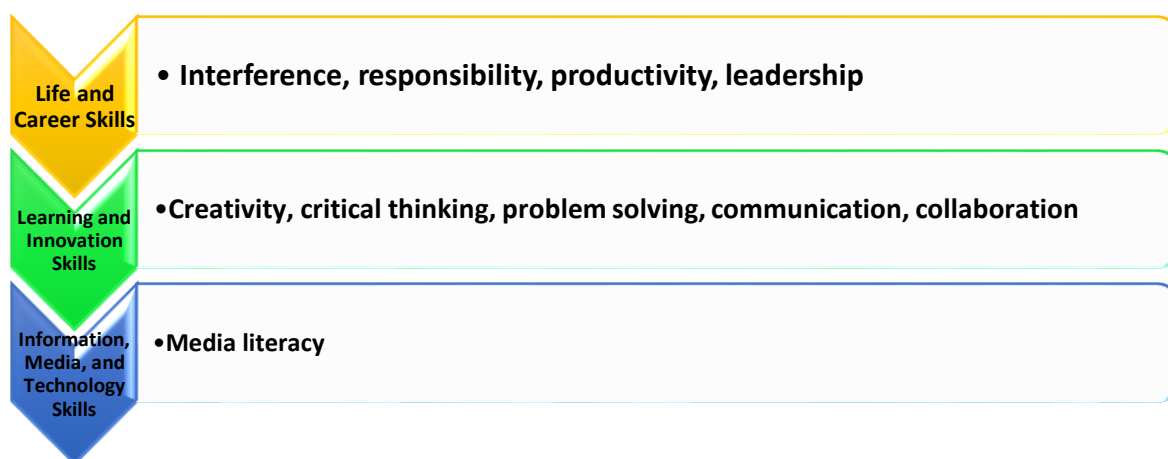


Figure 2. Teaching roles in the 21st century.

As a result of the research, it was concluded that the category that preschool pre-service teachers primarily stated regarding their teaching roles in the 21st century is media literacy for "Information, media and technology". In this context, the views of some pre-service teachers are as follows: *“………………….. must be individuals who have trained themselves very well in media literacy.”* (S-3, F, 20). *“Now children are intertwined with technology. Therefore, the teacher should have technological knowledge. It should convey the necessary information through technology so that it can convey the necessary information to the children without getting bored. Or the teacher should be a good follower of this situation because he is a child affected by social media.”* (S-7, F, 22). *“……………..But with the changing technology, it becomes important to introduce technology to children and teach technology, and to provide education according to the needs of the age.”* (S-9, M, 22). *“I think that the roles of teachers have changed within the framework of the developments in the field of information and technology and the transformation in the understanding of education and training.”* (S-16, M, 21).

The second issue that preschool pre-service teachers emphasize regarding their teaching roles in the 21st century is critical thinking, problem solving, creativity, communication and collaboration for the category of "Learning and innovation". The opinions of some preschool pre-service teachers regarding this are as follows: *“………………… should improve himself in terms of critical thinking and problem solving. If he can't improve himself, he can't adequately support children."* (S-10, F, 24). *“The way of education applied by the teacher also changes over time and continues to change. The teacher should come up with creative things both in theory and in practice. Creativity is very important in this age, if it cannot develop in creative skills………..”* (S-17, M, 22). *“……….. Because what the teacher does can sometimes seem very simple to children and knows how to support*

*children's knowledge skills. There are also changes in the way events work. There is also variation in terms of labor and time. To overcome them, he has to work hard and collaborate with other teachers around him."* (S-8, F, 20).

The subject that preschool pre-service teachers indicate the least regarding their teaching roles in the 21st century is initiative, responsibility, productivity and leadership skills for the "Life and career" category. Some pre-service teachers expressed their views on this subject as follows: *"There is a need for more courageous and assertive teachers. Teachers should not stay behind the agenda; they should catch the agenda. In this way, he shows that he is a leader in education and that he is a leader in education and that he can produce something."* (S-33, F, 35). *"We all know the benefits of technology, and we know that it facilitates education. However, some teachers can avoid activities because of technology. I think that the teacher should take responsibility and support the children under his responsibility with effort, effort and love."* (S-14, F, 20).

On the other hand, it was determined that many of the preschool pre-service teachers stated that teachers have changed a great deal in the 21st century regarding their teaching roles and that they are now "guide, mentor, adviser" rather than being a teacher. His views on this are as follows: *"I think teacher roles are changing. While the teacher was a person who gave information directly, now he is a guide who tries to find the information and make the children seek it".*" (S-2, F, 22). *"As the world is rapidly evolving and changing, learning needs are changing as well. Therefore, as expectations differ, teacher roles evolve and change. The role of the teacher as a guide for solving the problem rather than solving the problem………………"* (S-3, F, 20). *"…………………teacher is now more of a guide, it is important for children to research a subject and gain their own experience. Now the teacher is not always the person who knows something, but the person who tries to put the children on the investigative side."* (S-10, F, 24). *"…………………. Teachers should guide children's learning. I think it is important for children to create an environment where they can be more active instead of presenting ready-made activities and objects"* (S-16, M, 21).

### Results on family roles in the 21st century

Another result obtained from the research is that families have a very important and key role in supporting children in terms of 21st century skills in early childhood. Some pre-service teachers expressed their views on this subject as follows: *"I don't think it's enough just that teachers do something to support children's skills. The family should step in here and continue to support the child from the point where the teacher left off."* (S-19, M, 29). *"We can't expect much from the child if the parents are dealing with computers, televisions and telephones at home uncontrollably. If we mean the 21st century, I think the family is also very important in controlling the child and teaching right and wrong."* (S-23, F, 22). *"…Apart from these, families have left behind the strict and stereotyped rules as before. They're so comfortable. Whatever the teacher wants to give the child at school, it doesn't matter if they don't support it at home."* (S-12, F, 21).

### Results on the issues that pre-service teachers consider important regarding children's 21st century skills

Table 1. Crucial issues related to children's 21st century skills

| Konular | Critical | | Crucial | | Important | | Total | |
|---|---|---|---|---|---|---|---|---|
| | n | % | n | % | n | % | n | Order of importance |
| 1- Creativity | 24 | 64.9 | 13 | 35.1 | 12 | 32.4 | 49 | 1 |
| 2- Critical Thinking | 19 | 51.4 | 10 | 27 | 14 | 37.8 | 43 | 2 |
| 3- Problem solving | 15 | 40.5 | 6 | 16.2 | 11 | 29.7 | 32 | 4 |
| 4- Communication | 12 | 32.4 | 8 | 21.6 | 9 | 24.3 | 29 | 6 |
| 5- Collaboration | 10 | 27 | 9 | 24.3 | 6 | 16.2 | 25 | 9 |
| 6- Flexibility & Adaptability | 5 | 13.5 | 8 | 21.6 | 12 | 32.4 | 24 | 10 |
| 7- Interference | 8 | 21.6 | 14 | 37.8 | 9 | 24.3 | 31 | 5 |
| 8- Respect for Different Views & Thoughts | 10 | 27 | 8 | 21.6 | 9 | 24.3 | 27 | 7 |
| 9-Leadership & Responsibility | 7 | 18.9 | 5 | 13.5 | 6 | 16.2 | 18 | 11 |
| 10- Productivity | 9 | 24.3 | 10 | 27 | 14 | 37.8 | 33 | 3 |
| 11- Technology Skills | 5 | 13.5 | 3 | 8.1 | 6 | 16.2 | 14 | 12 |
| 12- Media Literacy | 10 | 27 | 7 | 18.9 | 9 | 24.3 | 26 | 8 |

It has been revealed that the subjects that preschool pre-service teachers consider the most important for children's 21st century skills are learning and innovation skills such as creativity, critical thinking, problem solving and communication. It was determined that among the other important issues related to children's 21st century skills

by the pre-service teachers, life and career skills such as productivity, interference, respect for different views and opinions, flexibility and adaptability. It has been determined that the subject that pre-service teachers consider the least important regarding children's 21st century skills are information, media and technology skills such as media literacy and technology knowledge. On the other hand, it is seen that each subject in children's 21st century skills is evaluated as important by preschool pre-service teachers, therefore, pre-service teachers do not evaluate any subject related to children's 21st century skills as "unimportant".

## Discussion and Conclusions

As a result of the research, "What are the opinions of preschool pre-service teachers about 21st century skills?" revealed that the opinions of the pre-service teachers regarding the question were gathered under three themes. In this context, it has been determined that the first of the themes is the skills that children should have in terms of 21st century skills, the second theme is teaching roles in the 21st century and the third theme is family roles in the 21st century. Also in the research, "What are the issues that preschool pre-service teachers consider very important regarding children's 21st century skills?" Regarding the question, it has been revealed that the most important subjects regarding children's 21st century skills are learning and innovation skills such as creativity, critical thinking, problem solving and communication.

In the research, it was revealed that preschool pre-service teachers emphasized mostly learning and innovation skills, then life and career skills, and knowledge, media and technology skills the least in terms of 21st century skills that children should have. In addition, it was determined that the most important subjects regarding children's 21st century skills were found to be learning and innovation skills such as creativity, critical thinking, problem solving and communication. In another study conducted with preschool pre-service teachers, in order to prepare children for life and to be successful; skills related to social development (f=26), skills related to language development (f=9), integrity of development areas (f=9), self-care skills (f=8), cognitive skills (f=2), self-regulation skills (f=1) and technology skills (f=1) (Arslan, 2022). The result of the research conducted in Tanzania to examine preschool teachers' support for children in the 21st century shows that although teachers neglect critical critical thinking and technological literacy skills, they give priority to children's emerging literacy skills such as reading, writing and numeracy (Tandika, 2022). In this context, the preschool period is a very important period in terms of supporting children's 21st century skills. It is inevitable that the 21st century skills gained and developed in this period will also have important contributions to the future lives of children. However, in a study conducted with primary school teachers, it was determined that most of the teachers think that primary school is the most appropriate period for the acquisition of 21st century skills (Hamlı, Hamlı, & Taneri, 2020). The international literature on 21st century skills indicates that the development of these skills begins when children are 18 months old (Ross, 2017) and that developing these skills in children makes significant contributions to social well-being as they transition to adulthood and then become involved in the production economy (Tandika, 2022). appear to be important. Therefore, it is important to support children's 21st century skills as early as 18 months.

As a result of the research, it was determined that many of the preschool pre-service teachers stated that teachers have changed a great deal in the 21st century regarding their teaching roles and that they are " guide, mentor, adviser" rather than teachers. In addition, in terms of teaching roles in the 21st century, it was determined that the primary category that preschool pre-service teachers stated was media literacy for "information, media and technology", and the second subject was critical thinking, problem solving, creativity, communication and cooperation for the "learning and innovation" category. The least mentioned subject by the pre-service teachers was initiative, responsibility, productivity and leadership skills for the "Life and career" category. The most striking result here is that pre-service teachers emphasize information, media and technology skills the least for children, and emphasize these skills as a priority for them. In the study carried out by Arslan (2022), it was concluded that preschool pre-service teachers feel most competent in the field of knowledge, media and technology skills. In a study conducted with primary school teachers by Hamlı et al. (2020), it was determined that the majority of teachers defined 21st century skills as the ability to use technology, and they thought that they were not competent to meet the needs of their students. However, in a study conducted with preschool teachers, it was concluded that teachers had a high level of innovative skills such as using new technologies and stated that they used these skills (Atis Akyol, 2023). Another study revealed that the lack of qualified teachers in preschool education affects efficiency in equipping children with 21st century skills (Tandika, 2022). Considering that teachers are in a key position in supporting children's 21st century skills, it is thought that it is important for them to be supported in terms of 21st century skills and to receive training on this subject, both in the universities where they are educated and in the institutions where they start their professional life after graduation.

The research also concluded that families have a very important and key role in supporting children in terms of 21st century skills in early childhood. Similarly, it was determined that primary school teachers emphasized the importance of parent support in education. Teachers stated that students who received parent support were more successful in gaining skills such as problem solving, critical thinking and cooperation than students who did not

receive parent support (Hamlı et al., 2020). In Tanzania, it was determined that preschool teachers stated that the biggest obstacle in preparing children for 21st century skills is low family involvement (Tandika, 2022). Families are crucial in supporting and developing their children's 21st century skills. In this respect, it is thought that it is important to inform families about how they can support and develop these skills from the preschool period. It is thought that the development of children's 21st century skills through the education to be given to families will contribute to both children and society.

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# Opinions of Preschool Pre-service Teachers on Distance Education in Terms of 21st Century Skills

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## Abstract

As a result of recent events such as pandemics and earthquakes in our country, distance education is frequently used to ensure the sustainability of education. The aim of this research is to examine the views of preschool pre-service teachers about distance education in terms of 21st century skills. In this study, case study, one of the qualitative research methods, was used. The participants of the research consisted of 15 preschool pre-service teachers studying in the 3rd grade of the preschool education department. An interview form was used as a data collection tool in the research, and interviews were conducted one-on-one with pre-service teachers online. The data were analysed by content analysis method and the 7 skills deemed necessary by the International Society for Technology in Education Standards [ISTE] (2017) were taken as the basis while dividing them into themes. As a result of the research, it was determined that the views of pre-service teachers on distance education in terms of 21st century skills were gathered under three themes. These themes are; Advantages, disadvantages and recommendations of distance education for 21st century skills. In the study, distance education provides teachers with some advantages in terms of learner, leader, citizen, collaborator, facilitator, analyst and designer skills in terms of 21st century skills, but it has limitations in terms of providing active participation and motivation of learners and supporting learning by doing-experience. It has also been determined that it brings disadvantages such as limiting interaction. In the light of the results obtained from the research, it is thought that it is important to increase the awareness of teachers and learners about distance education and to support the 21st century skills of the distance education process.

**Keywords**: ISTE Standards, 21st century skills, distance education, preschool teacher candidate.

## Introduction

21st century skills are a concept that has been emphasized frequently in recent years. With the rapid increase in population, the development of industry, urbanization and the advancement of technology, it is necessary to develop some skills in order to adapt to life. Skills needed for the 21st century; It differs considerably from previous centuries in terms of many skills such as technological literacy, adaptation to technological business life, respect for differences in multicultural societies, cooperation, effective communication, and being open to developments. These changes in society affect all institutions and people as well as education (Atis Akyol, 2023). One of the most important components of educational environments is the teacher (Atis Akyol & Aşkar, 2022). It requires teachers to be familiar with 21st century skills and integrate them into their education programs (Larson & Miller, 2011). It is vitally important for today's teachers to be individuals who can keep up with the 21st century and to be equipped with the vision, knowledge, attitude and 21st century teacher skills that can provide these skills (Özdemir, 2021).

Different studies have been conducted that classify the skills that 21st century teachers should have to ensure high-quality learning (E.g. International Society for Technology in Education Standards [ISTE]), 2017; Kennedy, Latham & Jacinto, 2015; Vocational Qualifications Authority, 2021; P21 Framework, 2019). Offering a roadmap to help students become competent learners, ISTE (2017) has set teacher standards for the use of technology in teaching and learning in parallel with distance education (Figure 1). These standards are important in preparing teachers to deepen their practice, encourage collaboration, and prepare students to direct their own learning rather than traditional approaches. Learning educators continually improve their practices by learning from and with others, and discovering applications that leverage technology to improve student learning. Lead educators create leadership opportunities to support student empowerment and success, and to improve teaching and learning. Citizen educators inspire students to contribute positively and participate responsibly in the digital world. Collaborative educators take the time to collaborate with both colleagues and students to improve practice, explore and share resources and ideas, and solve problems. Designer educators design unique, student-focused activities and environments that recognize and adapt to student variability. Facilitator educators facilitate learning with technology to support students' acquisition of skills. Analyst educators understand and use data to guide their teaching and support students in achieving their learning goals. In this context, it is seen that these standards provide a suitable framework for teachers and pre-service teachers in the distance education process in terms of 21st century skills discussed in the current research.
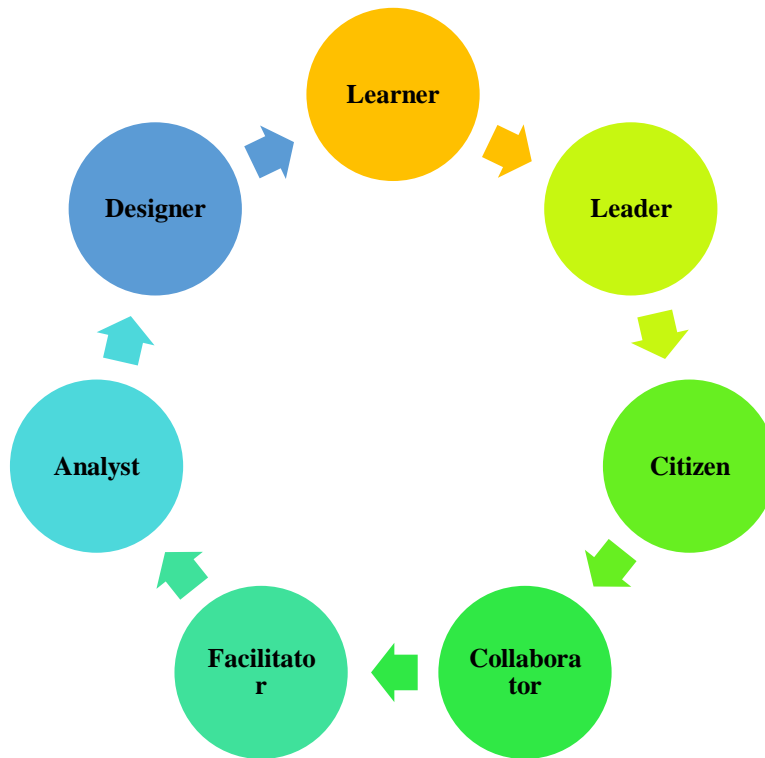
Figure 1. ISTE Educator Standards

As a result of recent events such as pandemics and earthquakes in our country, distance education is frequently used to ensure the sustainability of education. Distance education is the fastest growing form of education at home and abroad. The concept of distance education, which was considered a special form of education using non-traditional delivery systems in the past, has now become an important concept in general education. Concepts such as networked learning, connected learning spaces, flexible learning and hybrid learning systems have expanded the scope and changed the nature of previous distance education models (Gunawardena & McIsaac, 2013). In this process of change, it has gained importance to reveal the nature, applicability, contributions or negative features of distance education within the scope of 21st century skills. In this context, in a study examining the 21st century skills that should be gained to students before and after the pandemic from the perspective of pre-service teachers in our country, it was found that there was an awareness of access to information in the field of "information, media and communication skills" in the views of pre-service teachers, a change from creativity to critical thinking in the field of "learning and innovation skills". It has been concluded that there are increasing trends in adaptation and entrepreneurship in the field of "life and career skills" (Arslan, 2020). In another study, it was concluded that there is a positive relationship between learners' levels of commitment in open and distance education environments and their 21st century learning skills (Yıldırım & Altınpulluk, 2022). On the other hand, in studies for pre-service teachers, 21st century skills and digital storytelling (Donmuş Kaya & Akpunar, 2018), self-efficacy perceptions (Arslan, 2022; Kozikoğlu & Altunova, 2018; Özdemir Özden et al., 2018), creative thinking tendencies (Berkant & Varki, 2022), STEM education and problem-based learning (Akcanca, 2020), critical thinking dispositions (Alkoç, 2020), but no study has been conducted to examine the views of preschool pre-service teachers on distance education in terms of 21st century skills. With the rise and spread of distance education systems, there is a need to critically examine the strengths and weaknesses of various programs (Gunawardena & McIsaac, 2013). In this respect, it is aimed to examine the views of preschool pre-service teachers about distance education in terms of 21st century skills.

## Methodology

### Research design

In this study, case study, one of the qualitative research methods, was used. A case study is a method that is based on how and why questions and allows the researcher to examine, explain and analyze a phenomenon or event in depth (Best & Kahn, 2017; Yıldırım & Şimşek, 2013).

### Participants

The study group of the research consisted of 15 preschool pre-service teachers studying in the 3rd grade of a university's preschool education department. 9 (60%) of the pre-service teachers are female and 6 (40%) are male. In terms of the ages of the pre-service teachers, 12 students are in the 19-24 (80%) age group, and 3 students are in the 25-30 (20%) age group. The average age of pre-service teachers is 22.3.

**Data Collection Tools**

As a data collection tool in the research, "Interview Form on Distance Education in Terms of 21st Century Skills" was used. The interview form prepared by the researcher to determine the views of preschool pre-service teachers on distance education in terms of 21st century skills consists of two parts. The first part is about the personal information of pre-service teachers such as age and gender. In the second part of the form, "What are the views of preschool pre-service teachers about distance education in terms of 21st century skills?" question is included.

**Procedures**

At the stage of data collection, first of all, preschool pre-service teachers were interviewed and information about the content, purpose of the research, the voluntary basis of the research, the interview process and confidentiality were given. Then, one-to-one interviews were conducted with the pre-service teachers in the online environment by determining the days and hours that were suitable for the pre-service teachers who volunteered to participate in the research.

**Data analysis**

In the analysis of the data, the data obtained from the interviews were analyzed by content analysis. For this purpose, it is necessary to conceptualize the collected data first, then categorize them logically according to the emerging concepts and determine the themes that explain the data accordingly (Tavşancıl & Aslan, 2001; Yıldırım & Şimşek, 2013). In this context, the notes obtained by the researcher were read several times and divided into meaningful sections. The sections that have similar meanings in themselves were brought together to form categories. Then, numbers were given to the data set obtained from the pre-service teachers and S-1, S-2, S-3…..S-15 coding was made. After these coding, the gender of the pre-service teachers was coded as "F" for female students and "M" for male students, and age information was added to the coding. The disaggregated data is supplemented with direct quotations where necessary. These citations are in italics and the data number from which the citation is made is given in parentheses. While the data obtained were divided into themes, 7 skills deemed necessary by the International Society for Technology in Education Standards [ISTE] (2017) were taken as basis.

## Results

As a result of the research, what are the opinions of pre-service teachers about distance education in terms of 21st century skills? By analysing the data obtained for the question, it was determined that the opinions of the pre-service teachers were gathered under three themes. In this context, it has been determined that the first of the themes is the advantages of distance education related to 21st century skills, the second theme is the disadvantages of distance education related to 21st century skills, and the third theme is recommendations for distance education related to 21st century skills.

**Advantages of distance education for 21st century skills**



Figure 2. Advantages of distance education for 21st century skills.

In the study, it was determined that distance education provides some advantages to preschool pre-service teachers in terms of 21st century skills in terms of learner, leader, citizen, collaborator, facilitator, analyst and designer skills. The opinions of some pre-service teachers regarding this are as follows: *"Actually, we can both learn and*

*share while conducting trainings during the distance education process. In this case, it is easier to access information, and when we have a question, we can look it up immediately."* (S-8, M, 21 years old).

*"We can work comfortably with our friends on the subject. I think this makes it easier for us to design beautiful projects with them. Because when we are face to face, it is difficult for all of us to set the appropriate time."* (S-13, F, 25 years old).

*"Distance education provides us with a richer stimulus for both teachers and students. We do many things not only verbally, but also visually or audibly, and technology has entered our lives so much that we can immediately look at something we are curious about. Since we couldn't use the phone in class, we couldn't ask what's on our mind at that moment, now there is a chance to look at it right away"* (S-2, F, 23 years old).

*"……In one of our lessons, our teacher asked us to prepare an experiment by combining photos and videos. We gathered as a group right away, we researched how we could do something, ………..by this way, our ability to use technological tools and applications also develops. From now on, when asked for such an assignment, I can do it very easily."* (S-9, M, 26 years old).

**Disadvantages of distance education for 21st century skills**
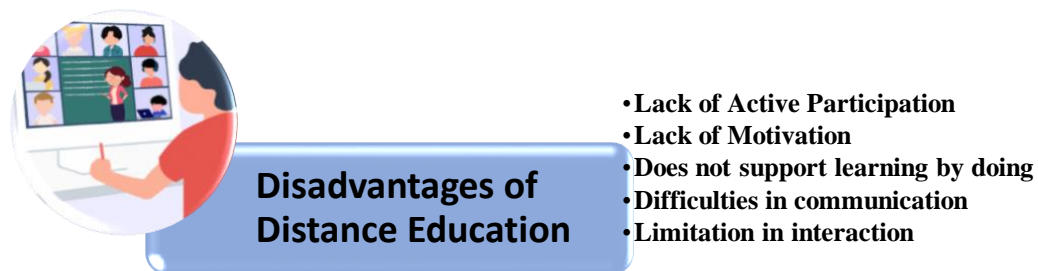


Figure 3. Disadvantages of distance education for 21st century skills.

As a result of the research, it was determined that distance education related to 21st century skills has some disadvantages according to the opinions of preschool pre-service teachers. It was determined that these disadvantages include providing active participation and motivation of learners, supporting learning by doing and experiencing, and limiting communication and interaction. The opinions of some pre-service teachers regarding this issue are as follows:

*"In some distance lessons, I can really get sleepy, there is no communication because the teacher constantly tells and we listen, this forces me."* (S-15, M, 22 years old).

*"It doesn't just happen when something is explained, then……..when he asks a question, there is a great silence as we are not fully concentrating on the lesson at that time."* (S-4, M, 23 years old).

*"…….we can't practice in the drama class, I just can't do something with the children with the theoretical part of the drama. I wish we were face to face so that we could learn something by doing. Then, when we have to practice, I think about what I will do."* (S-7, F, 20 years old).

*"Sometimes the internet is cut off during classes, I don't understand what's being said at that time, I can't hear it. Then I don't understand what the teacher or your friends are saying. It can come intermittently due to the internet……"* (S-1, F, 21 years old).

**Recommendations for distance education on 21st century skills**
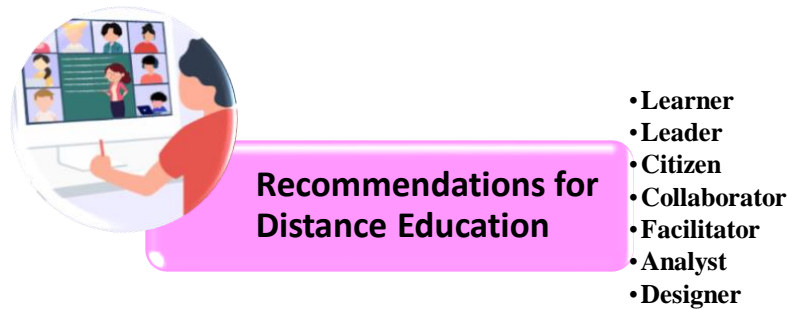


Figure 4. Recommendations for distance education on 21st century skills.

As a result of the research, it was determined that the recommendations of preschool pre-service teachers for distance education were directed to the advantages and disadvantages of distance education in terms of learner, leader, citizen, collaborator, facilitator, analyst and designer skills. The opinions of some pre-service teachers regarding this are as follows:

*"Now the roles of teachers have changed, they have a more guiding and supporting role, not just the teacher telling or the other person listening. In distance education, many technological resources are actually at our disposal, we can do many things using them, but we do not. Therefore, we can be supported to learn new things by increasing our participation."* (S-2, F, 23 years old)

*"It is not the same for all courses, our teachers can do different things to increase our motivation in distance education and to include us in the lesson"* (S-15, M, 22 years old).

*"Distance education changes from teacher to teacher. We can also research something in the distance lesson and share what we have researched with our other friends."* (S-11, F, 20 years old).

*"I think distance education should be a multi-faceted education. Collaboration and problem solving skills should be gained with other friends and teachers. In my opinion, we can be supported to be sensitive to technology and to learn new things while having fun. In fact, our self-development provides the basis for children who come face to face with technology and can use technology consciously. Able to find solutions to their problems on their own…………"* (S-3, F, 19 years old).

*"We need to gain the skills to look at things as they should be rather than as they are, or to look more critically, to use electronic devices better"* (S-12, M, 27 years old).

*"Because the generation is constantly changing. Change is progressing very fast, I think that I should always be up to date in order to keep up with them and I need training for this"* (S-13, F, 25 years old).

## Discussion and Conclusions

This research was carried out to examine the views of preschool pre-service teachers about distance education in terms of 21st century skills. As a result of the research, it was determined that the views of pre-service teachers on distance education in terms of 21st century skills were gathered under three themes. These themes are; Advantages, disadvantages and recommendations of distance education for 21st century skills.
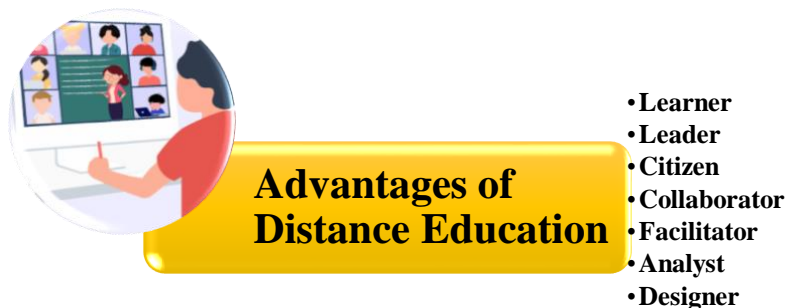
In the research, it has been determined that distance education provides some advantages to teachers in terms of 21st century skills in terms of learner, leader, citizen, collaborator, facilitator, analyst and designer skills. In a study conducted to examine the characteristics of 21st century learners and teachers from the perspective of pre-service teachers and to determine their awareness, it was determined that teaching approach, instructional design, information and communication technologies literacy, information literacy and personal, professional and social characteristics were emphasized in terms of 21st century teacher characteristics (Daghan et al, 2017). Distance education is one of the driving forces that provides the rise of higher education in the 21st century and gives a dynamic structure to scientific fields. Distance education has gained an undeniable importance by transforming into an interdisciplinary field of science with its functional flexibility, strong technology infrastructure, program diversity, innovative teaching approaches and rapidly increasing number of students (Fırat, 2016). As a matter of fact, in terms of 21st century skills, it can be said that distance education has a facilitating effect for teachers to gain learner, leader, digital world citizen, collaborator, facilitator, designer and analyst skills and to adapt to the globalizing world.

As a result of the research, it was revealed that distance education related to 21st century skills has some disadvantages such as providing active participation and motivation of learners, supporting learning by doing and experiencing, and limiting communication and interaction, according to the opinions of preschool pre-service teachers. Ministry of National Education in Türkiye 21st Century Student Profile (MEB, 2011) research 21st century. As a result of the research on the education system and the student profile in secondary education institutions, it was determined that 65% of the 10912 teachers who participated in the study thought that "Türkiye's education system is not as it should be in the globalization process". It has been determined that 86% of the teachers do not provide international professional qualifications in schools, and students are inadequate in terms of many values such as responsibility, respect, initiative, sensitivity, morality, solidarity, productivity, decision-making, and problem solving (MEB, 2011). In a study with 142 pre-service teachers from Bukidnon State University in the Philippines, the levels of 21st century skills and the 21st century teaching practices they use in the classrooms were examined, it was found that practices that improve pre-service teachers' skills in establishing global connections and using technology as a learning tool were given very little space, and learning technology, It has been determined that they are weak in including them in the teaching process (Mugot & Sumbalan, 2019). In a study conducted with pre-service teachers in an environment where face-to-face education completely disappears and only distance learning takes place on the learning of learners, it was concluded that students prefer face-to-face education even if they have knowledge about information, media and communication skills (Arslan, 2020). In the study of Avcı (2023), the main condition for an effective distance education process to be realized is that the process is based on a design and development model, long-term preparatory studies are carried out on this subject, and first of all, attention is paid to the fact that the trainers who will serve as instructors have the necessary qualifications, and then the students are informed about the use of the distance education system. indicated that they were informed. Therefore, in terms of 21st century skills, the trainings carried out with pre-service teachers in the distance education process should contribute to their cooperation, support their active participation, and increase their technological knowledge to become citizens of the digital world.

As a result of the research, it was determined that the preschool pre-service teachers' recommendations for distance education were for learner, leader, digital world citizen, collaborator, facilitator, designer and analyst skills. It is thought that it is important for teachers to integrate technological resources into the teaching process, especially in terms of 21st century skills, in terms of supporting learners. In a study conducted in Malaysia on this subject, it was found that teachers almost never use technology in the teaching process in the classroom, innovative use of technology in the learning process, teachers' techno pedagogical knowledge levels and their ability to integrate information and communication technologies while teaching the subject content are low, contrary to what should be in the 21st century learning environment. determined (Garba, Byabazaire and Butshami 2015). Within the scope of 21st century skills, a system in which learners are at the center of the education process as well as set educational goals and in which the teachers are in the position of guide while achieving these goals has gained importance and the education system has begun to take shape in this context (Soland, Hamilton, & Stecher, 2013). However, considering that this formation is not fully completed; It is of great importance that teachers and pre-service teachers are supported in both distance and face-to-face education processes, that they have the opportunity to develop these skills by doing and experiencing, and that they are a key part of change.

As a result of the current research, it is thought that the success of distance education in terms of 21st century skills is parallel to the success of teachers, therefore it is very important to support the skills of teachers for the distance education process and to increase the awareness of teachers by providing trainings for international standards. In studies examining 21st century skills of teacher or pre-service teachers, 21st century skills and teachers' dedication to the profession (Kozikoğlu & Özcanlı 2020), prospective teachers' creative thinking tendencies (Berkant & Varki, 2022), pre-service teachers' self-efficacy perceptions and lifelong learning tendencies. (Kozikoğlu & Altunova, 2018), it was determined that there is a relationship between preschool pre-service teachers' critical thinking dispositions (Alkoç, 2020). As Avcı (2023) points out, the basic condition for an effective distance education process is to pay attention to the fact that the trainers who will serve as instructors have the necessary qualifications. It is thought that it is very important for educators, who are role-models for future teachers, to include "learner, leader, citizen, collaborator, facilitator, analyst and designer skills" in the distance education process, which will increase the success of distance education in terms of 21st century skills.

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# Mindfulness in English Language Teaching: Design of a Web-based Mindfulness Teaching Tool

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## Abstract

There has been an outgrowing interest in mindfulness and how it might be incorporated into foreign language (FL) contexts to enrich the language learning process for both students and teachers. However, since mindfulness is a novel concept, English as a foreign language (EFL) teachers may lack knowledge of mindfulness, its features related to FL learning, and how it can be integrated into the lessons. Since there is limited access to mindfulness-based practices (MBPs) for teachers, this study aimed at developing a web-based mindfulness teaching tool that provides EFL teachers with necessary information on mindfulness and various MBPs. The present study also aimed at exploring the opinions of teachers regarding this web-based mindfulness teaching tool. 95 EFL teachers working at public and private schools, as well as state and non-profit universities in Türkiye participated in this study. For the purposes of the study, an open-access website was designed to provide information about mindfulness in general, the importance of mindfulness in English language teaching, various mindfulness practices, and sample MBPs directed at improving language skills and areas. Additionally, blog posts, a chat box, language options (English and Turkish), and a contact page were added to enhance the user-friendliness of the website. Participants used the website and related tools in their lessons and reflected on the content, structure, and usage of the website via reflective journals. The results of the qualitative analysis revealed three main categories, namely, the advantages of using the web-based tool, the difficulties faced during the process, and several suggestions. The findings highlight a need for implementing technology-enhanced mindfulness practices for EFL teachers. This study offers valuable insights for teachers, teacher educators, and language practitioners regarding promises of the digital era to introduce new concepts such as mindfulness.

**Keywords**: Mindfulness in foreign language teaching, Web-based tool for mindfulness-based teaching practices, Technology and mindfulness in English language teaching.

## Introduction

Recently, a new concept called 'mindfulness' has taken the attention of researchers and language practitioners and its implementation into language learning/teaching environments has gained remarkable momentum (Kuru Gönen, 2022). It is asserted that integrating mindfulness-based practices (MBPs) into FL teaching may be worthwhile and can enhance the language learning process (Tural &Küçükkaragöz, 2021). Likewise, Zeilhofer and Sasao (2022) underline the importance of practicing mindfulness as a novel strategy to promote the growth of vocabulary, enrich learning experiences, and decrease speaking anxiety (Zeilhofer, 2023). However, the initial results of a needs analysis carried out as part of an Erasmus+ Strategic Partnership Project with 245 EFL instructors in Türkiye recently demonstrated that teachers are not accustomed to MBPs despite their eagerness to try such practices, and that there is an absence of training and sample content they may utilize with their students (Kuru Gönen, 2022). Therefore, there is a need for designing practical and feasible tools that will introduce mindfulness and mindfulness-based practices (MBPs) to FL teachers. In this aspect, using technology-induced materials and web-based tools (WBTs) can help to make the MBPs accessible to teachers and learners regardless of time and place boundaries. The aim of this study, therefore, is to introduce Mindfulness-Enhanced Language Teaching (MELT) and learning (MELL) (Kuru Gönen, 2023) to FL/SL teachers and to develop a web-based mindfulness tools that can be implemented in teaching/learning contexts.

### Mindfulness-Enhanced Language Teaching and Learning

According to Bishop et al. (2004), mindfulness is a distinct pattern of attention to the present that is characterized by awe, transparency, and agreement, as well as the regulation of focus to that observation. In education, specifically, in language teaching, mindfulness has received great attention; therefore, practices associated with mindfulness that promote welfare are being integrated into the lessons, and various benefits have been observed. For example, when done correctly, breathing exercises can reduce anxiety, aid in concentration, relax the nervous system, and boost motivation for learning the target language (Jenkins, 2015). According to Wang and Liu (2016), when students participated in mindfulness activities, they became more conscious of the process of learning

English, began to appreciate their own learning process, and became more motivated to learn and involved in this process than previously.

Although there have been several studies regarding the concept of mindfulness and its use in FL/SL settings, mindfulness is still novel in language teaching. In this aspect, Kuru Gönen (2023) introduced Mindfulness-Enhanced Language Teaching (MELT) and Mindfulness-Enhanced Language Learning (MELL). MELT pertains to the integration of mindfulness principles into foreign or second language teaching settings in an in-depth way, utilizing MBPs with a mindful perspective that aligns with the findings of second language acquisition research. She further explains that "based on the idea of creating a mindful learning atmosphere in language learning to cultivate motivation, personal growth, compassion, and empathy, MELL focuses on improving the learning experience vowed into the fabric of language learning contexts". Regarding these, there has been a need and an obvious necessity to introduce the practices of MELT and MELL in FL/SL settings and provide various materials to teachers that can be accessed easily via using technology.

In this study, it is preferred to present mindfulness and sample MBPs to FL teachers through a WBT to access a broad audience of teachers by utilizing the efficacy and usefulness of the Internet and technology-enhanced tools and to foster communication among them regardless of their place of residence WBTs are easy to use, an Internet connection and a browser are the only things needed, and they are known by most people; therefore, it is assumed that teachers will not face any difficulty while using a website developed to introduce the concepts of MELT and MELL, and various MBPs. Additionally, there is a lack of a website specifically designed for teachers on mindfulness that offers sample MBPs to integrate mindfulness into FL/SL classes. Thus, the purpose of this study is to develop a WBT that provides EFL teachers with the necessary background information regarding mindfulness and various MELT practices, and to investigate the teachers' opinions regarding this novel tool.

## Methodology

### Participants

The participants of the study were 95 EFL teachers working at both private and public schools and universities all around Türkiye. All of the participants were chosen on a voluntary basis following a convenient sampling strategy (Creswell, 2012). Online consent forms were also sent to the participants guaranteeing their voluntary participation and their right to opt out of the study upon their request. The participants were named *T1, T2, T3*, and so forth to ensure their anonymity of participation.

Based on the demographic information, of all the participants, 91,6% of them were females and 8,4% of them were males. 64 of the participants have a bachelor's degree, 21 have a master's degree and 10 have a doctorate degree. In terms of teaching experience, about a third of the participants have 1-5 years, a quarter have 6-10 years, and the rest have more than 10 years of experience. Also, nearly half of them believe that their students are partially motivated toward the English lesson. In terms of the age group they teach, 61% of the participants teach English to young learners, 13% teach to teenagers and the rest teach to adults. All participants consider it necessary to integrate extracurricular activities into English language teaching. With regards to mindfulness, it is seen that more than half of the teachers (n=51) are familiar with the concept, but the majority of them (n=71) do not know how to integrate mindfulness into educational settings.

### Instruments

For the purposes of the study, a background questionnaire was used to gather background information about the participant teachers (i.e., gender, educational background, and familiarity with mindfulness). To collect data regarding the teachers' opinions on the use of the website and MELT practices, a Google form including reflection questions was sent to teachers. The participants used the website for five weeks and wrote weekly reflections regarding their experiences. The following reflection questions were asked after the teachers used the website:

*Reflection questions*

1. What are the advantages of using/integrating the MELT website? (if no, write no)
2. What are the disadvantages of using/integrating the MELT website? (if no, write no)

### Procedure

The present study lasted for a total of ten weeks and followed two phases: (1) The design of a website about mindfulness and its practices in ELT-five weeks, (2) The use of the website by the teachers to implement mindfulness in actual FL/SL teaching settings-five weeks.

In order to accomplish the goals of the study, researchers first sought out a website development platform with which they could build an educational website. WIX was determined to be the most suitable platform because it provides more than 800 templates and is known for its user-friendliness. After creating an account on wix.com, the domain was selected. Mindfulnessinelt.com was selected as the website's domain since its purpose was to provide language teachers with information about mindfulness and propose practices that can be implemented in language teaching. The domain is optimized using keywords that are particularly basic in order to provide language teachers with easy access to the website. After the domain was obtained, the main sections of the website were determined. The main sections were "Home", "About Mindfulness", "How to Start"," MELT for Kids"," MELT for Teens", "Blog", "About Us", and "Contact".

Firstly, In the *Home* section, MELT and MELL definitions were added to help teachers and researchers. The latest posts were also added allowing teachers to see the most up-to-date posts. Sample mindfulness-based breathing exercise videos that teachers could use on smart boards were included as well. Secondly, in the *About Mindfulness* section, the visitors were provided with the answers to frequently asked questions regarding mindfulness. The questions are, "What is mindfulness?", "Is mindfulness a religious activity?", and "What are the benefits of mindfulness scientifically?". Thirdly, in the *How to Start* section, it was aimed to offer the teachers a guide on the fundamentals of mindfulness, important considerations while integrating mindfulness in FL/SL contexts, and tips for more mindful classes. The following two sections were *MELT for Kids* and *MELT for Teens*. The former included MELT practices for young learners from kindergarten to primary school, whereas the latter included MELT practices for teenagers and adults. As the main goal was to present sample practices that could be used in EFL classes, breathing exercises, language practices, and activities centered around the themes in the students' books were added to these sections. Additionally, in the *Blog* section, all of the posts published on the website could be found. These included frequently asked questions, sample practices, scientific blog articles, and so forth. In this section, various articles regarding mindfulness are available. These articles are aimed to introduce the concept of mindfulness, explain the fundamentals of it, and provide background information about this concept. Moreover, in this section, the visitors were allowed to like the posts and share their comments. By allowing these, it was aimed to provide other teachers all around the world with an idea of how the activity affected the lesson and several possible recommendations by the actual users of the practices. Furthermore, in the *About Us* section, background information about the researchers is shared. Lastly, in the *Contact* section, visitors could easily fill in a form and send their questions, requests, complaints, and so on to the researchers, and thanks to this section, they could receive quick responses by sharing their e-mail addresses. Besides these sections, to facilitate faster discussions, a chat box was added to the bottom right corner of the website. In the meantime, the Turkish version of the website was also developed to provide language support for the ones who had limited levels of English. Finally, to increase the user-friendliness of the website, the mobile version was generated both in English and Turkish.

In the second phase, an online meeting was scheduled to inform the teachers of the research procedure. The website was presented and the necessary information was given in the meeting. Each section was carefully explained in the session and teachers' questions were answered. In the following five weeks, the participants chose several MELT practices to use in their classes. After each time they used a practice, they were asked to answer the reflection questions about the website.

## Data Analysis

Reflections of the teachers regarding the use of the website -mindfulnessinelt.com- during English lessons were analyzed qualitatively. The qualitative analysis focused on examining the concepts that are prevalent in the data. Accordingly, Thematic Analysis (TA), which is a structured approach that involves the systematic identification, organization, and interpretation of patterns of meaning (themes) that emerge from a given dataset (Braun & Clarke, 2012), was utilized. Accordingly, the analysis started by generating codes, which was gradually followed by the construction of themes by grouping similar codes. In the next step, sub-themes were defined which were eventually formed under the main themes. Finally, the existing themes and sub-themes were further reviewed by an expert in the field, and final versions of the main themes and sub-themes were confirmed.

## Results

This study aimed at discovering teachers' perceptions of WBT use in cultivating mindfulness in language teaching. As a result of the qualitative analysis, a total of 49 codes were identified which were formed under ten sub-themes and three main themes.  Sub-themes, themes, and the distribution of the codes are displayed in Table 2.

Table 1. Distribution of the main themes and sub-themes

| Theme | Sub-themes | N* |
|---|---|---|
| The Advantages of Using the Website | User-friendliness | 14 |
| | Clear instructions & language | 10 |
| | Easy integration | 7 |
| | Variety of activities & articles | 5 |
| | Saving on time | 3 |
| Suggestions Regarding the Website | Adding more activities | 4 |
| | Adding sounds | 4 |
| | Developing a mobile app | 2 |
| The Disadvantages of Using the Website | Problems with Internet Connection | 1 |
| | Website familiarity | 1 |
| | Total | 49 |

N*: Number of the codes

Table 1 displays the sub-themes and the three main themes that emerged from the participants' perspectives on utilizing mindfulnessinelt.com. The primary themes identified in the analysis pertained to the benefits of utilizing the website, recommendations for enhancing its functionality, and the drawbacks associated with the usage.

## The Advantages of Using the Website

The participant teachers expressed numerous advantages of incorporating the MELT practices provided via mindfulnessinelt.com into their English lessons. The predominant benefit stated by the teachers regarding the website was its user-friendliness. That is, the process of accessing the website was deemed easy, the interface was straightforward, the layout of the content was understandable, and all the provided information was practical. One of the teachers remarked:

> "Firstly, it is easily accessible and has a user-friendly interface. Secondly, the practices have been categorized well. Additionally, the visuals and instructions are well-chosen and developed." (T48)

Echoed by the teacher above, the website was found easy to use and assisted teachers find the necessary piece of information effortlessly and in a practical way. Moreover, another teacher stated:

> "They (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." (T41)

It can be understood from the quote above that teachers can readily access the practices through the website, and integrating them into the classroom settings is rather simple. Furthermore, the teachers thought that the content of the website had simple and clear language. As per the teachers' statements, the articles pertaining to the concept of mindfulness and the instructions in all practices were deemed clear, understandable, and carefully prepared. It is also seen that the practices could be easily integrated into the lessons due to the fact that they were aligned with the curriculum teachers were following in their teaching contexts. Apart from the language of the MELT practices and the resources, the teachers emphasized the diverse range of activities provided. One of the teachers indicated that:

> "Thanks to you, the MELT website has freed us from trying to find not very reliable content from different sites. It also provides a variety and more organized activities and information that is not available on other sites." (T49)

It is seen from the comments of the teachers that in contrast to conventional methods of delivering educational materials to teachers, the introduction of a WBT has the potential to appeal to teachers using a diverse array of unique activities easily. Other advantages of using the website included saving time, easy access using interactive whiteboards, increased student motivation, and students' interest in the website; and therefore, increased focus on the lesson. Consequently, it can be assumed that teachers welcomed the website and integrated it into their lessons enthusiastically.

**Suggestions Regarding the Website**

The participants mostly expressed positive views about the website and have put forward several suggestions in order to enhance the effectiveness of the website. They believed that apart from the students, there should be MBPs specifically designed for teachers. What is more, the teachers suggested the inclusion of related sounds inside each MELT practice. Additionally, in terms of easier access to the MELT practices, the teachers recommended that a mobile app could be developed. Even though the website was generally found advantageous, a need for a mobile application was stated as:

> "Mobile version of the website as an app would be nice to access the materials even more easily." (T21)

**The Disadvantages of Using the Website**

Albeit numerous advantages of using the website and integrating it into the lessons quite successfully, only two disadvantages were mentioned by only two teachers. One of them stated the necessity to pre-check the website to get accustomed to it. That is, it is advisable for teachers to familiarize themselves with MELT practices before their classroom sessions, as accessing the website for the first time in the presence of students without prior knowledge of its layout and content can induce stress. Another teacher mentioned a possible shortcoming regarding possible internet connection problems that could be experienced in classes from time to time as:

> "The only problem can be the connection problem we experience sometimes, even though we don't have such a problem now." (T10)

It is seen from this utterance that although the problem was not experienced by the participant recently, there was a possibility of internet connection problems in some classes due to a lack of infrastructure.

## Conclusions

The results of the data analysis revealed mainly positive perceptions regarding the integration of the WBT. In other words, teachers welcomed mindfulnessinelt.com as it is user-friendly, has a clear language, the practices provided in it are easy to integrate and various, and it is time-saving. Teachers generally benefited from this novel experience of mindfulness integration in their classes although they mentioned very few possible drawbacks. The results of the study indicate that integrating mindfulness practices into language teaching and utilizing the MELT website as a tool for this purpose yielded positive outcomes, such as higher motivation and less anxiety. Students' benefiting from the relaxing nature of mindfulness has been recognized by teachers, drawing parallels to the observed advantages of mindfulness on learners in the Chinese EFL context (Geng, 2021). Accordingly, there exists a significant relationship between mindfulness, foreign language anxiety, and achievement motivation. Furthermore, Mortimore (2017) and Reilly (2021) assert that mindfulness practices help to create a calmer atmosphere in the classroom. Participant teachers in this study also reported the presence of such an effect as a result of practicing mindfulness using the website. Apart from these, the participants suggested that more practices and features can be added, and a mobile application is necessary for quicker access. Mobile applications support interpersonal and intrapersonal interactions (Watson et al., 2013) and help to exceed the limitations caused by place and time (Alnawas &Aburub, 2016). There is an obvious need to create alternative online tools for teachers to find sample mindfulness-based practices easily.

The current study was conducted over the course of five weeks. Further studies could be undertaken over a longer time frame. Additionally, the scope of the study was restricted to the analysis of the participants' answers to the open-ended questions. Future research could encompass a wider array of data collection instruments to more thoroughly investigate and evaluate the use of the MELT website. It is indicated that students who participate in MELT practices exhibit an increased degree of eagerness toward learning the target language. Concerning this, the current study suggests that the notion of mindfulness should be integrated into the whole lesson. Adopting a mindful approach to learning and teaching the target language and utilizing the MELT website to augment this mentality and the teaching process could bring about benefits for both learners and teachers. As a result, it is essential for curriculum developers to acknowledge and incorporate this potential when creating instructional content and shaping the curriculum.

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# A Treasure Chest: Digital Sources for Informal Digital Learning of English (IDLE)

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## Abstract

Informal Digital Learning of English (IDLE) has been a fast-growing area in the EFL research field recently. The tendency of using opportunities for informal education in the near future offers educators blue-sky thinking both in digital material use and language practice. Digital learning provides language learners and educators a treasure chest full of digital sources, yet navigating in this recent world has been forming its own rules in a fairly new way. Therefore, the present study aims to explore mostly used digital sources for IDLE in the Turkish EFL context to give an idea of the effective use of IDLE sources. Towards this end, a guidance program for IDLE was developed and 18 higher education students at a state and a private university in Turkey enrolled in this program. The participants used various IDLE sources for their language practice, and they were engaged in tasks to improve their language skills via IDLE materials and tools. Data on digital sources which were used by the participants to improve specific language skills during and after the program were obtained through the Guidance Evaluation Questionnaire which was adapted from previous studies on informal digital practices of language learners. The results showed that the participants used certain digital sources more frequently and used these sources mainly to improve language skills or areas such as vocabulary, listening, reading, and writing. This study presents the most preferred and beneficial IDLE sources for language teachers, educators, and practitioners to give insights into the effective integration of informal digital sources into English language teaching contexts with practical implications. The findings of the study suggest that IDLE sources might be used as supportive elements both for informal and formal learning practices.

**Keywords**: Informal digital learning of English (IDLE), Using digital sources in English language teaching, Technology in English as Foreign Language (EFL)

## Introduction

At a time of digital transformation, a vast array of digital tools and platforms -such as social networking applications, websites, vlogs, and video streaming platforms- have become prominent options in our daily life. These digital contents have affected not only our knowledge but also our learning tendencies and habits as well. As stated by the recent OECD report (2022) there is little knowledge about the integration of informal learning which is a broad but mostly uncharted field. Nevertheless, it is also highlighted that there are promising advances in this territory. Therefore, it is highly important to know how to navigate in this digital world as educators and to be a role model for our learners in finding the right digital sources for their learning. The digital environment provides a treasure chest full of digital sources and the learners can take advantage of this valuable content based on their interests.

When it comes to informal language learning in the digital environment, it is seen that this recent topic has caught the attention of several parts of the world including Brazil (Cole & Vanderplank, 2016), Morocco (Dressman, Lee & Sabaoui, 2016), and South Korea (Lee, 2019a). It is seen that research on informal language learning is more common in contexts where learners do not have enough exposure to the target language or do not have sufficient opportunities for its daily use. Informal Digital Learning of English (IDLE) is defined as "self-directed English activities in informal digital settings, motivated by personal interests and undertaken independently without being assessed by a teacher" (Lee & Lee, 2021 p.359).

IDLE can be categorized as a subfield of interest in CALL (Computer Assisted Language Learning) (Soyoof, Reynolds, Vasquez-Calvo & McLay, 2021). In the context of CALL, it is highlighted that when teachers use technological tools for the right pedagogical purposes, learners may have some space to foster their learning in and out of the class (Kuru Gönen, 2019). The concept of IDLE centres on learning outside of the classroom and it goes back to the studies about language learning beyond the classroom (LBC) (Reinders & Benson, 2017). As the subfield of LBC, Sockett (2014) studied Online Informal Learning of English (OILE) and Lee (2019b) carried out research using the term IDLE. In IDLE, language learners can follow either specifically designed content for language learners or they can just be exposed to the language through content in that language. They can watch

some videos or make some comments on a social media account. They select a digital source and benefit from it in terms of language learning.

Several studies showed that different Second Language Acquisition (SLA) theories have been used to ground IDLE. Since the learners are exposed to comprehensible input through informal learning opportunities, it can be referred to Krashen's (1981) Input Hypothesis. Cole and Vanderplank (2016) point out that learners can be involved in "acquisition" which is the sub-conscious process of using digital sources. On the other hand, Sundqvist (2011) focuses on learners' production and interaction like chats, comments, or singing, and refers to the Output / Interaction Hypothesis (Gass & Mackey, 2006). Godwin-Jones (2018) argues that Complexity Theory (Larsen-Freeman) can explain IDLE since language learning is an ongoing process. In its dynamic system, informal language learners can use various digital sources to pursue an individualized learning experience with unique outcomes.

IDLE has attracted lots of attention in recent years and several significant studies have been carried out (see Dizon, 2021; Lee 2019, 2020; Lee & Dressman, 2018). Many studies focused on the effect of IDLE on vocabulary (Sundqvist, 2019; Sundqvist & Wikström, 2015), English proficiency (Kusyk, 2016), speaking (Lee & Dressman, 2018), and cross-cultural strategic communication strategies (Lee, 2020). Focusing on IDLE sources specifically, Arvanitis (2020) carried out a study to investigate self-paced language learning using online platforms. A set of five different web-based platforms and mobile apps were selected: Duolingo, Babbel, Rosetta Stone, Busuu, and Memrise. These were some of the most popular and used web-based platforms that deal with language learning. Google Trends service was used to examine and compare the search interest for the platforms. It was found out that the platforms Duolingo and Babbel had a large number of total visits by the users and they were listed in the first and second places, with Memrise in third place. Afterwards, the researcher asked participants who were undergraduate students to choose an application among Duolingo, Babbel, and Rosetta Stone and to start learning a language by using that source. The findings indicated that the participants found the language-learning process very interesting and pleasant. Regarding self-assessment and feedback offered by applications, the participants expressed that they received satisfactory feedback. In a more recent study, Lee (2023) investigated new technological features on Instagram and TikTok and how they were utilised as IDLE sources for language learning. The researcher conducted a qualitative content analysis based on four key dimensions: multimodality, mobility, instantaneous participation, and interactivity. Findings revealed that language learning affordances of Instagram and TikTok were specific to certain features. The role of the user's agency was also highlighted to select digital sources and find some ways to utilise them for IDLE. That is, language-learning affordances depend on the design and technological features of digital platforms, and the users who have decisions on them.

The purpose of this study is to explore mostly used digital sources for IDLE in the Turkish EFL context to give an idea of the effective use of IDLE sources. The research is guided by the following research question:

Which IDLE sources do Turkish EFL learners use frequently to improve their foreign language learning?

## Methodology

This study employed a mixed-method design to explore the most frequently IDLE sources used by Turkish EFL learners. In this respect, IDLE Guidance Program was designed by the researchers and presented to the participants in ten modules. The details regarding the IDLE Guidance Program and its effects will be published elsewhere, and the current study focuses solely on the IDLE practices of the participants. In this study, data were collected through reflective journals and Guidance Evaluation Questionnaire.

*Participants*

A total of 18 students studying in English Preparatory Programs at a state and a private university in Turkey participated in this study. Convenient sampling strategy (Creswell, 2012) was adopted while selecting the participants since they were available, accessible, and voluntary for the study. There were 12 female and 6 male participants. Their language proficiency level was B1-Intermediate. English Preparatory Programs offered 24-20 hours English in a week based on students' levels. In terms of IDLE, students did not have any extramural leading as part of the curriculum. However, some participants stated that a couple of instructors could share some digital sources when it was needed in the classroom. The participants were coded as *S1*, *S2*, *S3*, and so forth for anonymity of the results. All participants signed consent forms prior to the study, and they are informed that they were free to opt out the study upon their request.

*Instruments*

The participants enrolled in IDLE Guidance Program in which various IDLE sources were presented for ten weeks. They used various IDLE sources for their language practice, and they were engaged in tasks to improve their language skills and areas (listening, speaking, reading, writing, grammar, vocabulary, and pronunciation) via IDLE

materials and tools. Reflective journals asking participants about IDLE experiences they were engaged in to improve their language skills and areas were collected throughout the Guidance Program for ten weeks. A total of 53 reflective journals were collected. At the end of the process, Guidance Evaluation Questionnaire which was based on the existing literature and several previous studies (Arndt, 2019; Ohashi, 2019) was implemented. The questionnaire included closed-response questions and open-ended questions to collect in-depth data as well. It consisted of several parts as the diversity and frequency of IDLE after the Guidance Program, the efficiency of IDLE tools, and deciding on IDLE sources. Since it was a voluntary process, 10 out of 18 participants answered the questionnaire.

*Data Collection and Analysis*

Data gathered from Guidance Evaluation Questionnaire were analyzed using descriptive statistics and frequencies were calculated. Reflective journals were analyzed qualitatively. For qualitative analysis, the Constant Comparative Method (CCM) was used in which codes and categories emerged from the actual data instead of preexisting categories (Corbin & Strauss, 2015). In the first step, all data were coded regarding the IDLE sources the participants used during their language learning experience. After the coding process, the emerging codes were constantly compared and contrasted with each other until they were formed into sub-themes. These sub-themes were once again reviewed a few more times to form the main themes. Ten percent of the data was rated by another researcher and the formula offered by Huberman and Miles (2002), [agreement / (agreement + disagreement)] X 100, was used for inter-rater reliability. Accordingly, the agreement between raters was found at .92, which indicated a high level of reliability (Creswell, 2012)

## Results

This study aimed at finding out the IDLE sources and practices learners were engaged in to improve their language skills and areas. In this vain, the Guidance Evaluation Questionnaire was implemented to find out the efficiency of IDLE sources and asked participants' views on IDLE sources they used during the program. The findings were presented in Figure 1. below:
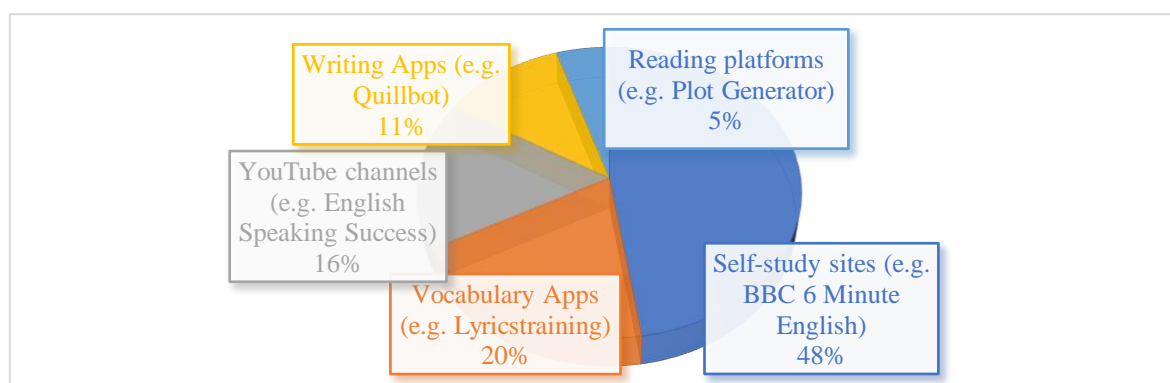


Figure 1. IDLE sources used by the participants.

As shown in Figure 1. above, the data revealed that participants mostly preferred English self-study sites (48%), vocabulary apps (n=20%), YouTube channels (16%), writing apps (11%), and reading platforms (5%). The results showed that some IDLE tools/platforms were found easy to use by the participants. These were English self-study sites (n=8) like *BBC Learning English, Ello, Quizlet, Cambridge English,* and *British Council*; YouTube channels (n=5) like *English Speaking Success*; writing apps (n=4) like *Quillbot, Write and Improve*, *Virtual Writing*; vocabulary apps (n=4) like *VoScreen* and dictionaries (n=3) like *Tureng, Cambridge Dictionary,* and *Thesaurus*. Other answers for digital tools which they found easy to use were *Google Translate, Tandem, Lyricstraining,* and *Netflix*.

In the following question, participants expressed the most useful digital tools and platforms for them. These were English self-study sites (n=14) like *BBC Learning English, Englishclub.com, Usingenglish.com, Perfect-English-Grammar.com, Ludwig, Ello, British Council, Esl-lab*, and *Quizlet*. Additionally, YouTube (n=2), Vocabulary Apps (n=2) like *VoScreen* and *Visuwords*, dictionaries (n=2), series and films (n=2), song lyrics (n=2), and online news sites (n=2) were among the most useful digital tools and platforms. *Plot generator*, *Ted talks,* and translation platforms were also stated as the most useful ones.

Another question of this part asked about the digital tools and platforms which the participants want to use to learn English in the future. These were English self-study sites (n=7) like *BBC Learning English, British Council, Cambridge,* and *Ludwig*; vocabulary apps (n=4) like *VoScreen* and *Visuwords*; writing apps (n=3) like *Quillbot* and *Virtual Writing Tutor*; *YouTube* (n=3), and dictionaries (n=2). Some other answers were listed as *Lyricstraining, Ted Talks, Netflix,* and translate platforms.

Qualitative results justified quantitative findings and indicated that Turkish EFL learners tended to use IDLE sources for the skills they wanted to improve. The participants wanted to improve their vocabulary knowledge by using related IDLE sources as can be seen in Table 1.

Table 1. Distribution of the codes according to the main theme and sub-themes.

| Theme | Sub-theme | N* |
|---|---|---|
| IDLE sources and related areas | Vocabulary (e.g. *Visuwords, Lyricstraining*) | 46 |
| | Listening (e.g. *Elllo, BBC 6 Min. English*) | 39 |
| | Reading (e.g. *Webtoon, Plot Generator*) | 32 |
| | Writing (e.g. *Virtual writing tutor, Quillbot*) | 24 |
| | Speaking (e.g. *Learn English with TV series*) | 15 |
| | Grammar (e.g. *UsingEnglish*) | 15 |
| | Pronunciation (e.g. *Phonetizer*) | 13 |
| | **Total:** | **184** |

N*: Number of codes

According to Table 1, the participants used various IDLE sources mostly to improve their vocabulary knowledge (n=46), followed by listening (n=39), reading (n=32), writing (n=24), speaking skills (n=15), grammar knowledge (n=15), and pronunciation practice (n=13). Based on the findings, the most frequently used IDLE sources can be listed as *Lyricstraining, VoScreen,* and *Visuwords* for vocabulary, *BBC 6 Minute English*, and YouTube channels e.g. *English Speaking Success* for listening, *Plot Generator* and News websites e.g. *BBC News, ABC News, New York Times* for reading, *Quillbot, Virtual Writing Tutor* and *Write and Improve* for writing.

Detailed information for some of these IDLE sources is given below. Such information would help language practitioners to consult when they are looking for IDLE sources for language practice.

*IDLE Source 1 – Lyricstraining (https://lyricstraining.com/es)*: This digital platform provides updated and free content for language learners. It is available both as a website and as a downloadable mobile application. The source can be used for vocabulary learning or practice through listening to songs. Users select a song and decide on the exercise they want to do. The source offers two options as write mode and choice mode. When users start the song, they listen to the song and follow the lyrics. There are some gaps in the lyrics and users are expected to complete these gaps based on the level they choose before the start. There are four level options including beginner, intermediate, advanced, and expert. Participants highlighted that they enjoyed a lot while using this IDLE source. Since most young adults like listening to music, the source can offer fun for spare time.

*IDLE Source 2 – BBC 6 Minute English (https://www.bbc.co.uk/learningenglish/english/features/6-minute-english)*: This IDLE source is an online, free, language-learning web platform and downloadable mobile application. It can be found in the podcast version as well. It offers specifically designed content for English language learners. Each week new content is shared with the followers. Users can find a listening track with transcription. There are downloadable materials including PDF and audio files. In each content, two presenters talk about a recent topic, ask a general knowledge question to arouse interest, and give target vocabulary during their talk. The level of the content is intermediate. Users can reach the archive part and benefit from a great number of contents.

*IDLE Source 3 – English Speaking Success (https://www.youtube.com/c/englishspeakingsuccess)*: This YouTube channel is a great example of an EduTuber concept that offers videos related to education. There are 2.77 million subscribers of the channel and videos are watched by thousands of followers. The tutor, Keith, provides many useful videos for the speaking part of IELTS. Videos do not only include IELTS preparation but also speaking tips, target vocabulary for different topics, and effective listening practice. Each week, the tutor gives a live class and announces it beforehand on his page. He asks some questions and creates space for interaction during the live classes. Recorded videos can be watched for repetition and they are all free. Different levels of learners can get benefit from the channel, but intermediate-level learners can follow the content for IELTS preparation more easily.

*IDLE Source 4 – Plot Generator (https://www.plot-generator.org.uk/):* This free web platform helps learners write and read their own stories, using different themes and genres such as short stories, fairy tales, or movie scripts. This website helps learners set the scene, build the characters and generate the connections among the characters. Firstly, the user chooses a theme from the selection provided by the website. Then, the user decides on the keywords or gives prompts. Finally, this IDLE source automatically creates content for users to practice the language. All levels of learners can use the source since they can find an appropriate theme and genre for themselves.

*IDLE Source 5 – Quillbot (https://quillbot.com/) & Virtual Writing Tutor (https://virtualwritingtutor.com/):* These two writing assistants have some similarities in use. They have several components like checking mistakes and paraphrasing. These IDLE sources are helpful for learners to get feedback on their writing. Participants stated that they preferred to use these websites among all others since these are free sources. In Virtual Writing Tutor, the users can check their level and even get a score for their essays. All levels of learners can use these IDLE sources to control their written productions.

Participants' expressions also revealed that IDLE sources were effective for their language learning experience. Their reflections showed that using IDLE sources increased their motivation and encourage them to use these sources more. They stated these views as:

*"I used Visuwords while studying vocabulary to see the different uses of a word I just learnt. I used it for the first time and I liked it very much. I will use it for my future studies." (S3)*

*"Lyricstraining is a great site for me who likes listening to music." (S4)*

*"The Plot Generator was even better than I expected. Using different phrases (I wrote down some useful phrases like 'To make matter worse'), they created a nice story. It was a fun activity. I decided to use Write and Improve more often these days. I think it will improve my writing before the exams." (S5)*

As another advantage, participants had expectation for feedback to check their mistakes and they found this opportunity through IDLE sources. Two of the participants explained this process as follows:

*"Quillbot helped me to learn how to make sentences better." (S4)*

*"I wrote an essay and used the virtual writing tutor site to check it. I learned both my grammar mistakes and the level of the words I used. It has been very useful in this respect." (S6)*

It was found out that participants became aware of their learning process and their proficiency level which led to self-evaluation and reflection. One of the participants conveyed his views on such an awareness as follows:

*"I have been listening to BBC Six Minute English program every day since Tuesday, but there are parts that I cannot understand because I need improvement in listening, but in this way, I can feel that I am improving slowly, I can progress, but yet very slowly." (S1)*

All in all, it was found out that Turkish EFL learners used some digital sources like English self-study sites, vocabulary apps, YouTube channels, writing apps, and reading platforms more than other digital platforms to improve their English proficiency. With the help of IDLE practices, they wanted to improve their vocabulary knowledge and some language skills like listening, reading, and writing mostly. By doing so, they used some IDLE sources more frequently than others and they expressed how effective these sources were in their out-of-class language studies.

## Conclusions

The findings of this study indicate that Turkish EFL learners used IDLE sources to improve their language skills and areas like vocabulary, listening, reading, writing, speaking skills, grammar, and pronunciation, respectively. To this end, they preferred to use some IDLE sources more than others since they got feedback, liked the source, or they had just fun in the simplest terms. The current study is believed to bring new insights for the implementation of IDLE practices inside and outside EFL classrooms. Since IDLE is a fairly new concept, educators and material developers in the EFL field can benefit from the accessibility of digital sources. They can help learners use various digital sources for the learning objectives based on learners' interests which will enhance personalized language learning. This study focused on IDLE sources used by English preparatory program students at the tertiary level; hence, the results are limited to the data obtained from a small group of participants. Future studies can be conducted in various contexts with a great number of participants. IDLE practices and their effects on both formal and informal language education can shed light on further implementations in learning processes.

As Prensky (2007) stated fun is a powerful motive for learners because when the learning happens under pleasant conditions, learners feel relaxed and they become open to learning new things. IDLE sources are like gems in a

treasure chest for learners. There are various options for the different interests of learners. These digital tools and platforms are constantly evolving and so selecting more appropriate and credible ones requires some digital literacy skills as well. At that point, the role of educators is to raise awareness for IDLE in the language learning context. Creating some opportunities for the use of IDLE sources in or out of class can boost its effect both as a complementary and combinational tool in digital learning environments.

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# Principles of Training in the Field of Telecommunications at the Base of E-Learning System

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## Abstract

The paper presents the theoretical background of system of training in the field of telecommunications and intermediate results of it's implementation with the help of e-learning platform at the Center for Aerospace Education of the Belarusian State University. The aim of the work was to make the process more effective by engaging students in learning through their involvement in the collaborative classroom projects within a special education course. Analysis of video recordings of observations of the processes of self-organization, reasonable cooperation and mutual exchange of information inside a small group of students in the competitive environment made it possible to avoid serious conflicts.

The main attention was paid to identification of the student's motivational states and detection of ways of productive interaction between the participants in the educational process. Students were expected to spend substantial amounts of time in independent learning and implementation of educational projects. In the beginning, a minimal number of participants were involved and a group was created to carry out simplest projects. The team productivity and the probability of success has been estimated periodically by the students themselves while solving the problem. Gradually, the roles of students in the group has been determined, and the group recruited the strategically required number of participants. It is shown experimentally that success and stability of small group is depend on proper distribution of roles. Project activities allow students to gain the necessary practical experience, since the projects being implemented are an example of some industrial problems.

**Keywords**: telecommunications, e-learning platform, collaborative classroom projects

## Introduction

Modern efficient industry requires a well-organized system of human relationships - rational division of labor, cooperation, and mutual assistance. Rational relationships within a production team allow for finding new niches in economic activity and help the enterprise survive in a crisis situation. Since students easily learn and then copy what they have seen in university during their professional activity, the model of such relationships should be visible to them at university. This also applies to working methods, skills in working with modern equipment, attitudes towards ecology, and ways of solving personal problems.

Most researchers tend to agree that joint activity based on the principles of rational cooperation allows for increasing individual productivity in any field of activity. Since the positive influence of cooperation on our cognitive abilities is genetically inherent, it should be used in organizing the educational process. An important role is played by the method of assessing the results of work and the levers that allow managing the work of the group.

The paper includes the theoretical background of the process of students cooperation in order to implement educational projects. It does not look highly scientific. It is written mostly by students themselves. That is why it reflects not only the hard work on improvement of their English, but also their attitude to the process of education and to the results of the sociological experiment on organization of educational process realized at the Aerospace Education Center of the Belarusian State University.

## Principles of Rational Cooperation

Educational groups mostly consist of 20-25 people. Such a group will not function as a single system as it is designed for individual work. Since roles and responsibilities are duplicated during academic tasks, there is an opportunity to exploit a desk mate, making individual work less effective. Additionally the role of the teacher in such educational system is look like the role of Mallory from the classical man-in-the-middle attack (fig.1). That is why such education is not extremely effective.

Working in a small group can produce better results and also be beneficial for students' psychological preparation for functioning in future work collectives. A small group is a relatively isolated association of a certain number of

people who interact, depend on and influence each other. Such a group is formed to achieve a specific goal(s). Within this group, its participants perform various duties, and joint activities are coordinated depending on each other. As a result, a single independent mechanism is formed. Effective groups usually consist of people with different knowledge and experience. According to research (Sundstorm, 1990), the number of members of an effective group should be sufficient to ensure constructive interaction but not so large as to create obstacles for discussion. Studies show that the best group size is the smallest number of people required to achieve the goal. For solving many tasks, 3 to 5 people are enough. This is the optimal number of participants in a team for academic tasks. In addition to reducing decision-making time, it also accelerates the process of forming the group. Effective groups usually consist of people with different knowledge and experience (Verderber et al., 2017).
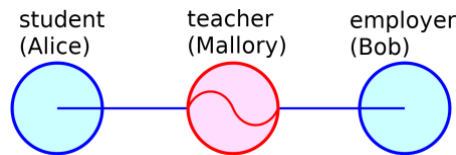


Fig 1. An illustration of the the teacher in the middle of the man-in-the-middle attack

The rules of functioning for such a group are determined by the fundamental laws of nature. It can be viewed as a small community in which there is a clear division of roles, necessary for the prolonged existence of this union of individuals and for the survival of each individual separately. This mechanism works similarly in laboratory rats, monkeys, and other animals. Dominants and subordinates, autonomies and outcasts form in the pack, meaning that there is a distribution that leads to various patterns of behavior in the group. When changing groups, roles are usually redistributed. Meredith Belbin's research (Belbin, 2010) identified and categorized 8 (9) main roles/psychological qualities that are inherent in every person. 2-3 of them are leading in accordance with personality traits, intelligence level, and previous experience. It should be noted that one person can perform several roles.

To form an effective small group, certain rules must be followed. Arbitrary division is usually not a good idea. Since the formation of working groups in a student collective does not occur on its own due to a lack of personal motivation and understanding of the meaning of the union, a third party, an observer who corrects all the main innovations, a sort of coordinator, is necessary. Naturally, effective teams are formed extremely rarely, since people tend to invite partners similar to themselves into the team, and as a result, there is duplication of psychological roles (which is why the group falls apart in the "storming" stage). Roles are not only assigned based on an individual's abilities and opportunities but also in the process of interaction between participants. The role is given to the person who confidently takes it on. The coordinator should take on the identification of roles and their distribution among the groups (Belbin, 2010).

Forming a group is one of the most important stages of group life (fig.2). At this stage, the key factor is establishing social connections, evaluating the essence of the work, and identifying each member as a part of the group. After this stage comes the so-called "Storming" phase. This is the moment when the group comes out of its equilibrium state, tension arises, and roles of each member are clarified. Here, the role of the leader, the expert, the performer, as well as the role of the so-called outcast will be determined (Tuchman, 1965).
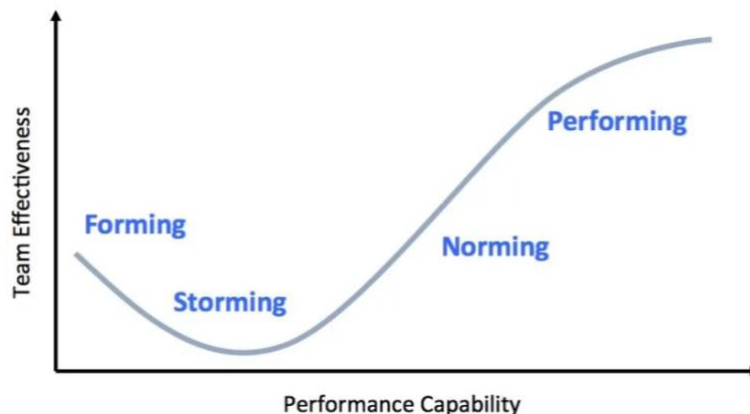


Fig 2. Group dynamics according to the Tuchman model

The role of the organizer (leader) is one of the main roles (fig.3). The main personal quality of an effective leader is responsibility. To determine a person for this role, it is necessary to simulate a situation in which those who can take on a certain "blow" will stand out from a group of people. There are games for identifying leaders, each of which implies a situation where a person will take on a leadership role. In the case of a study group, the coordinator creates conditions in which decision-making is necessary "here and now". An important point is the manifestation of not personal responsibility, but group responsibility.



Fig 3. One of the stages of forming a small group to carry out the project.
The man in the foreground is trying to take on the role of organizer.

Identifying the least productive person, the outcast, is important for ensuring the group's stability. The presence of an outcast motivates the others and allows the group to identify them as the "weak link" and relieve tension during moments of conflict. This role should be considered as one of the driving forces, as relieving tension allows the system to return to equilibrium.

There are concepts such as cohesion and tension. Cohesion in a group is a stabilizing factor, as support and a sense of security are necessary to complete actual tasks. However, if the system, in this case the group, remains in a state of absolute equilibrium, the group's goals will be secondary. Tension is a motivating factor that takes the group out of equilibrium. Tension creates dissatisfaction and a desire to return to the original equilibrium state. In this case, the working group must come to a joint decision on the task with which the majority agrees. Ideally, for maximum productivity, the group must maintain a balance between the sense of cohesion and tension. In a working group, the level of cohesion largely depends on the interest and importance of the task to all participants (Andreewa, 2001).

Factors that influence the development of community in a group include:

- Group goal
- Voluntary participation
- Freedom of expression of opinion
- Success in achieving the goal and its recognition

Thus, it can be concluded that a productive small group is a fairly complex system that must be formed according to certain rules. Participants must be selected, prepared, and trained so that the group can exist stably and productively complete tasks. A prelude to forming a small group can be some testing activity within a minimum group of two people, which will later help to determine roles and learn to cooperate to solve a specific task. In this case, the preparation of materials and presentation of courses on "Fundamentals of Telecontrol and Navigation" were used as such an activity.

## Students in the role of a teacher

One of the formats for conducting lectures, in addition to the commonly accepted one where the teacher presents the material, is the students' performance in the role of teachers (fig.4). The Zone of Proximal Development (ZPD), defined by Vygotsky, is determined by the content of the tasks that the child cannot yet solve independently, but can solve in joint activity with an adult. This form of organizing feature classes involves independent study of course materials by students, followed by a presentation of the learned material. Students have the opportunity to independently choose a topic from a list of topics proposed by the teacher, and then prepare a report and present it during the lecture class. The report involves the presentation of the main concepts and positions of the topic being studied, thereby fully or partially replacing the teacher's discussion of the topic. The report can be done using computer technologies (such as pictures, presentations, audio and video recordings, etc.).



Fig 4. Performance of students as teachers

This approach can be best implemented within a single class group for conducting lectures or seminars. Changing the structure of educational activities has an impact on the quality of knowledge acquired, as well as the interest and motivation of learners. This approach has several advantages: students gain public speaking experience, which simplifies all subsequent challenges of speaking in front of an audience, puts themselves in the teacher's shoes and begins to perceive this role firsthand, which allows them to understand the difficulties of this work and determines a more loyal attitude towards the teacher, which provides a sense of understanding, and also takes responsibility for their understanding of the topic and preparation for it, as well as accessible explanation for others. There are many factors in general.

The most significant positive impact of students' independent preparation for lecture sessions is the active development of analytical thinking skills. As a result of working with large volumes of unfamiliar information, competencies in self-learning, identifying the most significant aspects of the topic being studied, structuring information with subsequent organization of a report on the topic in conjunction with the work of the main sensory organs are formed. In this case, they are involved more actively than when writing notes from the teacher's words. These skills are some of the most in-demand for modern specialists in any field of activity.

For graduating students who are writing a coursework or thesis, important skills are public speaking, report writing and preparing a presentation on the research topic. A similar situation is modeled in the independent preparation of students, which allows improving the necessary competencies as a result of their training.

The aforementioned advantages are relevant primarily for students who present on the topic being studied, but such an approach to organizing educational activities has positive aspects for the rest of the group's students. First of all, it should be noted that the perception of information delivered by a student with a similar level of knowledge (compared to the teacher) significantly facilitates its perception and contributes to better assimilation of knowledge. During the use of such a methodology, the principles of the P2P (peer-to-peer) system are fully implemented - a system of mutual learning in which people standing at the same level of the educational hierarchy participate, so there is no vertical subordination between the participants of the educational process.

Most often, students understand each other's educational needs well, have similar abilities in perception and memorization, and comprehend the presented information at roughly the same level (Strauss & Howe, 1991). Thus, it becomes possible to avoid situations where a teacher presents material in an inaccessible way for students, which hinders the learning process. In addition, students within formed study groups often have good interpersonal relationships, which can contribute to better understanding, concentration, and increased interest.

The use of various forms of presenting educational information, achieved through different approaches of each student to preparing the material, also leads to an increase in students' motivation. Diversity is achieved by introducing new approaches to education, which involve changing familiar scenarios, and often has a positive impact on students' motivation and interest.

However, when using this approach to learning, students may face a number of difficulties. Often, these difficulties may be related to the lack of sources containing the necessary information on the topic and the complexity of finding it. This problem is especially characteristic of specialization subjects that require the most up-to-date data on the topic and in-depth study of individual facts. The lack of sufficient professional competencies among students can also lead to incorrect interpretation or incomplete representation of information.

It is also important to note that all students have different attitudes towards the educational process, and not every student is initially interested in quality report preparation, which negatively affects the educational process results for the entire study group. It should also be noted that not all students have the skills of competent presentation of information due to a lack of pedagogical experience possessed by the teacher. For this reason, individual presentation features of each student do not always have a positive effect on knowledge acquisition.

Most of the above-mentioned drawbacks can be eliminated with the teacher's competent participation in the educational process. The most productive steps may include more detailed planning of the presentation topic with the students, which involves discussing a number of questions that need to be covered in the report. This approach can significantly improve the quality of the presented information and, if necessary, facilitate preparation for the exam or test. In addition, this educational methodology provides feedback, which simplifies the process of information perception from both sides. Thus, we can highlight specific advantages and drawbacks in the form of the table (table 1):

Table 1. Advantages & drawbacks

| Advantages | drawbacks |
|---|---|
| Experience in public speaking | Limited resources for information search |
| Experience in independent information search | Limited time for preparation and interaction |
| Experience in structuring found information | Not all teachers are ready for a new vision (rigid thinking, reluctance to criticism) |
| Common language of communication and information dissemination, which facilitates understanding for others | Possibility of misunderstanding the topic (can be corrected by the teacher) |
| Parallel preparation for exams | |
| Communication with the teacher (literature, unclear topics, any consultations) | |
| Ability to give feedback to the teacher on his methods | |
| Mutual observation in information delivery | |
| Opportunity to learn something new for both parties (achieved through openness to criticism) | |

The optimal number of speakers in this case is two people. As a rule, intuitively for students, this becomes fundamental to motivation in preparation, since competition gives them an idea that there is always a chance to perform worse than a partner (Deutsch et al., 2000). Excluding the motivation factor, mutual support can be highlighted in case one of the students could not thoroughly understand the topics that arise in the preparation process, the other one can help. The number of students in preparation is no more than two, ensuring the absence of an irresponsible approach. As we know, in small groups, the lack of a balanced distribution of tasks is often manifested, and one person is not enough to deal with a large amount of material. Using this method enhances students' ability to self-organize and ultimately allows them to independently formulate their educational needs and satisfy them. The logical continuation of the lecture course organized according to the methodology described above is project activity.

## Assessment system and process management levers.

This approach involves students working in teams on projects based on topics previously covered in the course lectures. The project work is organized in such a way as to allow students to independently divide themselves into teams, choose a project topic, search for necessary information, organize the work, complete the assignment, and present the results obtained. As before, the teacher does not participate in the process of organizing groups and primarily performs the role of organizer of the necessary conditions for work.

The completion of projects also involves the continuous presentation of intermediate results and their subsequent evaluation by the students themselves. An essential stage of evaluation is writing a review that describes in detail the main provisions within the topic of the project and contains an analysis of the work performed. Reviewing is done by one of the groups working on other projects. Group members can seek the advice of the teacher or another qualified specialist in this area. The review should contain constructive comments on the work process that allow for improvements to be made to the group's work.

Other students in the group who worked on other projects but have theoretical knowledge of the topics of the other projects, after familiarizing themselves with the course lectures, also participate in their further evaluation. Based on the evaluation results of the group's work on the project, suggestions for its modernization can be made, which positively impacts the final outcome of the work. The need for evaluation also allows all students in the group to have an understanding of each of the projects being completed, to acquire a wide range of theoretical knowledge on many modern topics within their specialty. Mutual evaluation also positively affects the ability of the student group to independently organize their work, as the teacher's opinion regarding the quality of the work performed is not determining, and evaluation takes into account the opinions of other students.

The group's progress is evaluated after the presentation of the results, which takes place over a week, through a specially prepared form with questions filled out by other students. Based on the results of anonymous evaluation, the group working on the project receives results in the form of a table with answers. While evaluating, students can make suggestions not only to improve the process of organizing work in the group but also to modernize the technical side of the task being performed. Thus, the group can track its progress and use the suggestions to improve the results of its work.

Based on the evaluation results, a rating is compiled (table 2), allowing for a comparison of the work of different groups. If one of the groups encounters significant difficulties in their work, they can take advantage of additional consultation with a teacher or members of other groups. If the rating of this item does not increase over a certain period, the topic of their project may be changed or the team may be restructured.

Table 2. Rating of projects.

|   | project | score | star rating |
|---|---|---|---|
| 1 | The web-application for a self-organization of student | 3, 0 \| 5 | ******. |
| 2 | Optical communications between satellite subsystems | 4, 2 \| 5 | ******** |
| 3 | Aerodynamic platform for pre-flight tests of nanosatellites | 3, 6 \| 4 | ********. |
| 4 | Grid calculations of heat conduction equations | 0, 0 \| 3 | *** |
| 5 | Ground control complex | 0, 0 \| 3 | *** |
| 6 | Lunar flight simulation | 3, 1 \| 4 | ****** |
| 7 | Image processing: removal of bright objects in space images | 0, 0 \| 2 | ** |

Project-based learning allows students to gain necessary practical experience, as the projects implemented serve as examples of some working tasks, as well as to acquire deeper subject knowledge in specialization disciplines in practice. Learning on specific tasks of enterprises engaged in the field of students' future qualifications (case-based learning) is the best of all possible methods that allows training in accordance with the most modern trends in the labor market in this area.

It should be noted that such an alternative organization of the educational process will be more effective with the real cooperation between the higher educational institution and the enterprises implementing the employment of specialists in this field.

Thus, creating a system of optimal relationships between labor market participants is one of the key tasks in the existing educational and economic paradigm. Optimization of this factor will allow extracting maximum benefit from the resources invested in the higher education system and lead to their more competent distribution..

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# Editing EndNote Default In-Text Citations in Academic Writing

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## Abstract

EndNote is a citation management software programme among many others—such as RefWorks, Mendeley, and Zotero—for storing, managing, retrieving, and citing sources in academic writing. This study deals with my lived experience of how I edit the EndNote default in-text citations of reference types with reference to American Psychological Association (APA) 7th style of academic writing. For this, I collected my own direct but scattered experience of editing the default form of in-text citations while citing from the EndNote library. I present the results and discussion thematically, in terms of the in-text citation types on the basis of the way they can be accurately managed in MS (Microsoft) word file. The findings lead to conclusion that the EndNote default in-text citations can be edited to achieve the accurate citation of a wider range of citation types. The implication is that the strategic use of EndNote helps to achieve accurate and systematic citation with slight manual adjustment, thereby accelerating and systematizing academic writing as a whole.

***Key terms***: EndNote, in-text citation, EndNote library, APA 7th, default citation, intended citation

## Introduction

Citation refers to the task of "acknowledging how others contributed to your work" to avoid plagiarism and self-plagiarism in academic writing (APA, 2020, p. 253). Citation has two complementary parts—brief in-text citation and (full) end-text or reference citation (see APA, 2010, 2020). EndNote in-text citation, the concern of this paper, refers to the in-text citation as a result of citing the sources from the EndNote library in a word file. The EndNote default in-text citation appears in the form of "parenthetical citation" that can be systematically edited using the EndNote (APA, 2020, p. 262). This paper deals with how to edit the default EndNote in-text citation as per the need, following the APA 7th style of citation without mismatching each of the in-text citations with their corresponding end-text or reference citations. Therefore, the research problem is to consider how to edit the default in-text citation to bring about accurate, intended citations depending on the 'source and author' types. Accordingly, the all-encompassing objective of this paper is to demonstrate through screenshots and writing, some technical operations for editing default in-text citations of sources with various author types to achieve accurate intended citations.

EndNote, as a software for citation management, is supposed to help in accurate citations. My direct experience of using EndNote shows that if all the sources used are cited using the EndNote library, there is hardly any possibility of mismatch between in-text and end-text citations. However, using EndNote is not a panacea for solving all the problems in citation. More specifically, regarding in-text citation, its default form does not fit all contexts. For accurate in-text citation in various contexts, the default citation should be strategically edited.

The existing literature shows that there is little dissemination on editing EndNote default in-text citation as required to produce accurate citation with reference to APA 7th style of citation. Hensley (2011), Lonergan (2017), Lorenzetti and Ghali (2013), and Mendes et al. (2019), for example, deal with the use, usability, and the users' preferences of different citation management software programmes. Most of the works, such as  Walker et al. (2007), Hupe (2019), Sherwin (2020), and Sharma (2022) highlight only the features and importance of the EndNote, and the basic guideline on how to use the software. Some works on EndNote, such as Agrawal (2009) and Clarivate Analytics (n.d.) provide a bit detailed guideline for its use. However, none of these works deals with editing default in-text citations to make accurate citations occur in accordance with APA (2020). This article is expected to fulfill this gap in the existing literature.

In this article, I, therefore, want to share some strategical aspects of ensuring accurate in-text citations in academic writing on the basis of my lived experience with using EndNote. My lived experience of using EndNote for managing

citation in an academic writing, and its meaning making can be beneficial to all the academic writers, researchers, research supervisors, librarians, EndNote trainers and users, and even to the ones who have not yet used EndNote but are willing to do so for managing and citing sources in their academic writing, since it sheds light on how to systematize citation in general and in-text citation in particular in academic writing.

## Methodology

This article aimed at exploring my direct experience of editing EndNote default in-text citations for desired, accurate citation format. For this purpose, I adopted the technical reflective auto-phenomenological research design. In general, phenomenology deals with gaining "a deeper understanding of the meaning of everyday . . . phenomena" (Vagle, 2018, p. 35). In reflective phenomenology, the pre-conceived world is taken aside in order to concentrate on the perception of the real world phenomena related to the study (Smith et al., 2009). The reflective auto-phenomenology "involves the analytical isolation of phenomena" experienced by the researcher him/her-self (Gorichanaz, 2017, p. 3). In this phenomenological study, I have emulated through writing my pre-reflective lived experiences of how I managed to edit the default in-text citations using the EndNote to bring about accurate in-text citations, recalling the process I followed, by using various records, such as diary, screenshots, and my writings with the EndNote citations. In this paper, I have thematically explicated the data (i.e., my lived experience of editing the default in-text citations), and descriptively presented the reflections of the findings via verbal description and screenshots methods. That is to say, I share through writing and screenshots some strategies of editing EndNote default in-text citations to accurately manage the citations of the sources used with reference to APA 7th style of writing.

## Result and Discussion

I have explicated and interpreted my lived experience of editing the default in-text citations to accurately manage them in academic works, such as journal articles and other research reports. First, I cited the intended sources from the EndNote library by way of placing the cursor in a particular space in the word document where the citation is to be inserted. Then, I went to the EndNote library and selected the reference to be cited, and clicked on the symbol ' 🗨 ' for 'Insert Citation' in the EndNote library toolbar. This short chain of commands resulted into the appearance of the in-text citation in the intended place, and that of the full reference citation at the end of the text as per the intended style of citation. However, the default in-text citation appears as non-narrative, (Author, Year) citation, which is not appropriate or sufficient in all the contexts. In the following sections, I present how, after several trials and errors, I edited the default in-text citations of various types of sources with various author types into the appropriate ones as per the APA 7th style of academic writing.

*One-Author Work Citation*

The EndNote default in-text citation of a one-author work appears in parenthetical form together with its end-text citation as:

> (Peoples, 2021)
>
> Peoples, K. (2021). *How to write a phenomenological dissertation: A step-by-step guide*. Los Angeles: Sage. Retrieved from https://www.ebooks.com

To convert this non-narrative in-text citation into narrative one as required, I edited the default citation by following the steps: right-click on it > Edit Citation(s) > Display As: Author (Year) as shown in the screenshot in Figure 1.

**Figure 1**. *Conversion of Narrative Citation into Non-Narrative One*
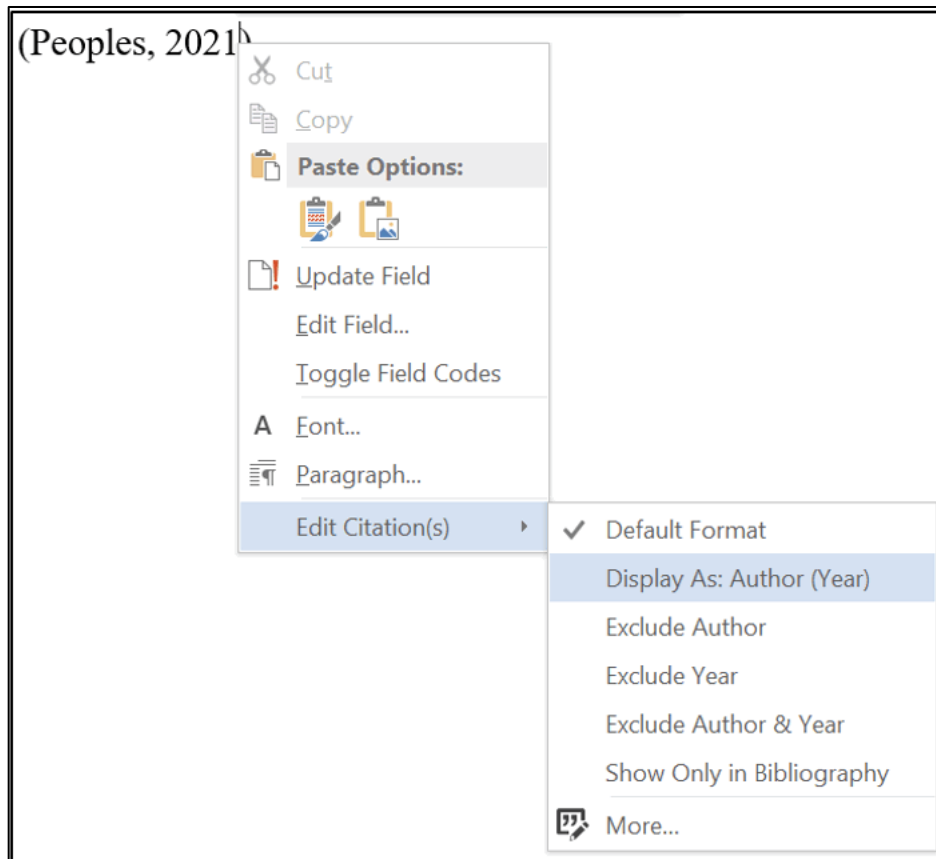


resulting into the subjective narrative citation, 'Peoples (2021)'.

When the subjective narrative citation needs to be changed into possessive as 'Peoples's (2021)' in the context such as 'Peoples's (2021) idea that . . . ', I typed the possessive form of the author before its subjective form as 'Peoples's peoples (2021)', and excluded the author operating the following steps: right-click on the subjective narrative citation > Edit Citation(s) > Exclude Author as shown in Figure 2.

**Figure 2.** *Conversion of Subjective Narrative Citation into Possessive One*
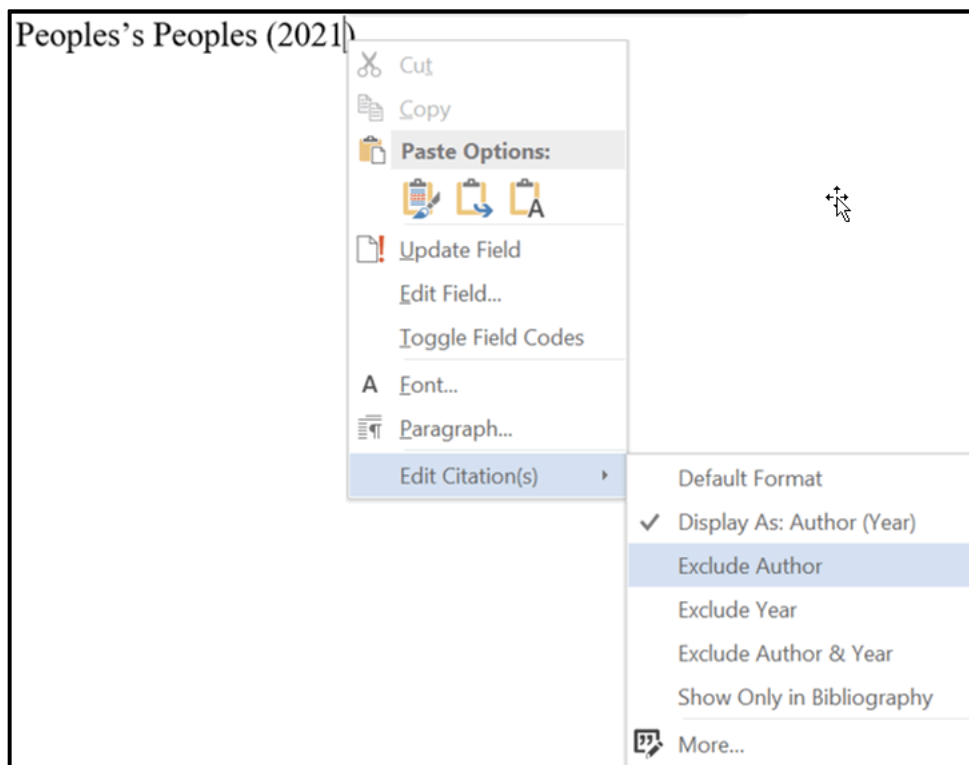


resulting into the intended structure of the in-text citation.

*Two-Author Work Citation*

The two-author work in-text citation, as in the one-author work, appears in parenthesis in its EndNote default form with its corresponding end-text citation as shown in the following example:

> (Sharma & Banjade, 2023)
>
> Sharma, U. N., & Banjade, G. (2023). *A course in phonetics and phonology* (7th ed.). Sunlight Publication.

The parenthetical in-text citation in this example can be changed into narrative one in the same way as the parenthetical citation of the one-author work since every parenthetical citation can be converted into non-parenthetical one in the same process. The only but slight difference is of the product. That is to say, the two authors are separated by '&' in parenthetical citation while the '&' is replaced by 'and' in narrative citation as per APA (2020). This change automatically occurs while converting the parenthetical citation into non-parenthetical one using EndNote. For example, the narrative form of the citation '(Sharma & Banjade, 2023)' appears as 'Sharma and Banjade (2023)'. For the conversion of this citation into possessive one, I typed the possessive form before the citation as 'Sharma and Banjade's Sharma and Banjade (2023)', and excluded the author from Edit Citation(s) option. Then, it appeared to be 'Sharma and Banjade's (2023)'.

*Three-or-More-Author Work Citation*

The in-text citation of a work with three or more authors includes the surname of the first author followed by 'et al.' (see APA, 2020, p. 266). EndNote manages this automatically. For example, the default in-text citation of a work by three authors along with its end-text citation appears as:

(Cohen et al., 2007)

Cohen, L., Manion, L., & Morrison, K. (2007). *Research methods in education* (6th ed.). Routledge.

We can edit this citation into subjective and possessive narrative citation through EndNote to result in 'Cohen et al. (2007)' and 'Cohen et al.'s (2007)' respectively in the same way as the one or two-author work citation.

### *Group-Author Work Citation Without Abbreviation*

In the end-text citation of any work with a 'group author' (also called corporate author), we "spell out the full name of the group as presented in the source" (APA, 2020, p. 268). Even in the in-text citation, the group author is not necessarily abbreviated, but it can be done if it appears at least three times in the work. When the in-text citation requires the full name of the group author due to its appearance less than three times in a paper, the default citation appears in the intended format if the required information has been appropriately managed in the reference field of the EndNote library. That is to say, the corporate author's name should be followed by comma (,) while entering it to the Author field in the library.  For example, the default citation of a work by American Psychological Association appears to be:

(American Psychological Association, 2010)

American Psychological Association. (2010). *Publication manual of the American Psychological Association* (6th ed.).

The in-text citation in the above example can be edited into subjective or possessive narrative citation as required in the same way as the non-group author work citation.

### *Group-Author Work Citation With Abbreviation*

If the name of a group author appears three or more times in a work, the group author can be abbreviated. If the full name of the group author appears before its first citation in a work, all the in-text citations are abbreviated. However, if the group author name appears first in the in-text citation, it includes the full name of the group followed by its abbreviation. The subsequent citations are abbreviated. The full name of the group appears automatically in default form while citing through EndNote, such as '(American Psychological Association, 2020)'.

If the group author first appears in a narrative citation, the full form of the group author is followed by the abbreviation kept before the publication year in parentheses, separated with a comma, such as 'American Psychological Association (APA, 2020)' (see APA, 2020). To achieve such an in-text citation without mismatching it with its corresponding end-text citation, I typed the intended citation before its default citation as 'American Psychological Association (APA, 2020) (American Psychological Association, 2020)' and excluded the author and year from the default citation as shown in Figure 3.

**Figure 3.** *Group Author Work Narrative Citation With Abbreviation*
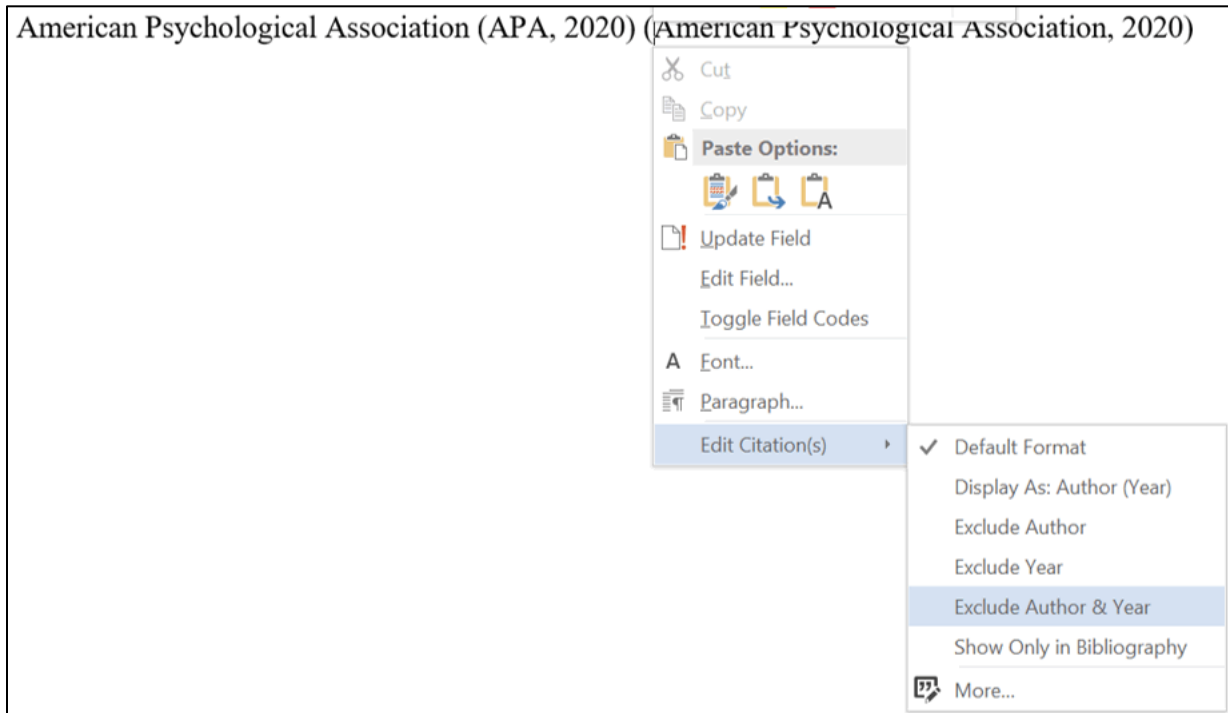


resulting in the intended format of citation.

If the name of the group author first appears in a parenthetical citation, the abbreviation is kept in square brackets after its full form, followed by a comma and the year of publication, such as '(American Psychological Association [APA], 2020)'

Such a citation can be achieved by following the steps: right-click on the default citation > Edit Citation(s) > More, as shown in Figure 4.

**Figure 4.** *Group Author Work Parenthetical Citation With Abbreviation (First Step)*
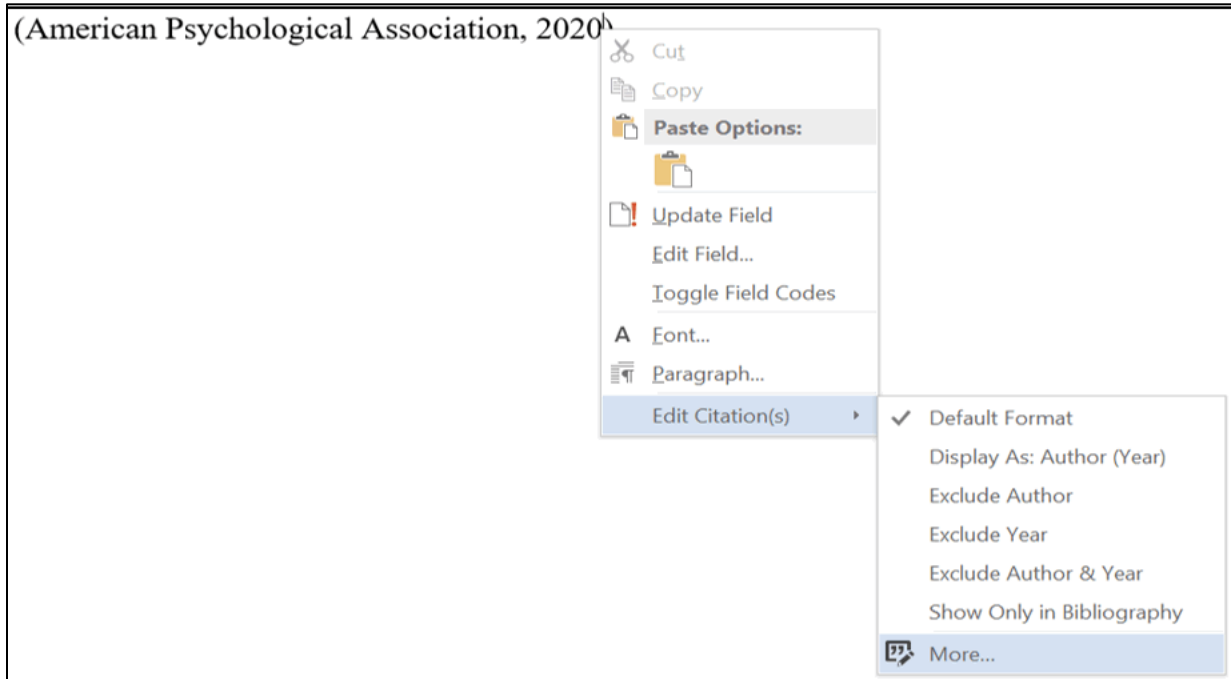


The operation results in the display as shown in Figure 5.

**Figure 5.** *Group Author Work Parenthetical Citation With Abbreviation (Second Step)*
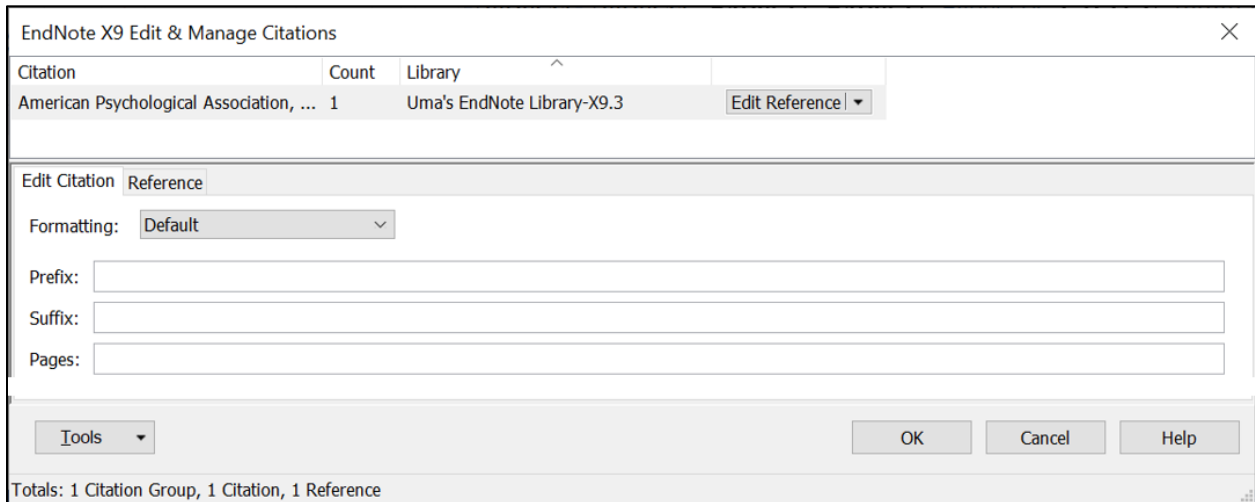


In field shown in Figure 5, change the Formatting into Exclude Author; enter 'American Psychological Association [APA], ' to the Prefix slot as shown in the screenshot in Figure 6.

**Figure 6.** *Group Author Work Parenthetical Citation With Abbreviation (Third Step)*
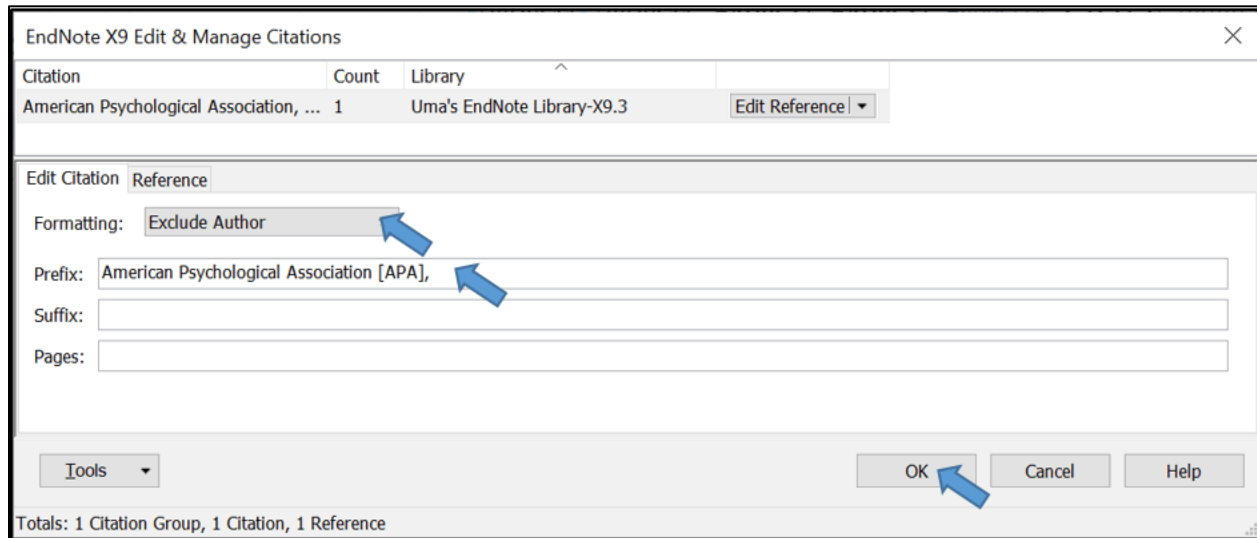


Click on OK or press enter to get the intended citation as: '(American Psychological Association [APA], 2020)'.

In the successive in-text citations of a work with the same group author, only the abbreviated form of the group author (i.e., APA) is written, such as '(APA, 2020)' in parenthetical form, and 'APA (2020)' in narrative form. For the derivation of '(APA, 2020)' from '(American Psychological Association, 2020)', follow these steps: right-click on it > Edit Citation(s) > More. The following display will appear as shown in Figure 7.

**Figure 7.** *Group Author Work Parenthetical Abbreviated Citation (First Step)*
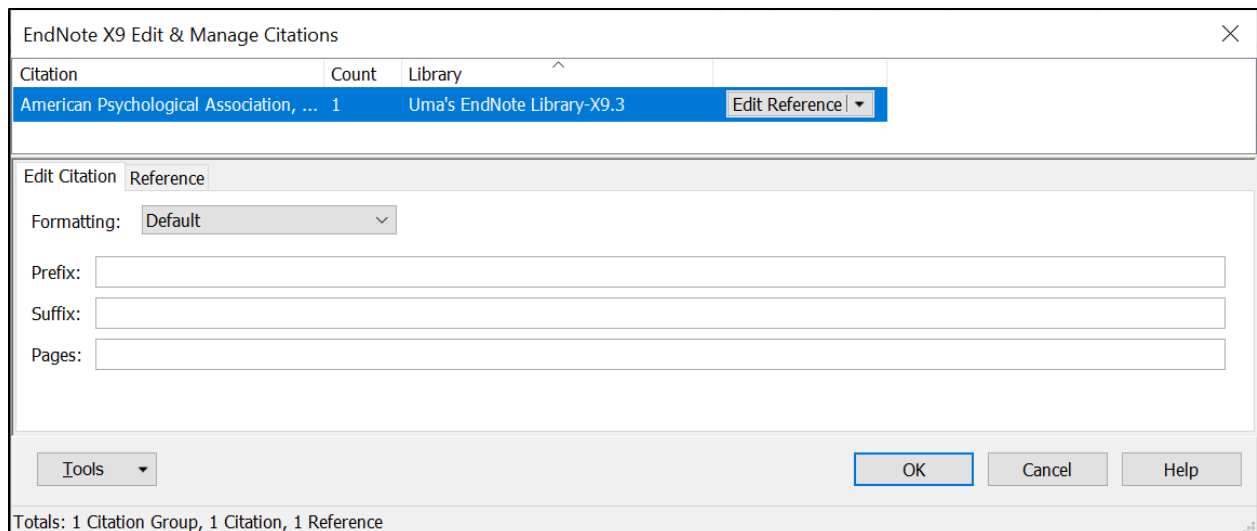


Edit the fields in the display as shown in Figure 8.

**Figure 8.** *Group Author Work Parenthetical Abbreviated Citation (Second Step)*
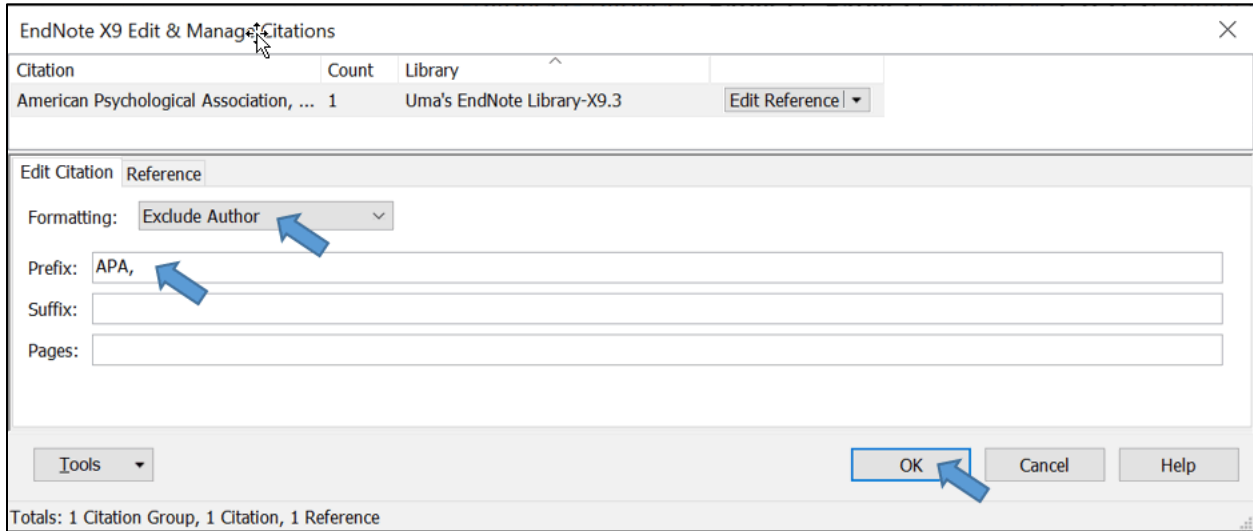


*Note*. There should be space after 'APA,'

Click on OK or press enter, and you will get '(APA, 2020)'.

For getting the citation as 'APA (2020)', exclude the author from the default citation: (American Psychological Association, 2020), and type 'APA' before the result.

*Citation With Page Number(s)*

Following APA (2020), we provide the author, year, and page number of the 'direct quotation' (which reproduces words verbatim from another work) cited in the text in both parenthetical and narrative formats. There are various ways of indicating page number. Only the page number in parenthetical citation is added through EndNote. To add the page number in the parenthetical citation '(Baker, 2011)', for example, right-click on the citation > Edit Citation(s) > More as shown in Figure 9.

**Figure 9.** *Parenthetical Citation With Page Number (First Step)*
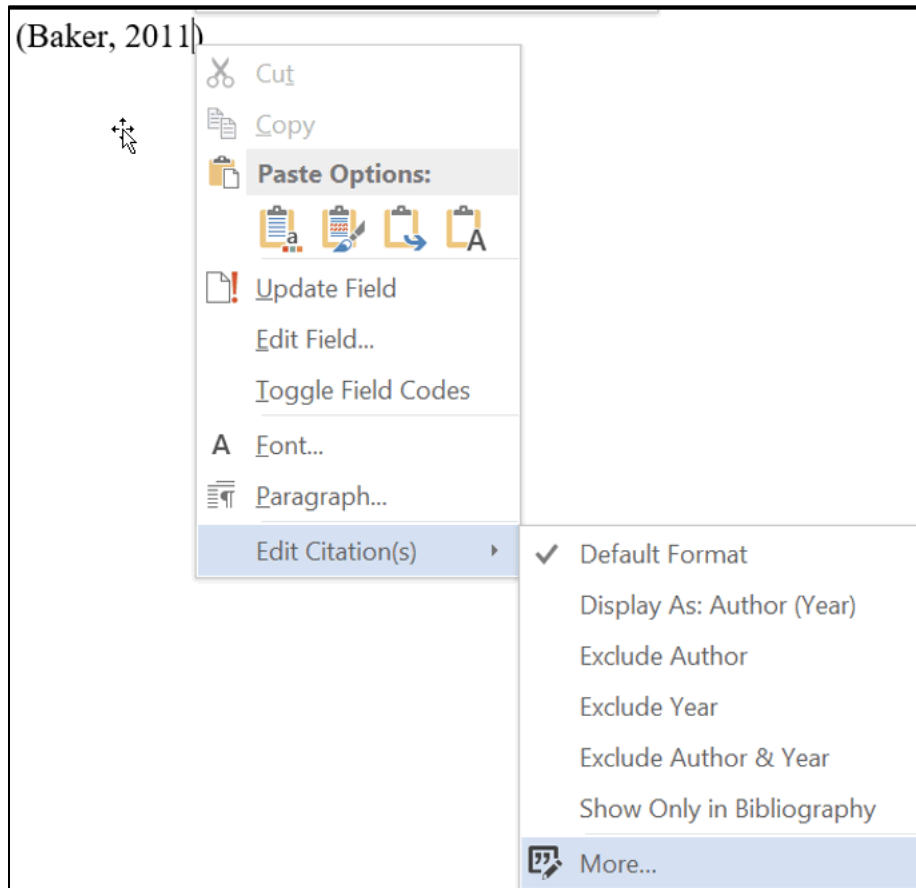


This action results in the dialogue box given in Figure 10.

**Figure 10**. *Parenthetical Citation With Page Number (Second Step)*
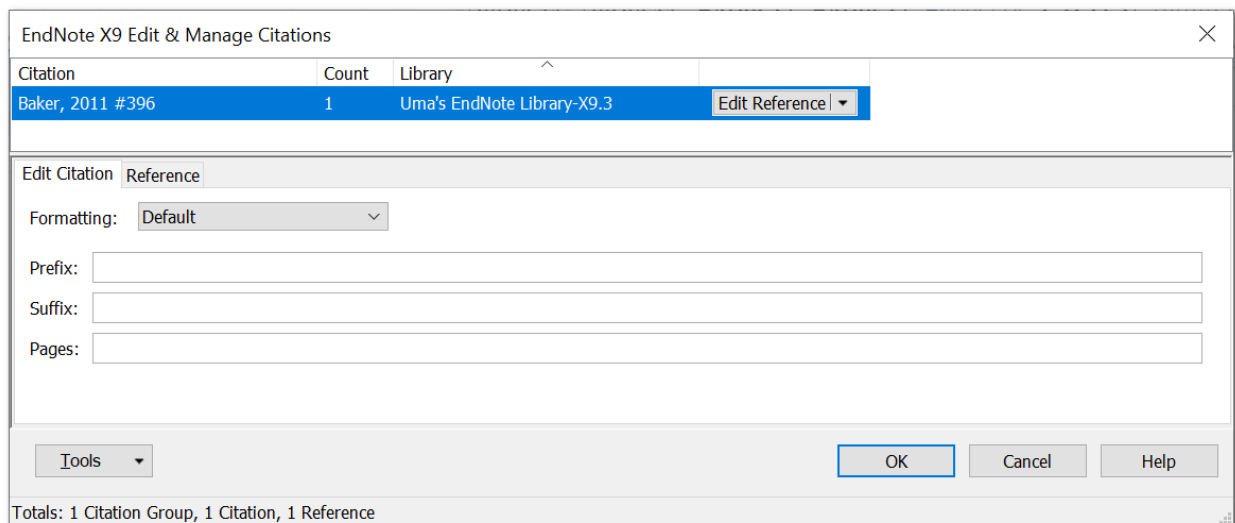


Type the page number of the cited quotation (e.g., 22) in the slot corresponding to 'Pages:' as shown in Figure 11.

**Figure 11.** *Parenthetical Citation With Page Number (Third Step)*
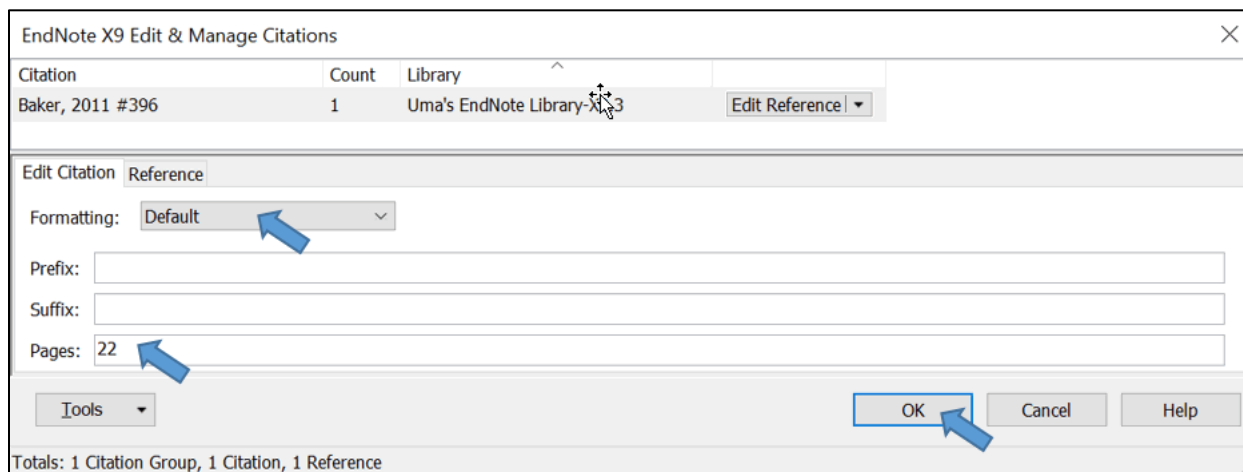


Then, click OK or press enter to get the intended result as '(Baker, 2011, p. 22)'. If the quotation cited extends on two or more pages, then the initial and final page numbers are typed separated by an en dash as shown as in Figure 12.

**Figure 12.** *Parenthetical Citation With Page Numbers*
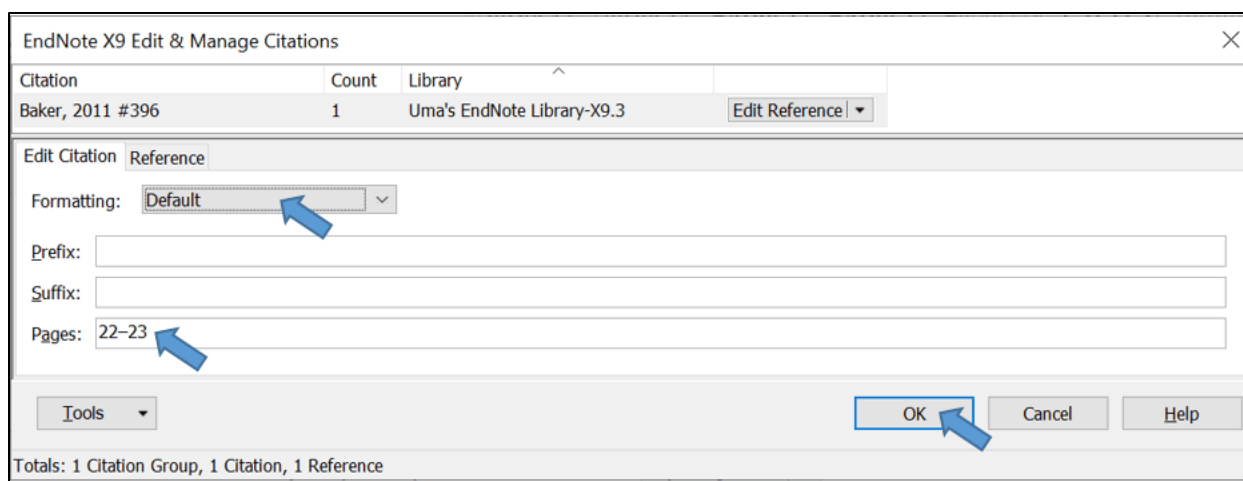


Then, click OK or press enter to get the intended result as (Baker, 2011, pp. 22–23).

The page number is not given adjacent to the year of publication in non-parenthetical citation. In such a case, the page number(s) are typed manually at the end of the cited material. For example, APA (2020) states that "Each work cited in the text must appear in the reference list, and each work in the reference list must be cited in the text" (p. 257). The page number of the quotation is indicated at the end of the cited 'block quotation (i.e., the quotation that contains 40 words or more) as well when the author and year are introduced earlier. For instance, we can write: In APA's (2020) words:

> If a quotation contains 40 words or more, treat it as a block quotation. Do not use quotation marks to enclose a block quotation. Start a block quotation on a new line and indent the whole block 0.5 in. from the left margin. (p. 272)

Note that the page number of the block quotation is given after the punctuation at the end of it, and no full stop is required after the page number as shown in the above example.

*Citation With Prefix and Suffix*

We can add prefix, suffix or both in parenthetical in-text citation as required using EndNote. For example, to add the required prefix or suffix or both, in the citation '(Friese, 2012)', right-click on its EndNote default citation > Edit Citation(s) >More to get the display as in Figure 13.

**Figure 13***. Parenthetical Citation With Prefix and Suffix (First Step)*
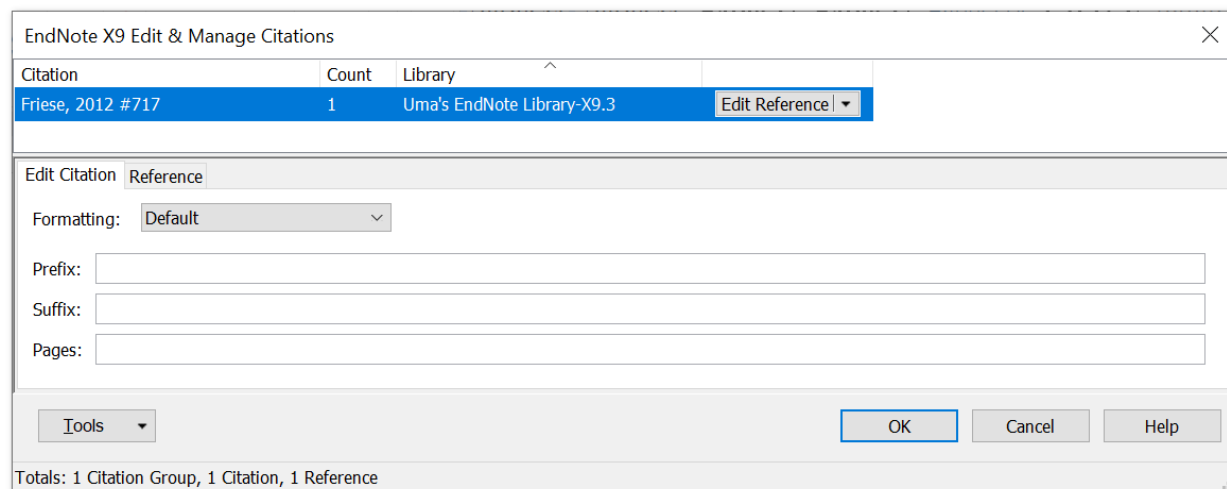


Then, type the prefix and suffix to be added in the corresponding slots as shown in Figure 14, for example.

**Figure 14.** *Parenthetical Citation With Prefix and Suffix (Second Step)*
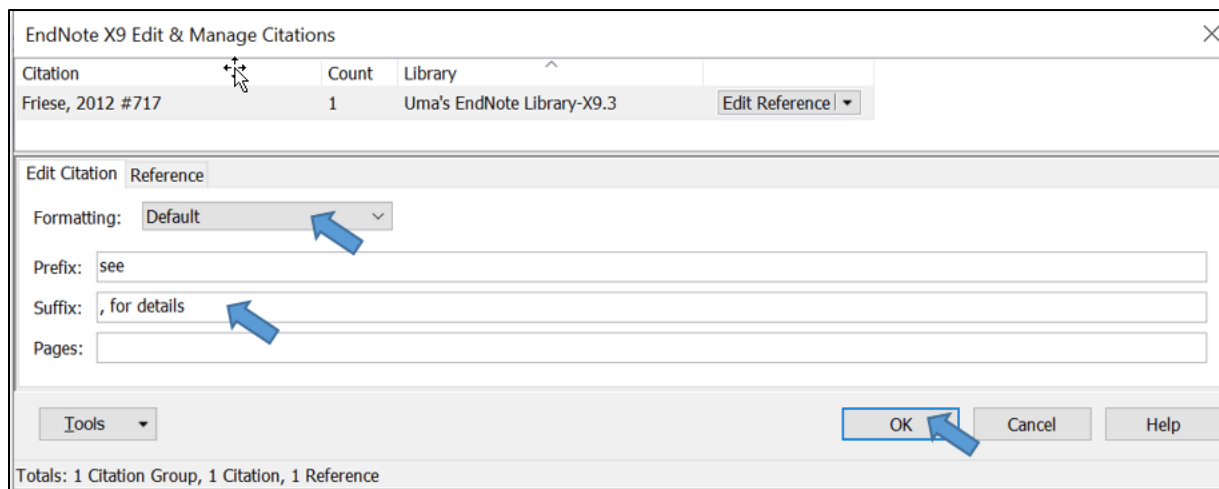


Then click on OK or press enter to get the result as '(see Friese, 2012, for details)'. Note that while typing the prefix in the slot, we should add one space at the end while the suffix should be preceded by comma plus one space as shown in the above screenshot.

*Secondary Source Citation*

APA (2020) suggests that we should "cite primary sources when possible and secondary sources sparingly" (p. 253). We can manage the intended secondary source citation editing the default citation of the concerned primary source. For this, I use the secondary source citation marker 'as cited in' as prefix element in the default primary source citation. For example, for the parenthetical citation of van Manen's (2017) idea as cited in Peoples (2021), I add 'van Manen, 2017, as cited in ' as a prefix to the default citation of the primary source to get the intended secondary citation as '(van Manen, 2017, as cited in Peoples, 2021)' (see Figure 15).

**Figure 15.** *Parenthetical Secondary Source Citation*
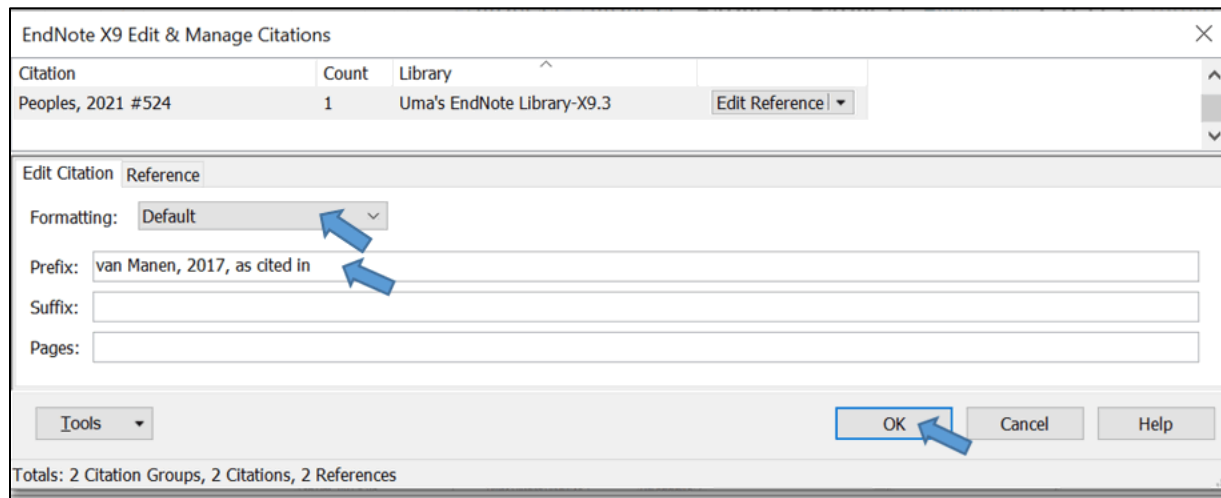


We can manage the narrative citation of secondary source, such as 'van Manen (2017; as cited in Peoples, 2021)', by inserting manually 'van Manen' before the citation '(Peoples, 2021)', and adding '2017; as cited in ' as a prefix as shown in Figure 16, and clicking on OK or pressing enter.

**Figure 16.** *Narrative Secondary Source Citation*
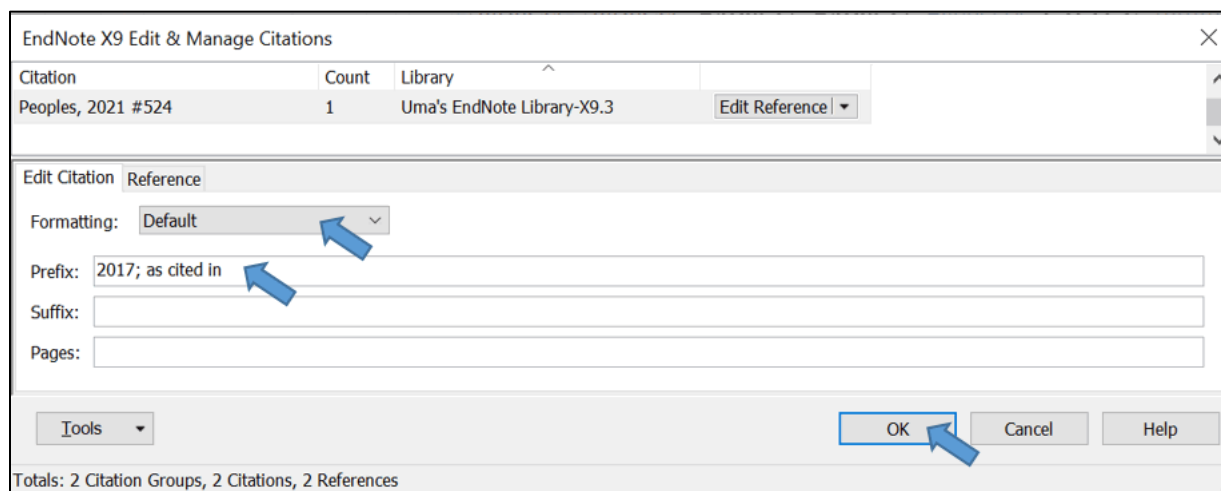


## Conclusion

Based on the discussion above, my experience of editing EndNote default in-text citations to achieve accurately formatted citations in accordance with APA 7th style of academic writing indicates that EndNote can effectively handle all types of in-text citations and corresponding end-text citations, with only minor manual adjustments required for certain citation types. These findings affirm that utilizing EndNote streamlines and expedites the citation process, thereby enhancing overall academic writing efficiency. Additionally, the research reveals that managing references within the EndNote library is a crucial prerequisite for commencing any writing task. This underscores the importance of familiarizing oneself with the usage of EndNote in advance. Furthermore, the findings demonstrate that employing EndNote for citations not only accelerates and organizes academic writing but is also nearly indispensable for ensuring consistent and accurate citation in works involving a substantial number of sources.

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# An Investigation of Using Elaborated and Metacognitive Feedback Strategies in Interactive Instructional Videos

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## Abstract

The purpose of this study is to compare the use of elaborated and metacognitive feedback strategies in interactive instructional videos in terms of undergraduate students' engagement and metacognitive awareness levels. This study also aims to investigate undergraduate students' evaluations of elaborated and metacognitive feedback in these instructional videos based on qualitative data. This study used a basic randomized post-test-only experimental design comparing two treatments supported by qualitative data. The participants were 52 preservice teachers who registered for an undergraduate educational technology course offered by a faculty of education. They were randomly assigned to the two feedback groups: the metacognitive and the elaborated feedback groups. The data were collected with the Short Form of the User Engagement Scale and the Metacognitive Awareness Inventory. In addition, qualitative data were collected through interviews and used to examine students' evaluations of the elaborated and metacognitive feedback used in the interactive instructional videos. The results showed that there was no statistically significant difference between the two types of feedback in terms of students' engagement and metacognitive awareness levels. The qualitative findings also suggested that while the two types of feedback did not provide a significant superiority over each other, students viewed the two types of feedback as serving different purposes. Our findings suggest that customizing the type of feedback based on students' answers and subject mastery level, or a thoughtful integration of both types of feedback, could enhance the learning experience in interactive instructional videos.

**Keywords**: Interactive Instructional Videos, Feedback, Metacognitive Feedback, Elaborated Feedback, Video-Based Learning

## 1. Introduction

While video-based learning has expanded dramatically since the 2010s (Kolas, 2015), the COVID-19 pandemic has highlighted the importance of relying on instructional videos in online education even more (Eidenberger & Nowotny, 2022). However, given that students may easily become inactive in video-based learning, interactive videos that can support user engagement and learning have gained popularity to promote active engagement and counteract the negative effects of passive learning (Sebille et al., 2018).

Interactive videos are typically characterized by the inclusion of test questions shown to users at certain points in an instructional video (Kovacs, 2016). With interactive instructional videos, students can have the opportunity to receive feedback after answering test questions (Cummins et al., 2016). In the distance education literature, immediate feedback is considered essential for effective interaction (Çuhadar & Kıyıcı, 2007). Research has also shown that the correct use of feedback has positive effects on student engagement (Hepplestone et al., 2011), and offering immediate feedback can further lead to improved metacognitive awareness (Lee et al., 2015; Molin et al., 2020).

There are different types of feedback that could be used in video-based instruction to support student learning. Some of the widely used feedback types are considered simple outcome feedback because they do not provide extra information about the task or strategy other than simply stating correct (or false) answers. Thus, even if these are less time-consuming to prepare, they offer minimal guidance and opportunities to develop student engagement and metacognitive awareness.

The purpose of this study is to examine the use of elaborated and metacognitive feedback strategies in interactive instructional videos in terms of undergraduate students' engagement and metacognitive awareness. This study also intends to explore undergraduate students' evaluations of elaborated and metacognitive feedback in these videos based on qualitative data.

## 2. Literature

### 2.1. Types of Feedback in Computer-Based Learning Environments

Feedback can be broadly defined as any post-response information regarding students' state of performance or learning in instructional contexts (Narciss, 2014). Feedback is an important instructional strategy to support learning because empirical evidence demonstrates that when students receive feedback, more effective learning can occur (Guo et al., 2014). Narciss (2014) identified several feedback types used in computer-based learning environments. Among these, the widely used feedback types are knowledge of response, knowledge of correct response, answer-until-correct, multiple-try feedback, and elaborated feedback (see Table 1).

Table 1. Commonly Used Feedback Types in Computer-Based Learning Environments (Narciss, 2014)

| Feedback Type | Explanation |
| --- | --- |
| Knowledge of response | Offers information about the truth of answer (e.g., true/false) |
| Knowledge of the correct response | Provides the true answer |
| Answer-until-correct | Includes knowledge of response and provides the chance for more tries on the same task until the task is answered correctly |
| Multiple-try feedback | Consists of knowledge of response and the chance for limited tries on the same task |
| Elaborated feedback | Includes further information in addition to knowledge of response or knowledge of the correct response |

Research suggests that, in comparison to the other types, elaborated feedback is found to be the most effective for student learning (Gilman, 1969; Kleij et al., 2012; Jaehnig & Miller, 2007; Pridemore & Klein, 1995;). Researchers have proposed various forms of information that can be effectively conveyed to students through elaborated feedback. According to Narciss (2012), elaborated feedback should include additional information helping to reduce differences between the students' current states and the desired state of understanding, and providing effective strategies for solving a problem. For Shute (2008), elaborated feedback can include a discussion of errors, additional examples, or general guidance, along with the right answer. Similarly, elaborated feedback can further be provided in such forms as explaining why a specific response is correct, giving cognitive or metacognitive hints, and providing additional background or related information (Golke et al., 2015). The most important feature of this type of feedback is that, with all these components and forms, students are supported to exhibit a deeper cognitive engagement with learning topics (Wanga et al., 2019).

### 2.2. Metacognitive Awareness and Metacognitive Feedback Strategies

According to Flavell (1976), *metacognition* is the monitoring and regulation of one's own cognitive processes. Metacognitive awareness is defined as the *ability* to regulate an individual's own cognition or thinking processes (Schraw & Dennison, 1994). It is commonly accepted that metacognitive awareness is positively correlated with higher learning gains (Ostafichuk et al., 2020).

Three essential metacognitive strategies, which help students become aware of their learning processes, have been widely discussed in the literature: planning, monitoring, and evaluation. Planning refers to strategy selection and allocation. Monitoring involves controlling self-comprehension, awareness, and performance. Evaluating is about the assessment of goals or products (Schraw, 1998).

A set of self-questions under these strategies (a regulatory checklist) is provided by King (1991) (see Figure 1).
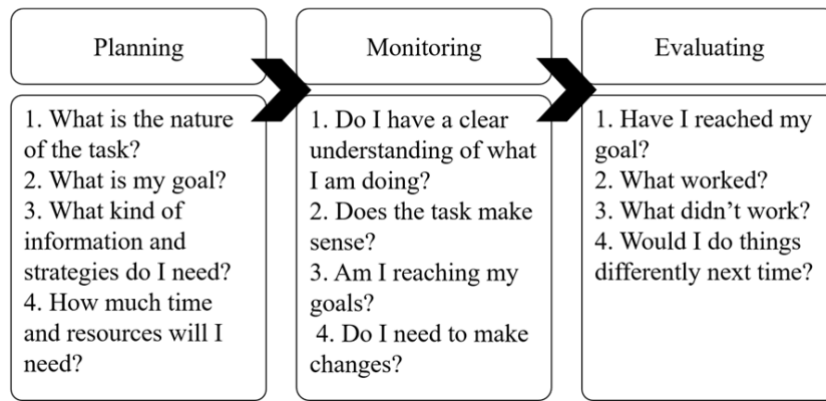
Fig. 1. A regulatory checklist, Source: [King, 1991]

King (1991) found that students who used a checklist similar to Figure 1 outperformed those who did not on problem-solving and asking strategic questions. Likewise, Tanner (2012) prepared a set of self-questions for planning, monitoring, and evaluating steps in the context of one class session, an assignment, an exam, or a whole course (see Table 2). While these questions might be shared directly with learners, they can also be embedded in different activities such as exams, tests, assignments, or feedback. These types of questions can further be used to develop metacognitive awareness (Altıok et al., 2019) and metacognitive awareness, which in turn supports students in becoming more independent learners (Asha et al., 2022; Kim, 2018). Also, according to Hew (2016), immediate feedback should be used to increase user engagement. For example, in the study by Karaoğlan Yılmaz and Yılmaz (2021), the effect of metacognitive feedback on students' engagement within the scope of a computing course based on online learning is examined. While the experimental group received metacognitive feedback (self-questioning e.g., "How could I relate what I have learned with real life?"), the control group didn't receive any feedback. The results show that the engagement of students, who received metacognitive feedback, was higher than the engagement of students, who didn't receive it (Karaoğlan Yılmaz & Yılmaz, 2021).

Table 2. Self-Questions for Planning, Monitoring, and Evaluating (Tanner, 2012)

| Activity | Planning | Monitoring | Evaluating |
|---|---|---|---|
| Class session | What are the goals of the class session going to be? What do I already know about this topic? What questions do I already have about this topic that I want to find out more about? | Do I find this interesting? Why or why not? How could I make this material personally relevant? Can I distinguish important information from details? | What did I hear today that is in conflict with my prior understanding? How did the ideas of today's class session relate to previous class sessions? What did I find most interesting about class today? |
| Active-learning task and/or homework assignment | What are all the things I need to do to successfully accomplish this task? What resources do I need to complete the task? | What strategies am I using that are working well or not working well to help me learn? What action should I take to get these? | When I do an assignment or task like this again, what do I want to remember to do differently? What worked well for me that I should use next time? |
| Test or exam | What strategies will I use to study? | Which of my confusions have I clarified? How was I | What did not work so well that I should not do next time or that I should change? |

| | Which aspects of the course material should I spend more or less time on, based on my current understanding? | able to get them clarified?<br><br>Which confusions remain and how am I going to get them clarified? | How did my answer compare with the suggested correct answer? |
|---|---|---|---|
| Overall course | What do I most want to learn in this course?<br><br>What do I want to be able to do by the end of this course? | In what ways is the teaching in this course supportive of my learning? How could I maximize this? | What advice would I give a friend about how to learn the most in this course?<br><br>If I were to teach this course, how would I change it? |

Source: [Tanner, 2012, p. 115]

In sum, previous research suggests that employing appropriate feedback strategies can positively affect students' engagement and metacognitive awareness (Hepplestone et al., 2011; Lee et al., 2015; Molin et al., 2020). And this could offer a potential solution to address the issue of passive learning typically associated with video-based learning. However, the existing literature lacks sufficient research comparing the effectiveness of different types of feedback in instructional videos concerning student engagement and metacognitive awareness, two constructs closely associated with self-regulated learning (Chung & Yuen, 2011; Sebille et al., 2018; Paris & Paris, 2001; Zimmerman, 2008 ).

### 2.3. Purpose and Research Questions

The primary purpose of this study is to conduct a comparative analysis of the use of elaborated and metacognitive feedback strategies within interactive instructional videos in terms of undergraduate students' levels of engagement and metacognitive awareness.

In addition, this study also aims to investigate undergraduate students' evaluations of elaborated and metacognitive feedback in interactive instructional videos based on qualitative data. Thus, the following research questions are asked:

- Is there any statistically significant difference between the engagement scores of students who watch interactive instructional videos with elaborated feedback and those who watch the same videos with metacognitive feedback?
- Is there any statistically significant difference between the metacognitive awareness scores of students who watch interactive instructional videos with elaborated feedback and those who watch the same videos with metacognitive feedback?
- How do the students evaluate elaborated and metacognitive feedback in interactive instructional videos?

## 3. Method

### 3.1. Research Design

This study used a basic randomized post-test-only experimental design comparing two treatments (Shadish, et al., 2002), supported with qualitative data. Participants were randomly assigned to the comparison groups, which are the elaborated feedback group and the metacognitive feedback group. For both groups, measurements were made after the implementation. In addition, qualitative data were collected through interviews and used to examine students' evaluations of the elaborated and metacognitive feedback used in the interactive video lectures.

The independent variable of the study is the two types of feedback embedded into a set of interactive instructional videos. The dependent variables of the study are students' engagement and metacognitive awareness levels.

### 3.2. Data Collecting Tools

The short form of the User Engagement Scale and the planning, comprehension monitoring, and evaluation subcomponent items of the Metacognitive Awareness Inventory were used as the quantitative data collection

scales. Additionally, an interview protocol that was prepared by the researchers was used to collect qualitative data.

### 3.2.1. The Short Form of the User Engagement Scale

The Short Form of the User Engagement Scale (UES-SF) consists of 12 items, including six negative and six positive items, and has a four-factor structure. This 5-point Likert scale aims to evaluate user engagement in a particular application. The factors are focused attention, perceived usability, aesthetic appeal, and reward. Cronbach's alpha values for these factors are calculated as 0.92, 0.92, 0.90, and 0.87, respectively, and 0.88 for the overall score (O'Brien et al., 2018).

### 3.2.2. The Metacognitive Awareness Inventory

The Metacognitive Awareness Inventory (MAI) is one of the most frequently used self-report instruments to measure metacognitive awareness (Harrison & Vallin, 2018). This inventory was created by Schraw and Dennison (1994) to assess the two theoretical dimensions of metacognition: 17 items for knowledge about cognition and 35 items for regulation of cognition. These dimensions also have subcomponents. The components of knowledge about cognition are declarative knowledge, procedural knowledge, and conditional knowledge. The regulation of cognition includes planning, information management strategies, comprehension monitoring, debugging strategies, and evaluation components.

Because the metacognitive feedback was constructed considering the planning, monitoring, and evaluation components, only the 20 items related to these three components were used to collect the data.

In the MAI, the original response format is true-false options, but researchers have used various scale formats, especially Likert-types (Harrison & Vallin, 2018). In this research, the 5-point Likert type is used as the answer option of the MAI. The Cronbach's α for the knowledge factor was reported as .88, and the regulation factor was reported as .91 (Teo & Lee, 2012).

### 3.2.3. The Interviews

Semi-structured one-on-one interviews were conducted with three volunteering students from the sample five months later. The purpose of collecting the interview data was to obtain more detailed information about students' evaluations of in-video feedback and to interpret the study's quantitative findings. In the interview, the participants watched one of the instructional videos with the first author in a recorded Zoom session. After they responded to each test question, both types of feedback were shown to them on the screen. And they were asked three main questions: (1) Which feedback type would you prefer, and why? (2) Which feedback type would you choose to enhance your metacognitive awareness? (3) Which feedback type would you choose for better engagement? The interview duration varied from 13 to 18 minutes.

### 3.3. The Participants

The participants were undergraduate students who took an educational technology course at the faculty of education at a public research university in Istanbul, Turkey. More specifically, they were 52 (45 female) preservice teachers from a variety of teaching majors registered for the course, which was offered totally online due to the COVID-19 pandemic in the spring of 2021. The age range of the students was 20-25. The participants were selected using a purposeful sampling strategy (Creswell, 2012) based on the following criteria: (a) being an undergraduate student, (b) having basic computer skills, especially in using Moodle, and Panopto.

### 3.4. The Context and Research Procedures

The study was conducted in an educational technology course offered during the COVID-19 pandemic period. This course has both lecture and lab sections. The lecture section covers the theoretical background of technology-supported learning environments, while the lab sections focus on hands-on experiences of developing instructional materials using different software tools. Since the course was fully offered online due to the COVID-19 pandemic, both the lab and lecture parts were carried out through Moodle, the learning management system of the university.

One of the major assignments of this course is to create an Articulate Storyline-based project. Articulate Storyline is an interactive multimedia software used to design interactive technology-based learning materials (Nabilah et al., 2020). The course utilized some instructional videos in the lab section of the course to enhance students' technical and design skills related to Articulate Storyline. These videos were screen-cast tutorials created and recorded by the course lab assistant. They showcased how different interactive learning media could be developed using articulate storyline features. These instructionals were shared with the students through the Panopto video service, which was integrated into the Moodle system. For the present study, six of these instructional videos were made interactive by inserting test questions and

feedback using the Panopto test feature. While the videos were in English, the test questions and the associated feedback were prepared in the students' native language, Turkish, given that using students' native language in feedback sessions can significantly enhance their active engagement (Aktaş, 2021). The authors and the course lab assistant worked together to determine the types of questions and their specific timing within the videos. Except for the last one, each video had three knowledge- or comprehension-level questions based on Bloom's taxonomy about the topic of the video in a multiple-choice format. The site articulate.bilgikurdu.net (2021) provided the content information for constructing the test questions and the feedback. Each video had two versions: one with elaborated feedback and one with metacognitive feedback (explained below).

We randomly assigned the participants to one of the two groups: elaborated feedback or metacognitive feedback. During the semester, all participants watched the same videos with the same set of embedded test questions. The only difference was the type of feedback they received after answering the test questions. Students in the elaborated feedback group only received elaborated feedback, while students in the metacognitive feedback group received metacognitive feedback. Further information about the videos is presented in Table 3.

Table 3. Video and Question Information

| The Topic of The Video | Video Duration | Number of Test Questions Embedded into the Video | Timing of the Test Questions |
|---|---|---|---|
| 1- Introduction to Interface: Meeting with Boo | 23:58 | 3 | 03:03, 12:33, 19:13 |
| 2- Presenting Content: Multiple Intelligence Theory | 11:46 | 3 | 00:50, 05:45, 10:22 |
| 3- Presenting Content: The Four Stages of Cognitive Development | 13:04 | 3 | 00:48, 06:08, 11:22 |
| 4- Presenting Content: The Four Stages of Cognitive Development | 10:17 | 3 | 02:02, 05:47, 08:15 |
| 5- Presenting Content: The Four Stages of Cognitive Development | 14:08 | 3 | 01:15, 07:21, 12:44 |
| 6-Final Project Layout | 45:40 | 7 | 00:54, 03:29, 08:06, 18:30, 35:56, 39:50, 45:06 |

### 3.4.1. Metacognitive Feedback

In the metacognitive feedback group, the feedback provided to the students consisted of the correct answer and metacognitive feedback that was prepared based on the suggestions in the literature (King, 1991; Tanner, 2012). The goal was to provide feedback that was consistent with the essential metacognitive strategies of planning, monitoring, and evaluation, which are the three major metacognitive strategies widely discussed in the literature (Schraw, 1998). The feedback was specifically tailored to the content covered in the videos. Table 4 provides some examples of the metacognitive feedback used in the study with the corresponding metacognitive strategies, based on the suggestions in the literature.

Table 4. Examples of Metacognitive Feedback

| Metacognitive Feedback Types from the Literature | Example Metacognitive Feedback Used in the Study | Corresponding Metacognitive Strategy |
|---|---|---|
| What do I already know about this topic? (Tanner, 2012) | What do I already know about the purpose of using "the timeline"? | Planning |
| Do I find this interesting? Why or why not? How could I make this material personally relevant? (Tanner, 2012) | Did I find this feature interesting? Can I use it in my own project? | Monitoring |

| Would I do things differently next time? (King, 1991) | What would I do differently if I used "variables" in my own project? | Evaluating |
|---|---|---|

An example of a metacognitive feedback screen can be seen in Figure 2. Here, students were asked about "Operator/Value Features of Articulate Storyline." The metacognitive feedback provided was: "*What should I pay attention to in order to use the Operator/Value concepts used for variables?*" that corresponded to the metacognitive strategy of monitoring.



**Test**     1 / 1   ✕

Soruyu cevapladıktan sonra devam etmeden önce "İncele" butonuna basmalı ve açıklamayı incelemelisiniz.

Soru: Öğrenci "Slider'ı bir adım hareket ettirmesine rağmen ekrana "Stage 4" geliyorsa (Stage 1 değil), Stage 1 için Show layer trigger'ında kullanılan Operator/Value ikilemesi hangisi olabilir?

  ⚪ A- Equal to / 1

✕ ⦿ B- Not equal to / 1

✓ ⚪ C- Equal to / 4

**Açıklama**

Doğru cevap C-Equal to / 4

Değişkenler için kullanılan Operator/Value kavramlarını kullanabilmek için neye dikkat etmeliyim?

‹ Önceki     ✓ Bitir

▶ ⟲ ⟳ 8:16 ▬▬▬▬▬▬▬▬▬▬▬ -2:01 🔊 1x Hız   Kalite

Fig. 2. Sample metacognitive feedback screenshot

### 3.4.2. Elaborated Feedback

In the elaborated feedback group, students were provided with the correct answer and received elaborated feedback. Based on the literature, we used detailed (or additional) information and essential hints tailored to the specific content to provide elaborated feedback (Chung & Yuen, 2011).

An example of an elaborated feedback screen can be seen in Figure 3. Similarly, students were asked about "Operator/Value Features of Articulate Storyline." The elaborated feedback provided was: "*If Stage 4 information is visible despite going to Stage 1, there is an error in the Show layer trigger's variables and values. So, this happens when the value is equal to 4.*"
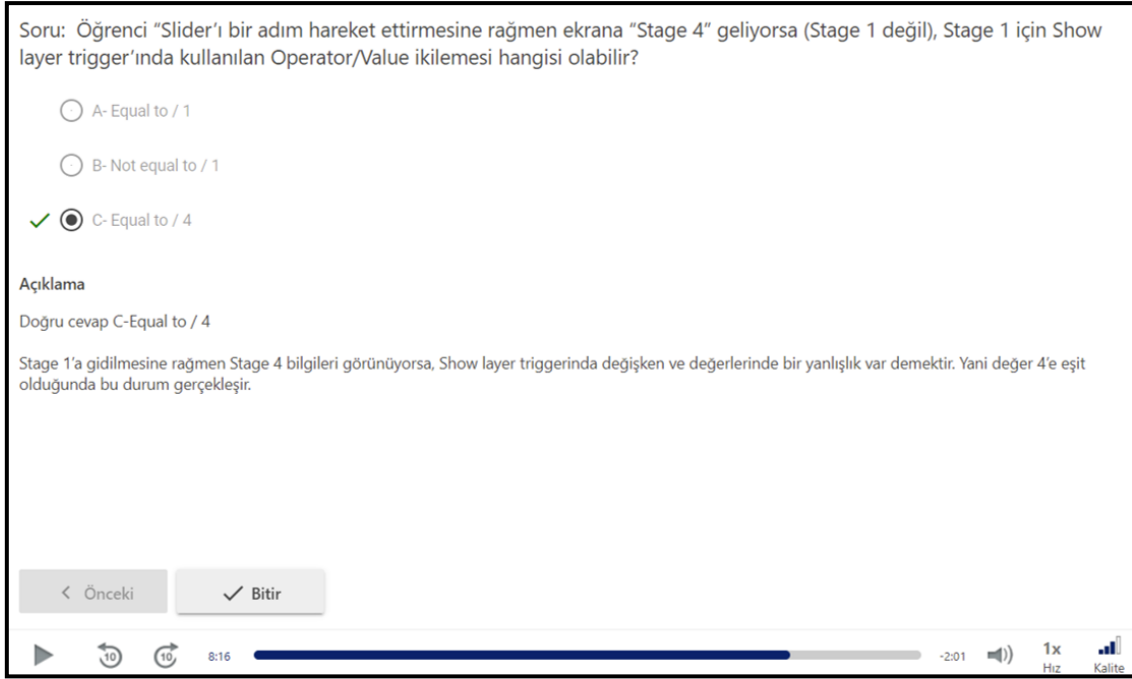
Fig. 3. Sample elaborated feedback screenshot

Table 5 contains the elaborated feedback used on this sample screen and more examples.

Table 5. Examples of Elaborated Feedback

| Example Elaborated Feedback | | |
|---|---|---|
| The correct answer is C-Equal to /4 | Detailed or Additional Information Part | Hints Part |
| If Stage 4 information is visible despite going to Stage 1, there is an error in the Show layer trigger's variables and values. So, this happens when the value is equal to 4. | If Stage 4 information is visible despite going to Stage 1, there is an error in the Show layer trigger's variables and values. | So, this happens when the value is equal to 4. |
| The correct answer is A-States | Detailed or Additional Information Part | Hints Part |
| With the states property, we can change any object depending on the student's action. We can set something to resize after being clicked or put an x on that object when the user clicks on the wrong object. | With the states property, we can change any object depending on the student's action. | We can set something to resize after being clicked or put an x on that object when the user clicks on the wrong object. |
| The correct answer is D-All of them | Detailed or Additional Information Part | Hints Part |
| We can add triggers to anything (buttons, images, text, whatever you want) and we can also use multiple triggers together to create a more complex structure. | We can add triggers to anything (buttons, images, text, whatever you want) | We can also use multiple triggers together to create a more complex structure. |

Students were allowed to answer the in-video questions only once since the correct answers were provided as part of the feedback in both the metacognitive and elaborated feedback groups. After completing the six video tutorials with their respective feedback types over a four-week period, students in both groups were asked to complete the UES-SF (User Engagement Scale-Short Form) and the MAI (Metacognitive Awareness Inventory) scales through Google Forms. The links to these data collection tools were provided at the end of the final video and sent to the students via a message on the Moodle platform during the fourth week of the implementation. The students had a 15-day period to fill out the scales and submit their responses.

Five months later, three volunteer students from the sample were interviewed one-on-one. During the interview, the first author and the participants watched one of the videos together in a Zoom meeting. When the test questions came on the screen, the participants were instructed to respond. Following their responses, the participants were shown both types of feedback. After examining each type of feedback, they were asked about their preferences and the type of feedback they would choose for improved engagement and metacognitive awareness.

### 3.5. Data Analysis

To answer the first and second research questions, students' UES-SF and MAI total scores were calculated. The maximum possible score for the 12-item UES-SF was 60, whereas the 20-item MAI test could produce a maximum score of 100. For each data set, descriptive statistics were computed, and the parametric test assumptions were controlled. Because the normality assumption was violated, the Mann-Whitney U tests were used to determine statistical significance between the UES-SF and MAI scores of the two groups.

The qualitative data analysis started with transcribing the Zoom meetings conducted with the three students. The researchers carefully read through the complete transcripts to gain a comprehensive understanding of how the participants evaluated the elaborated and metacognitive feedback in terms of their preference, metacognitive awareness, and engagement.

Descriptive explanations were then written for each student in terms of their preferences, level of metacognitive awareness, and engagement with each type of feedback. By examining these descriptions collectively, the researchers were able to draw inferences and identify some common patterns or themes. This analysis led to a deeper understanding of how the students perceived and interacted with elaborated and metacognitive feedback, thereby informing further interpretations and conclusions.

## 4. Results

### 4.1. Engagement

The descriptive statistics related to the UES-SF scale showed that the engagement mean score of students in the elaborated feedback group (40.58) was higher than the engagement mean score of students in the metacognitive feedback group (38.85) (see Table 6).

Table 6. Descriptive Statistics of the UES-SF Scores

|  | N | Min | Max | Mean | Median | SD |
|---|---|---|---|---|---|---|
| Metacognitive Feedback Group | 26 | 25 | 50 | 38.85 | 40.50 | 6.583 |
| Elaborated Feedback Group | 26 | 25 | 48 | 40.58 | 42.00 | 5.573 |

To examine if the mean difference in engagement scores between the two groups is statistically significant, first the parametric test assumptions were considered (i.e., normally distributed data, interval data, homogeneity of variances, and independence) (Field, 2009).

A Shapiro-Wilk's test for normality was conducted to check the normal distribution of data and the skewness and kurtosis $z$-values were calculated. Shapiro-Wilk's test results showed that the UES-SF scores of the metacognitive feedback group were normally distributed ($p > .05$) (see Table 7), with a skewness of -0.486 (SE = 0.456) and a kurtosis of -0.375 (SE = 0.887) (see Table 8). However, the UES-SF scores of students in the elaborated feedback group were not normally distributed ($p < .05$) with a skewness of -1.217 (SE = 0.456) and a kurtosis of 1.330 (SE = 0.887) (see Tables 7 and 8). In addition, while the $z$-values values of the metacognitive feedback group were in the acceptable range (between -1.96 and 1.96), the $z$-value of the skewness of the elaborated feedback group was not (see Table 7).

Table 7. Shapiro-Wilk Test Results of the UES-SF Scores for the Elaborated and Metacognitive Feedback Group

|  | Statistics | df | Sig. |
|---|---|---|---|
| Metacognitive Feedback Group | 0.961 | 26 | .415 |
| Elaborated Feedback Group | 0.893 | 26 | .011 |

Table 8. Skewness, Kurtosis, and $z$-values of the UES-SF Scores

|  | Skewness | SE | $z$-value | Kurtosis | SE | $z$-value |
|---|---|---|---|---|---|---|
| Metacognitive Feedback Group | -0.468 | 0.456 | -1.026 | -0.375 | 0.887 | -0.422 |

| | | | | | |
|---|---|---|---|---|---|
| Elaborated Feedback Group | -1.217 | 0.456 | -2.668 | 1.330 | 0.887 | 1.499 |

Therefore, we used a Mann-Whitney U test to examine if the mean difference regarding the engagement scores between the two groups is statistically significant. The analysis showed that there was no statistically significant difference between the mean engagement scores, $z = -1.184$, $p > .05$ (see Tables 9 and 10).

Table 9. Mann-Whitney U Rank Test of the UES-SF Scores

| | N | Mean | Sum of Ranks |
|---|---|---|---|
| Metacognitive Feedback Group | 26 | 24.02 | 624.50 |
| Elaborated Feedback Group | 26 | 28.98 | 753.50 |
| Total | 52 | | |

Table 10. Mann-Whitney U Test Statistics of the UES-SF

| | UES-SF Score |
|---|---|
| Mann-Whitney U | 273.500 |
| Wilcoxon W | 624.500 |
| Z | -1.184 |
| Asymp. Sig. (2-tailed) | .237 |

## 4.2. Metacognitive Awareness

The descriptive statistics associated with the MAI scale showed that the mean score of students in the metacognitive feedback group (72.23) was higher than the mean score of students in the elaborated feedback group (70.23) (see Table 11).

Table 11. Descriptive Statistics of the MAI Scores

| | N | Min | Max | Mean | Median | SD |
|---|---|---|---|---|---|---|
| Metacognitive Feedback Group | 26 | 58 | 91 | 72.23 | 71.50 | 8.373 |
| Elaborated Feedback Group | 26 | 40 | 87 | 70.23 | 72.50 | 10.297 |

Based on the Shapiro-Wilk test, the MAI scores were normally distributed (p >.05) for both the metacognitive and elaborated feedback groups (Table 12). However, while the $z$-values of skewness and kurtosis for the metacognitive feedback group were in the acceptable range, the $z$-value of the skewness of the elaborated feedback group was not (see Table 13). Thus, we used the Mann-Whitney U test to test for significance between the mean differences. The results showed no statistically significant difference between the mean MAI scores of both groups, $z = -1.184$, $p > .05$ (see Tables 14 and 15).

Table 12. Shapiro-Wilk Test Results of the MAI Scores for Both Groups

| | Statistics | df | Sig. |
|---|---|---|---|
| Metacognitive Feedback Group | .977 | 26 | .811 |
| Elaborated Feedback Group | .938 | 26 | .118 |

Table 13. Skewness, Kurtosis, and $z$-values of the MAI Scores

| | Skewness | SE | z-value | Kurtosis | SE | z-value |
|---|---|---|---|---|---|---|
| Metacognitive Feedback Group | 0.400 | 0.456 | 0.877 | -0.108 | 0.887 | -1.249 |
| Elaborated Feedback Group | -1.073 | 0.456 | -2.353 | 1.652 | 0.887 | 1.862 |

Table 14. Mann-Whitney U Rank Test for the MAI Scores

| | N | Mean | Sum of Ranks |
|---|---|---|---|
| Metacognitive Feedback Group | 26 | 27.15 | 706.00 |
| Elaborated Feedback Group | 26 | 25.85 | 672.00 |
| Total | 52 | | |

Table 15. Mann-Whitney U Test Statistics for the MAI Scores

|  | MAI Score |
| --- | --- |
| Mann-Whitney U | 321.000 |
| Wilcoxon W | 672.000 |
| Z | -.311 |
| Asymp. Sig. (2-tailed) | .756 |

Elaborated feedback, which has been identified as an important form of feedback for supporting self-regulation in computer-based educational settings (Butler & Winne, 1995), has been found to increase student engagement (Wanga et al., 2019). Past research has also shown that metacognitive feedback improves engagement (Karaolan Yilmaz & Yilmaz, 2021). Thus, the literature suggests that both elaborated and metacognitive feedback can affect engagement, while there has been no direct comparison between them.

Similarly, metacognitive awareness is valued in educational settings since it is linked to student achievement (Abdelrahman, 2020; Khan & Seemab, 2019; Khodaei et al., 2022; Ostafichuk et al., 2020). Providing immediate feedback can allow students to develop metacognitive awareness (Molin et al., 2020). Especially, the use of self-questioning as a metacognitive feedback strategy has been shown to improve students' metacognitive awareness (Altok et al., 2019).

Furthermore, both elaborated and metacognitive feedback can support students' self-regulation. Elaborated feedback that incorporates the strategies mentioned in the literature review has been shown to improve students' self-regulation (Butler & Winne, 1995; Chung & Yuen, 2011;), and self-regulated students can more easily learn to use metacognitive strategies to improve their achievement (Lee et al., 2016; Zimmerman, 2008; Delen et al., 2014). In that sense, one could expect that both the use of elaborated and metacognitive feedback could be equally effective in instructional videos.

Our analysis showed that while the mean engagement score of the elaborated feedback group was descriptively higher than the mean engagement score of the metacognitive feedback group, the difference was not statistically significant. Similarly, the difference in mean MAI scores between the two groups was not statistically significant, even though the mean MAI score of the metacognitive group was descriptively higher than the mean MAI score of the elaborated feedback group.

One could explain these findings in regards to the variations in how the feedback was prepared in this study. Elaborated feedback can involve general guidance (Shute, 2008) as well as cognitive or metacognitive hints (Golke et al., 2015). Similarly, metacognitive feedback strategies could include self-questions for planning, monitoring, and evaluation (Tanner, 2012), or self-questions for comprehension, connection, strategy, and reflection (Mevarech & Fridkin, 2006). In this study, metacognitive feedback was prepared based on self-questioning strategies suggested by King (1991) and Tanner (2012). Elaborated feedback was constructed so that it involved further information or essential hints about the topic (Chung & Yuen, 2011). However, different strategies are suggested in the literature to prepare each feedback type (Golke, Dörfler, & Artelt, 2015; Narciss, 2012; Shute 2018;). Thus, if alternative strategies were employed for the specific feedback prepared in the present study, the results could have been different.

Another factor that could have led to the present findings could be related to the cognitive level of the test questions embedded into the instructional videos. The literature suggests that when feedback includes information about the problem-solving strategy employed, it tends to enhance students' self-regulation (Diagnath & Büttner, 2008). This aspect is significant as self-regulation has a positive impact on students' engagement (Cho & Shen, 2013). Also, with problem-solving tasks, students' metacognitive abilities can be supported (Adagideli & Ader, 2017). Therefore, using higher cognitive level questions in terms of Bloom's taxonomy, such as application, analysis, or synthesis, could have produced different results.

### 4.3. Students' Evaluations of Feedback Strategies

Based on the qualitative data, we saw that the elaborated feedback was preferred five times and the metacognitive feedback was preferred four times (Table 16). While all students preferred the elaborated feedback for the first test question, for the second and third test questions, only two students preferred the elaborated feedback type. The students who favored the elaborated feedback mentioned that it was explanatory, summative, and descriptive. They particularly valued this type of feedback when they answered the test question incorrectly, as it helped them better understand the subject matter (see Table 16). On the other hand, the students who preferred the metacognitive feedback type stated that it enabled them to reflect and engage in deeper thinking. In summary, while both types of feedback were almost equally favored by the students, the reasons for preference varied.

Table 16. Students' Preferences for the Type of Feedback

| Test Question | Preferred Type of Feedback |
|---|---|
| First Test Question | Student 1 (Wrong answer) – The Elaborated Feedback<br>Student 2 (Wrong answer) – The Elaborated Feedback<br>Student 3 (Right answer) – The Elaborated Feedback |
| Second Test Question | Student 1 (Right answer) – The Metacognitive Feedback<br>Student 2 (Wrong answer) – The Elaborated Feedback<br>Student 3 (Right answer) – The Metacognitive Feedback |
| Third Test Question | Student 1 (Right answer) – The Elaborated Feedback<br>Student 2 (Right answer) – The Metacognitive Feedback<br>Student 3 (Right answer) – The Metacognitive Feedback |

Students who preferred elaborated feedback said it was explanatory and informative. These descriptions align with the descriptions provided in the literature. Golke et al. (2015) state that elaborated feedback can involve explanations of why a specific response is correct and provide additional background or related information. Therefore, students were able to identify the function of elaborated feedback as described in the literature.

On the other hand, students who favored metacognitive feedback generally mentioned that it facilitated deeper thinking about the subject. Most importantly, students noted that they would choose metacognitive feedback if they already had a good understanding of the topic and answered test questions correctly. For example, a student chose the elaborated feedback for a question saying, "I don't have enough background to say that I can use it here and there. Or I don't understand, it doesn't mean anything right now. I don't understand, then I'll go and investigate it. (Student 2 / Interview)" This suggests that benefitting from metacognitive feedback may require some prior knowledge or a certain level of mastery of the topic. These observations are consistent with the literature. According to Taub and Azevedo (2018), students with high prior knowledge can involve in processes including metacognitive strategies more than students with low prior knowledge.

Furthermore, all three students emphasized the importance of integrating these two types of feedback and receiving them simultaneously. They understood that the two types of feedback served different purposes, and both had value. Consequently, they expressed a wish to receive both types of feedback. The following words of a student can be given as an example.

> I think the two feedback types are very different from each other. It felt like these two feedbacks didn't serve the same purpose actually. That's why both of them are very beautiful separately, in fact, the first one [metacognitive feedback] was very effective for me. I guess if I had to choose one, I think I would choose the first. But still, I would like both together. (Student 2 / Interview)

Also, another student highlights this argument saying;

> The second type [elaborated feedback] again, for example, gave this information. For example, a question can be added to make you think about what else it can be used for. It can give information. For instance, we can give information and use the layer for a lot of things for this study after all. Perhaps, a question can be added that will make them think about what else it can be used for. (Student 3 / Interview)

For some researchers, elaborated feedback can incorporate metacognitive hints (Golke et al., 2015). This implies that metacognitive feedback can be integrated into elaborated feedback, allowing for the use of both types of feedback at the same time. Students asserted that such combined feedback would be both informative and beneficial for promoting deeper thinking.

## 5. Conclusions

The present study aimed to compare the effectiveness of elaborated and metacognitive feedback strategies in interactive instructional videos among undergraduate students in terms of their engagement and metacognitive awareness levels. Additionally, the study sought to investigate students' evaluations of these feedback types based on qualitative data. The results indicated no statistically significant differences in engagement and metacognitive awareness scores between the two groups. However, students' evaluations of these feedback types based on qualitative data provided some important insights.

The interview participants in the study recognized the importance of subject mastery in utilizing metacognitive feedback effectively. They tended to opt for metacognitive feedback when they believed they had a certain level of understanding of the subject and answered test questions correctly. On the other hand, when they had beginner-level knowledge about the topic, they preferred to receive elaborated feedback to enhance their understanding.

Thus, when designing interactive instructional videos, in-video feedback can be customized according to students' answers, with metacognitive feedback provided for correct answers and elaborated feedback offered for incorrect answers.

Moreover, all three participants offered suggestions for integrating the two types of feedback together. They proposed a feedback format that included "a brief explanation" (elaborated feedback) followed by a "reflection question" (metacognitive feedback). During the interviews, this suggestion stood out as a new strategy that has not been fully examined in the literature. Thus, another effective feedback strategy could be to combine topic-specific, elaborated, and metacognitive feedback in interactive instructional videos. Our findings suggest that providing feedback based on students' answers and subject mastery level, or a thoughtful integration of both types of feedback, could enhance the learning experience. Future research could investigate the most effective ways of providing such feedback for different subject matters in different contexts.

## 6. Acknowledgements

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# Artificial Intelligence for the Future of Learning: A Conceptual Study

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## Abstract

Artificial Intelligence (AI) is revolutionizing the landscape of education and holds immense potential for the future of learning. With the advent of advanced technologies, AI systems are being employed to enhance teaching methodologies, personalize educational experiences, and streamline administrative tasks. This abstract explores the transformative role of AI in education, focusing on its applications, benefits, and challenges. AI in education encompasses various areas, including intelligent tutoring systems, adaptive learning platforms, and automated grading systems. Intelligent tutoring systems leverage AI algorithms to provide personalized instruction, adapting to individual learning styles and pacing. Adaptive learning platforms employ AI to analyze learner data and deliver customized content and assessments, ensuring optimal learning outcomes. Automated grading systems utilize AI techniques to evaluate assignments and tests, saving valuable time for educators. The benefits of AI in education are manifold. AI-powered tools can augment teachers' capabilities by automating routine tasks, enabling them to focus on personalized instruction and mentorship. Additionally, AI can provide immediate feedback, helping students track their progress and identify areas for improvement. Moreover, AI-based platforms facilitate remote and distance learning, expanding educational access and bridging the gap between learners and educators across the globe. However, the integration of AI in education also poses certain challenges. Privacy concerns regarding the collection and use of student data need to be addressed through robust data protection measures. Ethical considerations, such as bias in AI algorithms, must be carefully addressed to ensure fair and unbiased learning experiences. Furthermore, there is a need for extensive teacher training to effectively utilize AI tools and leverage their full potential in the classroom. As AI continues to advance, the future of learning holds great promise. The integration of AI technologies can create a learner-centric ecosystem, where personalized instruction, adaptive learning pathways, and intelligent feedback systems optimize educational outcomes. By harnessing the power of AI, educators can unlock new possibilities, fostering creativity, critical thinking, and lifelong learning skills in students. It is crucial for policymakers, educators, and stakeholders to collaborate in navigating the evolving landscape of AI in education, ensuring its responsible and equitable implementation for the benefit of learners worldwide.

**Keywords**: Artificial Intelligence (AI), Education, Educators, Teaching Methodologies, Students, Technology.

## Introduction

Advancements in technology, particularly Artificial Intelligence (AI), have transformed our lives and interactions. Education is one field where AI can revolutionize traditional practices. The future of learning hinges on AI's potential to create personalized, accessible, and efficient learning experiences. Rather than replacing teachers, AI augments their roles by providing data-driven insights into students' strengths, weaknesses, and learning styles, facilitating tailored learning paths. AI-driven assessment systems offer continuous feedback, promoting effective learning. Moreover, AI democratizes education by breaking barriers and accommodating learners with disabilities. However, ethical concerns regarding data privacy and algorithm transparency need addressing. This exploration will delve into AI's applications, challenges, and potentials in education, fostering a future of empowered learners.

## Methodology

The research methodology employed in this paper is entirely founded on comprehensive research efforts, drawing from both primary and secondary sources. Secondary sources encompass a wide array of references, such as research papers, newspapers, professional journals, magazines, textbooks, and diverse websites. On the other hand, primary data was gathered through personal interactions and telephonic interviews with knowledgeable individuals.

## Overview of Artificial Intelligence in Education

Artificial Intelligence (AI) is revolutionizing education by offering innovative solutions to enhance the learning experience. AI technologies analyze vast amounts of data to personalize learning paths, providing tailored content and feedback to individual learners. Intelligent tutoring systems deliver real-time assistance, adapting to students' needs and learning styles. AI also aids educators by automating administrative tasks, allowing more time for personalized instruction. Moreover, AI-powered assessment tools enable efficient and precise evaluation of students' progress. As AI continues to evolve, its potential in education is boundless, fostering a more efficient, personalized, and effective learning environment for learners of all ages and backgrounds.

### Evolution of AI in the Educational Landscape

AI has revolutionized the educational landscape, reshaping how students learn and teachers instruct. Initially, AI facilitated personalized learning through adaptive platforms, tailoring content to individual needs. As technology advanced, AI-powered virtual tutors and chatbots emerged, offering 24/7 support and immediate feedback. AI also enhanced administrative tasks, streamlining operations and enabling data-driven decision-making. Ethical concerns regarding data privacy and bias arose, prompting development of responsible AI practices. Augmented reality and virtual reality applications further enriched learning experiences. Collaboration tools empowered global connections and cross-cultural understanding. As AI continues to progress, it holds immense potential to democratize education, bridge learning gaps, and empower learners worldwide.

### Current Applications of AI in Learning Environments

AI is transforming learning environments in various ways. Personalized learning platforms use AI algorithms to tailor educational content based on individual student needs, learning styles, and progress, enhancing engagement and knowledge retention. Intelligent tutoring systems offer real-time feedback and adaptive learning paths, fostering efficient learning. Natural Language Processing enables chatbots and virtual assistants to address students' queries and provide immediate support. AI-driven grading systems streamline assessment processes, reducing educators' workload. Data analytics and predictive models help institutions identify at-risk students and implement targeted interventions. Additionally, AI aids in creating interactive simulations and virtual reality experiences, promoting immersive and experiential learning. These applications collectively improve the effectiveness and accessibility of education.

## Theoretical Framework

### Learning theories and AI

Learning theories and AI are closely intertwined in the field of education and cognitive science. Learning theories provide the foundation for understanding how humans acquire knowledge and skills. The behaviorist theory, for instance, emphasizes the role of external stimuli and reinforcement, which has influenced AI in the development of reinforcement learning algorithms. Cognitive theories focus on internal mental processes, such as information processing and problem-solving, inspiring AI research on mimicking human thought processes through neural networks and natural language processing. Constructivist theories propose that learners actively build knowledge based on prior experiences, mirroring AI's ability to learn from large datasets and adapt through self-improvement algorithms. AI technologies like personalized learning platforms and intelligent tutoring systems leverage learning theories to optimize educational experiences for individual learners. By tailoring content, pacing, and feedback, AI can enhance the learning process, making it more efficient and effective. Understanding learning theories allows AI developers to create adaptive and learner-centered systems that align with human learning mechanisms.

### Cognitive Psychology and AI-enhanced Learning

Cognitive psychology, a branch of psychology, explores how humans process information, learn, and remember. AI-enhanced learning combines principles from cognitive psychology with artificial intelligence (AI) technologies to optimize educational experiences. AI can personalize learning paths, adapt content to individual needs, and provide real-time feedback, catering to learners' cognitive abilities and preferences. By analyzing vast amounts of data, AI can identify patterns and optimize instructional strategies, resulting in more effective and efficient learning outcomes. Integrating cognitive psychology with AI opens new possibilities to revolutionize education, making it more engaging, accessible, and tailored to the unique learning styles of individuals.

### Pedagogical Models and AI-driven Approaches

Pedagogical models and AI-driven approaches are two distinct yet interconnected elements in the realm of education. Pedagogical models refer to the structured frameworks and theories that guide teaching and learning

practices. They encompass various methodologies, such as behaviorism, constructivism, and experiential learning, to optimize the learning process. On the other hand, AI-driven approaches in education leverage artificial intelligence to enhance and personalize learning experiences. These approaches use data analysis, machine learning algorithms, and natural language processing to understand individual student needs, provide personalized content, and offer timely feedback. AI can also help automate administrative tasks, freeing up educators to focus on more impactful aspects of teaching. By combining pedagogical models with AI-driven approaches, education can be revolutionized. AI can adapt instructional materials to cater to diverse learning styles, identify knowledge gaps, and create adaptive learning pathways. Additionally, AI can assist educators in monitoring student progress and addressing challenges effectively. However, it is essential to strike a balance between technology and human interaction to ensure a holistic and effective educational experience for learners.

# AI Technologies for Personalized Learning

## Adaptive Learning Systems

Adaptive learning systems are a prominent AI technology in personalized learning. These systems utilize advanced algorithms and machine learning techniques to tailor educational content and experiences based on the individual needs, preferences, and learning styles of each learner. By continuously analyzing user interactions, performance, and feedback, adaptive learning systems can dynamically adjust the difficulty, pace, and sequencing of educational materials, ensuring that learners receive personalized challenges and support. This approach enhances engagement, knowledge retention, and overall learning outcomes, as it optimizes the learning process to match the unique characteristics and abilities of each student, fostering a more effective and efficient learning journey.

## Intelligent Tutoring Systems (ITS)

Intelligent Tutoring Systems (ITS) are AI technologies designed to provide personalized learning experiences to individual learners. These systems utilize machine learning algorithms, natural language processing, and data analytics to assess learners' strengths, weaknesses, and learning styles. By collecting and analyzing data from interactions with learners, ITS can adapt the learning content and pace to match each student's unique needs and preferences. Through real-time feedback, personalized recommendations, and tailored exercises, ITS helps learners grasp concepts more effectively and overcome specific challenges. This individualized approach fosters greater engagement, motivation, and knowledge retention, ultimately enhancing the overall learning experience and academic performance for students across various subjects and disciplines.

## Personalized Content Recommendation

Personalized content recommendation is a data-driven approach that tailors content suggestions to individual users' preferences and interests. Leveraging machine learning algorithms and user behavior analysis, it delivers highly relevant and engaging content, such as articles, videos, products, or music, based on past interactions and demographic information. By understanding users' habits, likes, and dislikes, personalized content recommendation systems enhance user experience, increase user retention, and drive conversions. This personalized approach fosters a deeper connection between users and platforms, leading to increased satisfaction and loyalty, while also providing valuable insights for content providers to optimize their offerings and better serve their audiences.

## AI-powered Assessment and Feedback

AI-powered assessment and feedback revolutionizes the traditional learning and evaluation process. By leveraging sophisticated algorithms and machine learning, it automates the analysis of student performance, providing instant and personalized feedback. This technology can assess various aspects of learning, including comprehension, problem-solving, and creativity, in diverse subjects. Adaptive algorithms adapt to individual learning styles, optimizing the educational experience. Educators benefit from real-time data insights, enabling them to identify areas of improvement and tailor instruction accordingly. AI-driven assessment fosters efficient learning, enhances accuracy, and promotes continuous growth by offering students timely guidance and encouragement. Embracing this innovation empowers both learners and educators in the pursuit of academic excellence.

# Enhancing Teacher Roles with AI

Artificial Intelligence (AI) can greatly enhance teacher roles, revolutionizing the education landscape. Firstly, AI-powered tools can assist in automating administrative tasks, such as grading assignments and managing schedules, freeing up teachers' time to focus on personalized instruction and student engagement. AI algorithms

can analyze vast amounts of student data, identifying learning patterns and individual needs, thus enabling teachers to tailor their teaching methods to cater to each student's unique requirements. Additionally, AI-powered virtual tutors and interactive learning platforms can offer personalized tutoring and adaptive content, supplementing classroom learning and providing students with continuous support outside school hours. Furthermore, AI can aid in the creation of innovative educational content, simulations, and virtual reality experiences, making learning more immersive and captivating. However, it is essential to strike a balance, ensuring that AI augments, but does not replace, the human connection and expertise that teachers provide, fostering holistic and empathetic educational environments.

## Ethical Considerations in AI-driven Education

AI-driven education brings numerous benefits, such as personalized learning, enhanced accessibility, and efficient administrative processes. AI systems collect and analyze vast amounts of student data to tailor learning experiences. Educators and developers must prioritize data privacy, ensuring that sensitive information remains secure, anonymized, and used solely for educational purposes. Transparency in data practices and obtaining informed consent from students or their guardians are crucial aspects. AI algorithms may perpetuate biases present in training data, leading to discriminatory outcomes. To prevent this, developers should continually audit algorithms, remove biased data, and implement fairness-aware techniques. Moreover, educational content must be diverse and inclusive to avoid reinforcing stereotypes. AI systems should be accountable for their actions. It's important to define who is responsible for AI-driven decisions and potential errors. Educators should have the final say in educational matters, with AI acting as an aid rather than replacing human judgement. AI should not diminish student autonomy and agency. It should empower students by providing them with choices and fostering critical thinking. Educators must ensure that AI tools complement teaching methods rather than substituting for direct engagement. AI algorithms can analyze students' emotions and behaviors. Ethical considerations include safeguarding students' mental well-being, avoiding excessive monitoring, and providing appropriate support when necessary. AI-driven education relies on technology access, potentially exacerbating the digital divide. Efforts must be made to ensure equitable access to AI tools and resources for all students.

## AI in Lifelong Learning and Skill Development

AI has emerged as a transformative force in lifelong learning and skill development. By leveraging machine learning algorithms, natural language processing, and data analytics, AI-driven platforms can offer personalized and adaptive learning experiences. These systems analyze individual learners' strengths, weaknesses, and preferences to deliver tailored content and optimize the learning process. Moreover, AI fosters continuous learning by identifying knowledge gaps and recommending relevant courses or resources to upskill or reskill individuals throughout their careers. It also enables remote and flexible learning, reaching diverse audiences worldwide. AI-powered simulations and virtual reality platforms provide immersive and interactive learning environments, allowing learners to practice real-world skills in a safe and controlled setting. This promotes practical learning and enhances retention. Additionally, AI facilitates the assessment of learners' progress, providing instant feedback and generating insights for educators to refine their teaching methods continually. Embracing AI in lifelong learning and skill development can empower individuals to thrive in rapidly evolving industries and meet the challenges of the future job market.

## Future Prospects and Challenges

### Predictions for AI's impact on Education

AI's impact on education is expected to be transformative. With the integration of AI technologies, personalized learning experiences will become more prevalent, catering to individual student needs and learning styles. AI-powered virtual tutors and chatbots will provide immediate feedback and assistance, enhancing the learning process beyond traditional classroom settings. The use of AI for data analysis will allow educators to gain deeper insights into student performance, enabling early identification of learning gaps and customized interventions. Moreover, AI can streamline administrative tasks, giving educators more time to focus on teaching and fostering meaningful student-teacher interactions. However, challenges may arise, such as ensuring data privacy and addressing potential biases in AI algorithms. Additionally, educators will need to adapt to new roles, emphasizing critical thinking, creativity, and problem-solving skills that AI cannot easily replicate. Overall, AI has the potential to revolutionize education, empowering learners and educators alike, but careful implementation and continuous monitoring will be essential to maximize its benefits.

### Overcoming Barriers to AI adoption

Overcoming barriers to AI adoption in learning requires addressing concerns such as data privacy and security, ensuring transparent algorithms and explainability, providing adequate training for educators, and addressing fears of job displacement. It is essential to build trust among stakeholders by demonstrating AI's potential benefits, like personalized learning and efficient administrative tasks. Collaborative efforts between policymakers, educators, and AI developers are crucial to establish ethical guidelines and regulatory frameworks. Additionally, integrating AI gradually into the educational system, showcasing successful case studies, and emphasizing its supportive role rather than a replacement fosters a positive perception, encouraging broader AI implementation in learning environments.

# Case Studies of Successful AI Implementation in Education

## Case Studies

*Carnegie Learning's Mika:* Mika is an AI-powered learning platform developed by Carnegie Learning. It utilizes machine learning algorithms to analyze student performance data and provide personalized recommendations and feedback. Mika's implementation has shown significant improvements in student engagement and academic achievement across various subjects.

*Duolingo:* Duolingo is a language-learning platform that employs AI algorithms to tailor language courses to individual learners. The system adapts based on the learner's strengths and weaknesses, allowing for more effective and personalized language learning experiences. Duolingo's success is evidenced by its large user base and positive learning outcomes.

*Coursera:* Coursera, an online education platform, integrates AI in various ways, such as providing personalized course recommendations based on learners' interests and previous interactions. It also uses natural language processing (NLP) for automated grading of certain assignments, enabling faster and more consistent feedback to students.

*Century Tech:* Century Tech is an AI-powered learning platform that helps teachers and students by using data analytics to identify learning gaps and provide personalized learning paths. The system's adaptive learning capabilities have resulted in improved student outcomes and more efficient teaching practices.

*Squirrel AI:* Squirrel AI is an intelligent tutoring system that uses AI to personalize the learning experience for each student. It offers adaptive content, assessments, and study schedules tailored to individual strengths and weaknesses. Squirrel AI has achieved remarkable results in China, outperforming human teachers in certain subjects.

*Third Space Learning:* Third Space Learning utilizes AI to provide one-on-one online math tutoring to primary school students. The AI algorithms analyze student performance data to identify areas of difficulty and adapt tutoring sessions accordingly. This personalized approach has led to improved math skills and confidence among students.

*IBM Watson Tutor:* IBM Watson Tutor is an AI-driven virtual tutor designed to assist college students in learning programming concepts. The system uses natural language processing and machine learning to understand students' questions and deliver appropriate explanations and examples. Early results indicated improved student engagement and learning outcomes.

*Georgia State University's AI Advising System:* Georgia State University implemented an AI-based advising system that analyzed historical student data to identify students at risk of dropping out. The system provided timely interventions and guidance, leading to significant increases in retention rates and academic success.

## Lessons Learned from AI Adoption in Different Contexts

AI adoption in various contexts has yielded valuable lessons. In business, successful implementation requires clear problem definition, data quality, and stakeholder engagement. In healthcare, AI must be ethically and privacy-compliant, and clinician collaboration is crucial. In education, personalized learning approaches can enhance student outcomes but require careful monitoring. In autonomous systems, safety and risk mitigation are paramount. In customer service, AI can augment human support, but empathy remains vital. Across domains, transparency and interpretability are necessary for user trust. Moreover, scaling AI requires considering organizational culture, skill development, and long-term planning. Overall, AI adoption necessitates a holistic understanding of technology, ethics, and human collaboration.

## Results

**Personalized Learning:** AI enables personalized learning experiences by analyzing data on individual students' strengths, weaknesses, and learning styles. This information allows educators to tailor educational content and activities to meet the specific needs of each learner, thereby enhancing their engagement and understanding.

**Adaptive Learning Platforms**: AI-powered adaptive learning platforms can assess students' progress in real-time and dynamically adjust the difficulty level of tasks or suggest appropriate content. This approach ensures that students are constantly challenged at their appropriate skill level, maximizing their learning outcomes.

**Virtual Tutors and Assistants:** AI-driven virtual tutors and teaching assistants can provide immediate and personalized feedback to students, acting as round-the-clock learning companions. These AI assistants can answer questions, explain concepts, and guide learners through challenging topics.

**Automating Administrative Tasks:** AI can streamline administrative tasks in educational institutions, such as grading assessments and managing student records. By automating these processes, educators have more time to focus on teaching and providing support to students.

**Intelligent Content Creation:** AI can assist in content creation by generating educational materials like quizzes, tutorials, and interactive lessons. This capability can help educators save time and resources, allowing them to concentrate on other aspects of teaching.

**Identifying At-Risk Students:** Through data analysis, AI can identify patterns and early warning signs indicating students who might be at risk of falling behind or dropping out. Educators can intervene promptly to provide additional support and guidance to these students.

**Continuous Learning and Training:** AI-powered learning platforms can offer employees and professionals opportunities for continuous learning and upskilling. AI identifies skill gaps and recommends relevant courses to help individuals stay competitive in their fields.

**Enhancing EdTech:** AI plays a crucial role in improving existing educational technologies (EdTech) and driving innovation in the sector. It enables EdTech solutions to become more sophisticated, interactive, and effective.

**Ethical Considerations:** As AI becomes more integrated into the learning process, there are ethical considerations regarding data privacy, algorithmic bias, and the transparency of AI-powered systems. Ensuring that AI applications are fair, transparent, and secure is essential. dui.

## Conclusions

Artificial Intelligence holds immense promise for the future of learning, revolutionizing education in numerous ways. Its ability to personalize learning experiences, provide adaptive platforms, and offer virtual tutoring can significantly enhance student engagement and understanding. Moreover, AI streamlines administrative tasks, allowing educators to focus on teaching and support. By automating content creation and identifying at-risk students, AI fosters efficient and effective learning environments. Continuous learning opportunities and improved EdTech further equip individuals for success in their careers. Nevertheless, addressing ethical concerns, such as data privacy and algorithmic bias, remains crucial to ensure the responsible integration of AI in education and unleash its full potential for positive impact.

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# The New Era in Education: Web 3.0

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## Abstract

In recent years, the rapid advancement of technology has transformed various aspects of our lives, and the field of education is no exception. Web 3.0, the next generation of the World Wide Web, has ushered in a new era in education by revolutionizing the way knowledge is created, shared, and accessed. This abstract explores the transformative potential of Web 3.0 technologies and their implications for education systems worldwide. Web 3.0 represents a paradigm shift from the predominantly centralized and static nature of Web 2.0 to a more decentralized, interconnected, and dynamic web ecosystem. It is characterized by emerging technologies such as blockchain, artificial intelligence, augmented reality, and the Internet of Things, which collectively redefine the educational landscape. One of the key aspects of Web 3.0 in education is the concept of decentralized learning. Through blockchain technology, Web 3.0 enables the creation of transparent and tamper-proof educational records, certificates, and credentials, fostering trust, authenticity, and verifiability. This decentralized approach empowers learners by giving them greater control over their educational data and credentials, reducing reliance on traditional institutional gatekeepers. Furthermore, Web 3.0 facilitates personalized and adaptive learning experiences. Artificial intelligence algorithms leverage vast amounts of data to provide tailored recommendations, adaptive assessments, and individualized learning paths. Learners can access customized content, collaborate with peers, and receive real-time feedback, enhancing engagement and improving learning outcomes. Web 3.0 also enables immersive and interactive learning environments through augmented reality and virtual reality technologies. These immersive experiences transcend traditional classroom boundaries, allowing learners to explore virtual worlds, conduct experiments, and engage in realistic simulations. Such experiences foster deeper understanding, experiential learning, and cross-cultural collaboration. Additionally, the Internet of Things (IoT) connects physical objects to the web, creating a networked ecosystem that enhances educational opportunities. IoT devices can collect real-time data, enabling educators to monitor student progress, identify areas for intervention, and provide timely support. Smart classrooms equipped with IoT devices offer enhanced collaboration, resource sharing, and remote learning capabilities, bridging geographical barriers. However, the implementation of Web 3.0 in education also presents challenges. Issues related to data privacy, security, and digital literacy need to be addressed. Ensuring equitable access to technology and internet connectivity is crucial to prevent the emergence of a digital divide. Educators and policymakers must adapt their pedagogical approaches and curricula to leverage the full potential of Web 3.0 technologies.

**Keywords**: Blockchain Technology, Digital Age, Education, IoT, Learners, Technology, Web3.0.

## Introduction

Web 3.0 heralds a transformative era in education, promising to revolutionize how knowledge is accessed, disseminated, and acquired. Web 3.0, the next evolutionary phase of the internet, is set to usher in a new era in education. As the digital landscape continues to evolve, Web 3.0 holds the promise of transforming the way we learn and access knowledge. While Web 1.0 was characterized by static web pages and one-way communication, and Web 2.0 introduced user-generated content and interactivity, Web 3.0 is envisioned as a decentralized, intelligent, and interconnected platform. In the context of education, Web 3.0 has the potential to revolutionize the entire learning experience. It will facilitate personalized and adaptive learning, tailoring educational content and methods to individual needs, learning styles, and progress. Leveraging advanced algorithms and artificial intelligence, Web 3.0 will empower educators to create more effective and engaging learning environments, supporting students in reaching their full potential. Furthermore, Web 3.0's decentralized nature will eliminate the need for intermediaries, enabling direct peer-to-peer interactions and collaborations. Students and teachers can connect globally, transcending geographical barriers and gaining exposure to diverse perspectives and cultures. Additionally, blockchain technology may enhance the credibility and security of academic records, certifications, and credentials. Web 3.0's emphasis on data privacy and ownership will empower learners to have greater control over their personal information, ensuring a safer online learning environment. With improved data management and privacy standards, educational institutions can foster trust and confidence among their stakeholders. In this new era of education, Web 3.0 will disrupt traditional teaching methods, encouraging lifelong learning, and enabling continuous upskilling and reskilling. As the potential of Web 3.0 unfolds, educators, policymakers, and stakeholders must embrace its opportunities while addressing its challenges to shape an inclusive and progressive future for education.

## Methodology

The research methodology utilized in this paper is based on extensive research, incorporating both primary and secondary sources. The secondary sources comprise a diverse range of references, including research papers, newspapers, professional journals, magazines, textbooks, and various websites. In contrast, the primary data was acquired through personal interactions and telephonic interviews with knowledgeable individuals.

## Understanding Web 3.0

### Evolution of the Web: From Web 1.0 to Web 3.0

The evolution of the web has gone through three major phases, each characterized by distinct technological advancements and user experiences: Web 1.0, Web 2.0, and Web 3.0.

Web 1.0, which emerged in the early 1990s, was a static and read-only web. Websites during this phase were basic and primarily served as repositories of information. Users could only passively consume content and had limited interaction. The focus was on the one-way dissemination of information, and there was little user-generated content.

Web 2.0, around the mid-2000s, marked a significant shift. It introduced dynamic and interactive web pages, enabling user participation and social interactions. This phase saw the rise of social media platforms, blogs, and wikis, where users could create, share, and collaborate on content. User-generated content became the driving force behind the web's growth, fostering online communities and enhancing engagement.

Web 3.0, the current and evolving phase, is characterized by intelligent and personalized experiences. It involves technologies like artificial intelligence, machine learning, and the semantic web. Web 3.0 aims to provide users with more meaningful and contextually relevant information. It emphasizes seamless integration across devices and platforms and strives to enhance privacy and security through decentralized technologies like blockchain. The focus is on a more immersive, interconnected, and intelligent web experience that empowers users while safeguarding their digital identities.

### Key Features and Characteristics of Web 3.0

Web 3.0 is the next evolution of the internet, characterized by decentralization, blockchain technology, and enhanced user experiences. Key features include trust and security through decentralized networks, smart contracts for automated interactions, data ownership and privacy empowerment, interoperability across platforms, and the integration of artificial intelligence to personalize content and services. Web 3.0 fosters a user-centric experience, enabling peer-to-peer interactions, tokenization of assets, and open-source collaboration. It emphasizes transparency, immutability, and censorship resistance, paving the way for innovative applications and Apps that redefine online interactions, commerce, and governance.

### Implications of Web 3.0 for Education

Web 3.0 will revolutionize education by enabling decentralized, peer-to-peer learning platforms. Smart contracts will facilitate transparent certification and credentialing, empowering learners to showcase skills and knowledge beyond traditional degrees. Immutable records and blockchain technology will secure academic data and prevent fraud. AI-driven personalized learning will adapt to individual needs, fostering more effective and engaging education. Global access to educational resources will increase, reducing disparities in learning opportunities. Collaboration tools and virtual classrooms will bridge geographical gaps, enabling diverse cultural and interdisciplinary interactions. Web 3.0's decentralized and data-driven nature will reshape the education landscape, promoting lifelong learning and a more inclusive, borderless, and adaptive educational ecosystem.

## Transforming Pedagogy with Web 3.0 Integration

Web 3.0, also known as the Semantic Web, represents the next phase of internet evolution, characterized by intelligent data interpretation and seamless connectivity. When integrated into education, Web 3.0 has the potential to revolutionize pedagogy and learning experiences. With Web 3.0, educational content becomes more dynamic and personalized. Advanced algorithms and AI-driven technologies enable the creation of adaptive learning platforms that cater to individual student needs, preferences, and learning styles. This ensures a more engaging and effective learning process. Furthermore, Web 3.0 enhances collaboration and knowledge sharing. Decentralized systems like blockchain facilitate secure credentialing, enabling students to have ownership of their achievements. Peer-to-peer learning networks foster global connections among students and educators, breaking down traditional geographical boundaries. Additionally, augmented reality and virtual reality applications powered by Web 3.0 enrich the educational environment. Immersive simulations provide hands-on

experiences, making complex concepts easier to grasp. However, challenges arise, such as ensuring equitable access to technology and addressing privacy concerns in a decentralized ecosystem. Hence, thoughtful implementation and strong data protection measures are crucial.

# Enhancing Collaboration and Communication

## Web 3.0-based Social Learning Networks

Web 3.0-based Social Learning Networks represent the next-generation evolution of online learning platforms. Building upon the advancements of Web 2.0, these networks integrate emerging technologies like blockchain, decentralized protocols, artificial intelligence, and virtual reality to foster more interactive and collaborative learning experiences. Web 3.0-based Social Learning Networks prioritize user privacy, security, and data ownership by utilizing decentralized storage and identity management systems. Smart contracts and blockchain-based certifications ensure transparent and verifiable credentials for learners. Through AI-driven personalized learning pathways, learners receive tailored content and recommendations based on their preferences and performance. Virtual reality elements provide immersive simulations and interactive scenarios, enhancing practical skills development. Peer-to-peer interactions are facilitated through decentralized communication protocols, enabling direct knowledge exchange and collaboration among learners across the globe. Overall, Web 3.0-based Social Learning Networks aim to empower learners, democratize access to education, and create a dynamic, inclusive, and self-sustaining learning ecosystem that adapts to individual needs and fosters lifelong learning.

## Virtual Classrooms and Global Connectivity

Virtual classrooms leverage technology to provide online learning experiences to students globally. With the power of global connectivity, students can access educational content from anywhere, breaking down geographical barriers. These virtual environments facilitate interactive and collaborative learning, offering diverse courses and expert instructors. The internet enables real-time communication, fostering engagement and knowledge sharing among students of different backgrounds. This global connectivity democratizes education, making it accessible to learners worldwide, regardless of their physical location. As a result, virtual classrooms promote lifelong learning, cross-cultural understanding, and the exchange of ideas, shaping a more connected and educated global community.

## Decentralized Learning Management Systems (DLMS)

Decentralized Learning Management Systems (DLMS) utilize blockchain or distributed ledger technology to empower learners and educators with greater control and security over educational data and content. By eliminating the need for a central authority, DLMS allows for peer-to-peer interactions, transparent record-keeping, and efficient content distribution. Learners can access courses from various sources, and their progress and achievements are securely recorded on the decentralized network. DLMS fosters collaboration, incentivizes content creation, and ensures data privacy, making it a promising solution to revolutionize the traditional learning landscape.

# Addressing Privacy and Security Concerns

## Data Ownership and Control in Web 3.0 Education

In Web 3.0 Education, data ownership and control are paramount concerns for learners and educators. Unlike traditional educational platforms, Web 3.0 utilizes decentralized technologies like blockchain to empower users with greater control over their data. Learners now have ownership of their personal information, academic records, and learning progress, eliminating the need for central authorities to store and manage such data. With cryptographic principles ensuring security and privacy, learners can share specific data selectively and securely with educational institutions or potential employers, enhancing trust and transparency in the process. Additionally, educators benefit from this paradigm as they gain insights into student learning patterns without compromising sensitive information. Web 3.0 Education fosters a more equitable and user-centric learning environment, where data ownership empowers individuals to harness the full potential of their educational journey while preserving their digital rights.

## Safeguarding Sensitive Information

Safeguarding sensitive information is crucial for data privacy and security. Employ robust encryption techniques to protect data during transmission and storage. Implement strict access controls, limiting access to authorized personnel only. Regularly update security protocols and employ multi-factor authentication to prevent

unauthorized entry. Conduct regular audits and risk assessments to identify vulnerabilities and address them promptly. Educate employees about data handling best practices and the importance of confidentiality. Ensure physical security measures for servers and data centers. Collaborate with cybersecurity experts to stay updated on emerging threats and industry best practices. Prioritize a culture of security awareness and continuous improvement.

## Cybersecurity Measures for Educational Institutions

Educational institutions should prioritize cybersecurity to safeguard sensitive data, intellectual property, and maintain a safe digital environment. Key measures include robust firewalls, regular software updates, strong password policies, multi-factor authentication, secure network infrastructure, encrypted data transmission, employee/student cybersecurity training, and strict access controls. Regular backups and disaster recovery plans are essential. Conducting periodic security audits and vulnerability assessments is crucial for identifying and mitigating potential threats. Establishing an incident response team to handle cyber incidents promptly is necessary. Collaboration with cybersecurity experts and promoting a culture of cybersecurity awareness among staff and students are equally vital aspects.

# Web 3.0 Assessment and Credentialing

Web 3.0 Assessment and Credentialing refers to the emerging paradigm of evaluating individuals' skills, knowledge, and achievements in a decentralized, secure, and interoperable manner on the internet. Unlike traditional centralized systems, Web 3.0 leverages blockchain and distributed ledger technologies to offer a more transparent, tamper-proof, and trustworthy approach to credentialing. Assessment in Web 3.0 involves the evaluation of a person's competencies, qualifications, and experiences, often through decentralized platforms or smart contracts. These assessments can cover a wide range of domains, such as education, professional certifications, and skills acquired through non-formal means like online courses or workshops. Credentialing in this context entails issuing and managing digital credentials that represent the verified achievements of individuals. These credentials are stored on the blockchain, enabling users to have complete ownership and control over their data, eliminating the need for third-party intermediaries, and ensuring privacy and security. Moreover, Web 3.0's interoperability allows different platforms and institutions to recognize and acknowledge these credentials universally, creating a seamless and verifiable system for employers, educational institutions, or any concerned parties to assess an individual's qualifications accurately.

# Overcoming Challenges in Web 3.0 Education

## Digital Divide and Inclusivity

In Web 3.0 education, overcoming challenges related to the digital divide and promoting inclusivity is crucial. To address the digital divide, policymakers must prioritize providing affordable and accessible internet access to underserved communities. Educational institutions should offer hybrid learning models to accommodate diverse technological capabilities and ensure access to learning materials offline. Inclusivity can be promoted by creating multilingual platforms, embracing diverse learning styles, and implementing assistive technologies for students with disabilities. Collaboration among governments, tech companies, and educators is essential to bridge the gap, ensuring that all learners have equal opportunities to thrive in the evolving digital landscape.

## Technological Infrastructure and Resources

In the transition to Web 3.0 education, another key challenge is establishing a robust technological infrastructure and ensuring sufficient resources. This requires upgrading network capacities, implementing decentralized systems, and optimizing data storage and processing. Additionally, equipping educational institutions and learners with the necessary hardware and software is crucial. Adequate funding and support are essential for research and development in cutting-edge technologies that drive Web 3.0. Collaboration among governments, organizations, and industry players is vital to overcome these obstacles and create an inclusive and efficient Web 3.0 education ecosystem, empowering learners with seamless access to innovative learning experiences.

## Training and Professional Development for Educators

In the realm of Web 3.0 education, third critical challenge is ensuring that educators receive adequate training and professional development to effectively utilize emerging technologies in the learning process. As the digital landscape evolves rapidly, educators must be equipped with the skills to integrate blockchain, augmented reality, virtual reality, and other immersive technologies into their teaching methodologies. This entails tailored workshops, online courses, and hands-on experiences that empower educators to navigate the complexities of Web 3.0 tools. By investing in comprehensive training, educational institutions can foster a generation of tech-

savvy educators capable of harnessing the full potential of Web 3.0 to enrich students' learning experiences and prepare them for a tech-driven future.

## Case Studies: Successful Implementation of Web 3.0 in Education

### Decentralized Learning Management System (LMS)

In this case study, a forward-thinking educational institution adopts a decentralized LMS based on Web 3.0 principles. This decentralized LMS is powered by blockchain technology, enabling secure and transparent management of student records, certifications, and academic achievements. Students have ownership of their digital credentials, making it easier for them to share verified achievements with potential employers or other institutions. The decentralized nature of the LMS ensures data integrity and reduces the risk of data breaches.

### Tokenized Incentive System for Learning

A progressive online learning platform leverages Web 3.0 technology to create a tokenized incentive system. Students earn tokens for completing courses, achieving high grades, or actively participating in discussions. These tokens can be exchanged for rewards such as access to premium content, exclusive webinars, or even real-world benefits like discounts on educational resources. This approach encourages engagement and fosters a sense of community among learners.

### Virtual Reality (VR) Enhanced Learning Environments

In this case, a group of educational content providers and technology companies collaborates to create an immersive VR-based learning environment powered by Web 3.0. Students can access these virtual worlds using a decentralized platform that ensures interoperability between various VR devices and applications. These environments provide interactive and engaging experiences, enabling students to explore historical sites, simulate scientific experiments, or participate in collaborative problem-solving activities with peers from around the globe.

### Personalized Learning Pathways with AI and Web 3.0

A cutting-edge educational platform integrates artificial intelligence (AI) and Web 3.0 principles to offer personalized learning pathways to students. The platform gathers data from various sources, including the student's academic performance, interests, and learning preferences. It uses this data to create tailored learning experiences, suggesting appropriate courses and resources that match each student's unique learning needs and goals. The data is stored securely on a decentralized network, ensuring privacy and giving students control over their information.

### Global Collaborative Research Network

In this case, Web 3.0 facilitates the creation of a global collaborative research network among educational institutions, researchers, and experts. A decentralized platform allows researchers from different parts of the world to contribute and share their findings securely. Smart contracts ensure fair attribution and compensation for contributions. This network accelerates the pace of research, enables interdisciplinary collaboration, and broadens access to cutting-edge knowledge and expertise.

## Future Directions and Potential Impact

### Anticipated Trends in Web 3.0 Education

In the future, Web 3.0 is expected to revolutionize education with anticipated trends such as decentralized learning platforms, blockchain-based certification systems, and personalized AI-driven curricula. Learners will have greater control over their data and learning pathways, fostering trust and transparency in educational processes. Smart contracts will enable peer-to-peer knowledge exchange and incentivize active participation. Immersive technologies like augmented and virtual reality will enhance experiential learning, making education more engaging and accessible. Web 3.0 will empower global collaboration among students and educators, breaking down traditional barriers and democratizing education. Overall, these advancements hold the potential to create a more inclusive, efficient, and effective educational landscape.

### Societal Implications and Ethical Considerations

Societal implications include enhanced learning opportunities but also potential marginalization and privacy issues. Careful consideration of data rights, accessibility, and digital literacy will be vital to ensure ethical development and equitable education. Striking a balance between innovation and human well-being is crucial to

prevent biases, discrimination, and privacy breaches. Transparent AI algorithms, unbiased data, and comprehensive regulations can safeguard against negative impacts and ensure technology benefits all. By fostering collaboration between stakeholders, including governments, researchers, and the public, we can harness AI's potential for positive societal change, empowering individuals, enhancing healthcare, and tackling global challenges while upholding ethical principles that respect human rights and dignity.

## The Role of Governments and Educational Institutions

In the future, the role of governments and educational institutions will be crucial in shaping societies and fostering progress. Governments will need to prioritize education funding and policy initiatives that promote equitable access to quality education, fostering a skilled and adaptable workforce. Educational institutions must embrace technology and innovative teaching methods to prepare learners for a rapidly evolving job market. Collaboration between governments and educational institutions will enable the development of comprehensive lifelong learning programs, empowering individuals to thrive in an ever-changing world. Together, they can create a knowledgeable and empowered citizenry, driving economic growth and societal development with lasting global impact.

## Results

Web 3.0 heralds a transformative era in education, redefining learning experiences. Utilizing decentralized blockchain technology and AI, it empowers learners with ownership and control over their data and credentials, enhancing privacy and security. Immersive virtual classrooms, powered by augmented and virtual reality, enable dynamic, collaborative learning beyond geographical limitations. Smart contracts facilitate transparent interactions between students, educators, and institutions, fostering trust and accountability. Personalized learning pathways, leveraging AI algorithms, cater to individual needs, optimizing educational outcomes. Open-access resources and peer-to-peer learning networks democratize knowledge dissemination, narrowing the digital divide. Web 3.0 revolutionizes education, making it inclusive, adaptive, and learner-centric, preparing students for the challenges of tomorrow.

## Conclusions

In conclusion, Web 3.0 heralds a transformative era in education, characterized by decentralization, personalization, and enhanced collaboration. By leveraging blockchain technology, smart contracts, and decentralized applications, educational institutions can ensure data security, transparency, and integrity. Learners will experience personalized learning pathways tailored to their needs, interests, and progress. Web 3.0's seamless integration of virtual and augmented reality will enable immersive and interactive educational experiences. Moreover, global connectivity and decentralized networks will facilitate knowledge sharing and collaboration beyond geographical boundaries. Embracing Web 3.0 in education holds the promise of fostering a more inclusive, innovative, and accessible learning ecosystem for the future.

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# Quality in Online Education: Need of the Hour

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## Abstract

In recent years, online education has gained significant prominence, especially with the advent of technology and the internet. As the world faces unprecedented challenges, such as the COVID-19 pandemic, the need for effective online education has become more evident than ever before. However, amidst the rapid expansion of online education, ensuring quality in these platforms has emerged as the need of the hour. This abstract discusses the significance of quality in online education and emphasizes the measures that need to be taken to ensure an enriching and valuable learning experience for students. The abstract begins by acknowledging the growing importance of online education, which has opened up new avenues for learning, transcending geographical boundaries. The COVID-19 pandemic has acted as a catalyst, accelerating the adoption of online education worldwide. However, with this rapid growth, concerns about the quality of online education have surfaced. The abstract highlights that quality in online education is crucial for several reasons. First and foremost, ensuring quality education is a fundamental right of every learner. Online education should provide learners with equal opportunities to access high-quality educational resources and engage in interactive and engaging learning experiences. Additionally, quality education ensures that learners acquire the necessary knowledge and skills to succeed in a rapidly changing world. Employers and society at large also benefit from the availability of well-educated individuals who can contribute effectively to the workforce and society's development. To achieve quality in online education, the abstract proposes various measures that need to be implemented. These include comprehensive teacher training programs to equip educators with the necessary skills and pedagogical strategies for effective online instruction. Additionally, the design and development of online courses must prioritize learner-centered approaches, interactive content, and assessments that promote critical thinking and problem-solving skills. Furthermore, reliable technological infrastructure and support services should be in place to ensure smooth functioning of online platforms, minimizing technical glitches and disruptions. The abstract concludes by emphasizing the importance of collaboration among educational institutions, policymakers, and stakeholders to establish clear quality standards and guidelines for online education. Regular evaluations, feedback mechanisms, and continuous improvement processes should be integrated to monitor and enhance the quality of online education offerings. By prioritizing quality, online education can fulfill its potential as a powerful tool for inclusive and accessible learning, empowering individuals worldwide with the knowledge and skills needed to thrive in the digital era.

**Keywords**: Development, Knowledge, Learners, Online Education, Quality, Skills.

## Introduction

Online education has become an indispensable part of modern learning, especially in the wake of recent global challenges. As the digital landscape continues to evolve, the focus on quality in online education has emerged as an urgent necessity. The shift to remote learning has accelerated the adoption of virtual platforms, demanding a robust and effective online education system. The need of the hour is to ensure that online education meets the highest standards in delivering knowledge and fostering a conducive learning environment. This introductory piece delves into the significance of quality in online education and explores the key factors that contribute to its successful implementation. From technological infrastructure to pedagogical approaches, this exploration highlights the critical elements that educators, policymakers, and institutions must consider to meet the growing demand for high-quality online education. As we navigate this digital frontier, prioritizing the quality of online education is paramount in shaping a competent and empowered generation of learners.

## Methodology

This paper employs a comprehensive research methodology that combines both primary and secondary sources to ensure a well-rounded investigation. The secondary sources used encompass a wide array of references such as research papers, newspapers, professional journals, magazines, textbooks, and reputable websites. These sources provide a strong foundation of existing knowledge and insights related to the subject. In addition to secondary sources, primary data is gathered through personal interactions and telephonic interviews with knowledgeable individuals. This approach allows for the acquisition of firsthand information, unique

perspectives, and real-life experiences directly from experts in the field. The utilization of primary data enhances the credibility and originality of the research findings, supplementing the existing body of knowledge. By employing a mix of primary and secondary sources, this research methodology ensures a comprehensive and well-informed analysis of the subject matter, contributing valuable insights to the field under investigation.

# Understanding Quality in Online Education

## Defining Quality in the Digital Learning Landscape

Quality in the digital learning landscape refers to the effectiveness, relevance, and accessibility of educational content and resources delivered through digital platforms. It encompasses interactive and engaging materials, adaptive learning, credible sources, expertly designed courses, and measurable learning outcomes. A focus on user experience, inclusivity, and continuous improvement ensures that learners achieve their educational goals and acquire valuable skills in an efficient and enriching manner.

## Key Components of Quality Online Education

Quality online education comprises essential components to ensure effective learning experiences. First, it demands well-designed and structured courses with clear learning objectives. Second, interactive and engaging multimedia content, including videos, simulations, and quizzes, enhances learner participation. Third, regular and timely feedback from instructors fosters personalized learning and improvement. Fourth, a robust and user-friendly online platform ensures seamless navigation and access to resources. Fifth, opportunities for collaborative learning through discussions and group projects promote social interaction. Sixth, assessment methods that accurately measure students' knowledge and skills. Lastly, dedicated support services, such as technical assistance and academic advising, contribute to a positive and successful online learning environment.

# The Impact of Online Education on Learners

Online education has had a profound impact on learners, transforming the way they access and engage with knowledge. Firstly, it has increased educational opportunities by breaking down geographical barriers, enabling individuals from diverse backgrounds to access courses and programs they may not have otherwise been able to attend. Secondly, online learning promotes flexibility, allowing learners to study at their own pace and schedule. This flexibility accommodates working professionals, parents, and those with other commitments, making education more accessible to a broader audience. Thirdly, online education encourages self-discipline and time management skills as learners must take responsibility for their learning progress. Moreover, it offers a wealth of multimedia resources, interactive content, and online communities that enhance engagement and comprehension. However, it also presents challenges such as the need for strong digital literacy and potential feelings of isolation due to lack of face-to-face interaction.

# Ensuring Quality in Online Education: Best Practices

## Technological Infrastructure and Accessibility

Ensuring quality in online education requires a strong focus on technological infrastructure and accessibility. Firstly, institutions should invest in reliable and up-to-date hardware, software, and network systems to support seamless delivery of online courses. Secondly, platforms and learning management systems should be user-friendly and intuitive, catering to learners of varying technical abilities. Compatibility with different devices ensures accessibility for all. Thirdly, adherence to accessibility standards, such as WCAG (Web Content Accessibility Guidelines), guarantees that online content is inclusive and usable for learners with disabilities. Regular maintenance and monitoring of the technological setup, along with prompt technical support, are vital to minimize disruptions and enhance the overall learning experience. By prioritizing technological infrastructure and accessibility, institutions can offer a more inclusive, effective, and equitable online education environment.

## Pedagogical Approaches and Learning Design

Ensuring quality in online education demands thoughtful pedagogical approaches and effective learning design. Firstly, instructors should employ student-centered strategies, fostering active learning through discussions, collaborative projects, and problem-solving activities. Secondly, designing courses with clear learning objectives and outcomes promotes focused and meaningful learning experiences. Thirdly, incorporating diverse multimedia resources, such as videos, interactive simulations, and virtual labs, enhances engagement and comprehension. Fourthly, regular and timely feedback on assignments and assessments supports continuous improvement.

Lastly, fostering a sense of community through online forums and peer interactions encourages social learning and motivation.

## Faculty Training and Support

Faculty training and support are crucial for ensuring quality in online education. Adequate training equips instructors with the necessary skills and knowledge to effectively navigate the digital learning environment, use educational technologies, and implement best practices in online pedagogy. Ongoing professional development keeps faculty updated with the latest trends and methodologies in online education. Additionally, providing technical support and a dedicated team for troubleshooting assists instructors in addressing any technical issues promptly, allowing them to focus on delivering high-quality content and engaging with students. By investing in faculty training and support, institutions promote a positive and enriching online learning experience for all stakeholders.

## Student Engagement and Interaction

Ensuring quality in online education requires prioritizing student engagement and interaction. First, instructors should design courses with interactive elements like discussions, group projects, and virtual collaborations to foster active participation. Second, regular communication and personalized feedback build a sense of connection and motivation. Third, incorporating multimedia content and gamified activities enhances interest and comprehension. Fourth, creating online communities or forums encourages peer-to-peer interaction and knowledge sharing. Fifth, real-time virtual sessions or webinars allow for direct interaction with instructors and guest speakers. Emphasizing student engagement and interaction in the online learning environment promotes a dynamic and enriching educational experience, resulting in higher retention rates and better learning outcomes.

# Leveraging Technology for Quality Online Education

## Artificial Intelligence and Personalized Learning

Leveraging technology for quality online education involves harnessing Artificial Intelligence (AI) to implement personalized learning approaches. AI can analyze vast amounts of student data and behavior to create individualized learning paths, tailoring content and activities to each learner's needs, preferences, and pace. This adaptive learning approach fosters greater engagement and improves retention rates. AI-powered chatbots and virtual tutors can also provide instant support and feedback, enhancing the learning experience. Moreover, AI can aid in automated grading and assessment, freeing up instructors' time for more personalized interactions. Integrating AI into online education maximizes efficiency, effectiveness, and student satisfaction, ultimately elevating the overall quality of education.

## Augmented Reality (AR) and Virtual Experiences

Leveraging technology for quality online education involves incorporating Augmented Reality (AR) and Virtual Experiences to enhance learning. AR overlays digital content onto the real world, offering interactive and immersive learning experiences. Virtual experiences simulate real-life situations, enabling learners to practice skills in a risk-free environment. By utilizing AR and Virtual Experiences, complex concepts become more tangible and understandable, fostering deeper engagement and knowledge retention. From virtual lab experiments to historical reenactments, these technologies offer unique and interactive ways for learners to explore, interact, and apply knowledge. Integrating AR and Virtual Experiences enriches online education, making it more dynamic, memorable, and impactful for students.

## Data Analytics and Continuous Improvement

Leveraging technology for quality online education involves harnessing Data Analytics and Continuous Improvement strategies. Data analytics can analyze vast amounts of student performance data, engagement metrics, and learning behavior, providing valuable insights into the effectiveness of online courses and identifying areas for improvement. This data-driven approach enables educators to make evidence-based decisions, refine instructional methods, and optimize content delivery. By continuously monitoring and evaluating the learning process, institutions can adapt and enhance their online education offerings, ensuring that students receive the most effective and relevant learning experiences. Data analytics and continuous improvement play a crucial role in maintaining and elevating the quality of online education.

# Case Studies: Exemplary Models of Quality Online Education

## Universities and Institutions Leading the Way

*Indian Institute of Technology (IIT) Madras – NPTEL*

The National Programme on Technology Enhanced Learning (NPTEL) by IIT Madras is one of the largest online repositories of high-quality engineering and science courses in India. It offers free online courses with comprehensive video lectures, course materials, and assessments.

*Indira Gandhi National Open University (IGNOU)*

As one of the world's largest open universities, IGNOU has been a pioneer in distance and online education in India. It provides a wide range of undergraduate, postgraduate, and diploma courses through online mode, making education accessible to a diverse group of learners.

*Swayam*

Swayam is an online platform initiated by the Government of India, offering MOOCs (Massive Open Online Courses) from various universities and institutions. It provides free and low-cost courses on diverse subjects, ensuring quality content and interactive learning experiences.

*Amity University Online*

Amity University offers a robust online learning platform that provides various degree and diploma programs. They focus on interactive content, regular assessments, and personalized support to enhance the learning experience.

*BITS Pilani*

Work Integrated Learning Programs (WILP): BITS Pilani offers Work Integrated Learning Programs that enable students to pursue higher education while working. These online programs combine academic rigor with industry relevance, catering to the needs of working professionals.

*Tata Institute of Social Sciences (TISS)*

TISS offers various online courses in social sciences and allied disciplines. The online mode allows learners to access quality education from TISS faculty and experts from different parts of the country.

## Successful Implementation in K-12 Education

*Khan Academy India*

Khan Academy India offers free, high-quality educational content in various subjects, aligned with Indian curricula. The platform provides interactive video lessons, practice exercises, and personalized learning pathways, making it accessible to a wide range of students.

*BYJU'S*

The Learning App BYJU'S is a popular online learning platform that provides engaging video lessons and interactive content for K-12 students. It uses adaptive learning technology to cater to individual learning needs and has gained widespread adoption in Indian households.

*Toppr*

Toppr is an online learning platform that offers comprehensive test preparation and personalized learning solutions for K-12 students. It covers a range of competitive exams, school boards, and subjects, helping students excel in their studies.

*Akash Educational Services Limited (AESL)*

AESL is a prominent offline coaching institute that expanded its reach through digital platforms. Their online classes and live interactive sessions have enabled students from across India to access quality coaching for various competitive exams.

*Central Board of Secondary Education (CBSE) Digital Initiatives*

CBSE, the national education board of India, has been promoting various digital initiatives to improve online education. This includes e-learning resources, digital textbooks, and online teacher training programs.

*Atal Tinkering Labs (ATLs)*

ATLs are a government initiative aimed at promoting innovation and hands-on learning among school students. These labs are equipped with technology like 3D printers and robotics kits, fostering creativity and practical skills.

## Overcoming Challenges and Ensuring Equitable Access

### Addressing Digital Divide and Inclusivity

To overcome the digital divide and ensure equitable access to online education, several measures can be taken:

*Providing Infrastructure:* Governments and educational institutions can invest in infrastructure, such as internet connectivity and devices, especially in remote and underserved areas.

*Zero-Rating and Data Plans:* Collaborations with telecommunication companies can offer zero-rated educational content or discounted data plans to reduce data costs for students.

*Offline Learning:* Offering downloadable content or offline access to materials can help learners with intermittent internet access.

*Community Learning Centers:* Establishing community learning centers equipped with technology allows students without resources to access online education.

*Inclusive Content:* Ensuring online content is accessible to learners with disabilities through text-to-speech, closed captions, and alternative formats.

### Data Privacy and Security Concerns

To address data privacy and security concerns in online education:

*Compliance and Policies:* Institutions must comply with data protection regulations and establish clear policies regarding data collection, storage, and usage.

*Encryption and Secure Platforms:* Using encrypted communication and secure platforms protects student data from unauthorized access.

*Educating Users:* Educating students, teachers, and staff about data privacy best practices helps maintain a secure learning environment.

*Data Retention Policies:* Implementing appropriate data retention policies ensures data is only stored for necessary periods.

*Regular Audits:* Conducting regular audits to assess data security measures and identify potential vulnerabilities.

### Supporting Diverse Learning Needs

To support diverse learning needs in online education:

*Differentiation:* Providing a range of content types, learning activities, and assessment methods accommodates different learning styles.

*Personalization:* AI-driven adaptive learning systems can tailor content and pace to individual student needs.

*Inclusive Design:* Creating accessible content that caters to learners with disabilities promotes inclusivity.

*Multilingual Support:* Offering courses in multiple languages allows non-native speakers to engage effectively.

*Student Support Services:* Providing counseling, tutoring, and academic advising supports students with varying needs.

## Future Trends and Innovations in Online Education

### Emerging Technologies Shaping the Future of Online Education

*Artificial Intelligence (AI) and Machine Learning:* AI-powered adaptive learning systems can provide personalized learning experiences, track student progress, and offer targeted interventions.

*Virtual Reality (VR) and Augmented Reality (AR):* VR and AR can create immersive learning environments, allowing students to interact with complex concepts and experience real-life scenarios.

*Blockchain Technology:* Blockchain can be used for secure credentialing and certification, verifying students' academic achievements and enhancing the authenticity of online degrees.

*Internet of Things (IoT):* IoT devices can facilitate seamless data collection and enable interactive and connected learning experiences.

*Chatbots and Virtual Assistants:* AI-powered chatbots can provide instant support, answering students' questions and offering guidance 24/7.

*Big Data Analytics:* Analyzing vast amounts of data can provide insights into student behavior, performance patterns, and optimize course content.

*Gamification:* Integrating game elements into learning activities can enhance engagement and motivation.

## The Evolution of Blended Learning

Blended learning is an educational approach that combines traditional in-person instruction with online learning. It has evolved to encompass various models:

*Flipped Classroom:* Students study online content before class, and in-person sessions focus on discussions, collaborative projects, and problem-solving.

*Station Rotation:* Students rotate between online learning stations and face-to-face activities, catering to different learning needs.

*Flex Model:* Students have the flexibility to choose between attending physical classes or accessing content online.

*Hybrid Courses:* Courses are designed to deliver a portion of the content online, reducing the amount of time spent in the classroom.

*Online Labs and Simulations:* Students can access virtual labs and simulations to complement traditional hands-on experiences.

## Results

Quality in online education is imperative as it ensures effective learning outcomes and student engagement. A well-designed online curriculum, interactive teaching methods, personalized feedback, and support mechanisms foster a conducive learning environment. Ensuring qualified and trained instructors, up-to-date content, and user-friendly platforms further enhance the learning experience. Additionally, incorporating multimedia and interactive resources can promote better understanding and retention. Rigorous assessment methods maintain academic integrity, while regular evaluations enable continuous improvement. Prioritizing quality in online education is vital to meet the evolving educational needs of diverse learners and prepare them for the challenges of the digital age.

## Conclusions

In conclusion, the significance of quality in online education cannot be overstated; it is the need of the hour. As technology continues to shape the way we learn, ensuring a high standard of online education becomes paramount. A focus on well-structured courses, engaging content, interactive learning platforms, and skilled educators is essential to deliver valuable and effective online learning experiences. By investing in quality, we can bridge gaps in accessibility, reach a broader audience, and prepare individuals for a rapidly evolving digital world. Embracing and prioritizing quality in online education will lead to empowered learners, better career opportunities, and a more knowledgeable and productive society overall.

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# Automatic Generation of Algebraic Representation for Physics Problems

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## Abstract

During today's e-learning era, students often need to opt for self-study sessions to solve word problems. Word problems are generally solved by transforming them into corresponding algebraic equations. This paper presents an approach for automatically generating such algebraic representations for any word problems in the physics domain. The current system first suggests a suitable template to generate an abstract version of the given word problem. These templates are formed with one or more equations, replacing specific values with generic variables. The motivation for choosing such templates was limiting the number of possible templates to the minimum to reduce further ambiguities. Once the templates are predicted, the values for the variables are tagged by parsing the word problems using named entity recognition (NER) based and rule-based approaches. While developing and assessing our system, we collected a database of Physics word problems and asked experts to determine their algebraic representations manually. Inconsistencies are filtered out using proper preprocessing and normalization measures. Although our system is a preliminary step towards automatically solving physics word problems, the template generation and tagging modules performed their corresponding tasks with around 70% accuracy.

**Keywords**: Word problem, physics, abstraction, algebraic representation, equation, problem solving.

## Introduction

Physics is a foundational subject in both science and engineering education all over the world. A subject like physics comes with well-established laws and theories, understanding which becomes easy when applied to real-life issues. Physics problems are typically represented in terms of everyday, real-world objects and their relations discussed over some events. To solve a specific physics problem, one needs to determine the properties of these objects and the effect of the events. These can be determined by understanding the physical laws and theories and applying them to the objects given in the problem. Given a problem to solvers, experts or novices, try to develop an abstract representation of the problem to understand the physical representation of the word problem. Hence, it is necessary to model the physical laws into different representations to solve a physics word problem. Understanding physics theories relies on such representations (Buffler, 2008).

Accurate development of the word problems' physical representation is vital to capture the relations between the objects and their representation in corresponding domains. A good problem representation incorporates significant problem constraints while hiding superfluous details (Addanki, 1989). Different levels of abstract representation are necessary to generate an intelligent tutoring system or an automatic physics word problem solver. According to Larkin (1983), different levels of abstraction have been achieved so far to solve physics word problems using different applications.

- **Literal representation:** It extracts relevant keywords from the problem statement.
- **Naive representation:** This contains the literal objects, their spatial relationships, and a sketch of the situation presented in the problem statement.
- **Scientific representation:** Considers canonical or idealized objects and physical concepts (such as force, momentum, energy etc.) that are required to describe the dynamics of a situation in algebraic form or system of equations.
- **Algebraic representation:** Reasons about the canonical objects and physical concepts to construct the algebraic system corresponding to the problem domain.

Considering a physics problem as follows,

***Example 1.*** *A 5.00-g bullet leaves the muzzle of a rifle with a speed of 320 m/s. The expanding gases behind it exert what force on the bullet while it travels down the barrel of the rifle, 0.820 m long? Assume constant acceleration and negligible friction.*

The four representations mentioned above will be as follows:

- **Literal representation:** This will generate keywords such as 'bullet,' 'rifle,' 'force,' 'barrel,' 'constant acceleration,' and 'negligible friction.'
- **Naive representation:** This consists of a visual schematic description of a bullet having a mass and a force being applied to that by the rifle, generating some acceleration to move the bullet through the muzzle of the rifle.
- **Scientific representation:** The scientific schema is constructed by identifying fundamental physical concepts and principles like 'laws of motion,' 'the concept of force,' and 'the concept of acceleration.'
- **Algebraic representation:** Following equations describe the problem:

$$F = m * a$$

$$v^2 = u^2 - 2 * a * s$$

The 'force' (F) is applied to the bullet having 'mass' (m), creating an 'acceleration' (a). The acceleration moves the stationary bullet (u or initial velocity is zero) through the muzzle having length 's'. At the end of the muzzle, the bullet has a speed of 'v' (final velocity). The relation is derived using the laws of motion, particularly Newton's second law of motion.

A word problem is a typical sequence of free text describing some events on some physical objects and their relations. The corresponding physical theories are abstract formulations of some established laws and do not directly relate to the word problem (Greca, 2002). Two word problems concluding the same physical laws may have different lexical and semantic distributions. However, the events and objects in the word problems concluding the same physical laws have similar features. Hence, generating the algebraic representation from the word problem can be carried out accurately if the objects and events are correctly distinguished.

In the present study, an attempt has been made to generate an algebraic representation for a physics word problem. A particular physics word problem can be represented using a set of algebra equations. For the problem below,

***Example 2.*** *A force of 10 N is applied on a block having a mass of 5 Kg. What would be the acceleration generated?*

The equation will be: $10 = 5 * u_1$

Such equations do not reflect the identity of the objects or the underlined physical laws. The paper suggests an algebraic representation where the slots of an equation (known or unknown) are tagged with a physics concept. The suggested algebraic representation is as follows for the problem given in Example 2: $F \mid 10 = m \mid 5 * a \mid u_1$

Each token in the equation is denoted in a format $a \mid b$ where $a$ is a variable denoting a physical object, and $b$ is the value denoting the object's properties in the given problem. If the value is unknown, the value is denoted by an unknown slot $u_1$. For example, the value of the variable $a$ is unknown and so, denoted by $u_1$.

The algebraic representation generation approach used in the current study is simple. Such models can be used in several applications. This approach is the primary step toward developing an intelligent tutoring system which can be used for automatic problem generation, guided problem solving, student diagnostic and feedback, or automatic grading. Similar works have been reported regarding automatic semantic interpretation systems, automatic word problem solvers or different information extraction systems (Ghosh, 2017; Ghosh, 2022).

## Literature Survey

Several representations have been formed to abstract word problems based on applications and domains. An intelligent physics tutor - ISAAC was implemented where problems are abstracted in different levels - case-structured semantic network, language-free internal model, canonical object frame and geometrical models (Novak, 1976). These representations store semantic, objective, canonical and geometric information from the word problem. One does not require a semantic or geometric model to generate the algebraic representation from a word problem. The objective (physical) model gathers two types of information - (i) information related to a particular object (such as properties of an object A) and (ii) information which relates to two objects (such as the location of an object A above another object B). The canonical model, on the other hand, substitutes the physical model information based on the context as described in the word problem. For example, a person is modelled as a pivot when carrying a plank and as a point mass sitting on a plank. Another study involves an object-oriented approach to represent objects and their features using a canonical physical model. In contrast, another physical

model is formed to describe the relations between the objects (Kook, 1990). Research has been reported on automatically solving various types of mathematical word problems. This domain suggests developing application-specific queries or canonical forms and finally uses rule-based systems to solve the problems (Lev, 2004; Kushman, 2014). Our approach is quite similar to such systems but, at the same time, differs in a few aspects. Unlike algebra problems, physics problems from different chapters or concepts hardly generate the same template equations.

The area of problem representation generation is quite similar to areas like automatic semantic interpreters and information extraction systems. Natural language texts are converted to abstract representations in these areas for efficient searching and processing. Much research has been done to understand the mapping between the natural language and formal semantic representations. Reinforcement learning is one of the approaches which can be used to interpret commands or instructions and perform actions in a specific scenario (Vogel, 2010). Some attempts have been reported using canonical or annotated logical forms (Ghosh, 2022). These techniques learn from the pair of sentences and indirect feedback collected from controlled applications like question answering (Clarke, 2010; Cai, 2013), dialogue systems, robot instruction (Chen, 2012), program executions (Kushman, 2013; Lei, 2013) and automatic navigation systems (Vogel, 2010). These systems rely on basic mathematical or logical knowledge and are language-independent. For handling complex domain problems such as algebra word problems, sentences are processed in serial; hence cannot count for the inter-dependencies between the sentences.

The current study is related to template-based information extraction systems, as the event templates are to be identified in the text, and their slot fillers must be extracted. Such attempts have been noted using a supervised approach where the templates are defined manually based on the specific application. Automatic induction approaches have been recently noted. In our approach, developing the algebraic representations is relatively easy as there is no requirement to consider relations between the objects separately. When the properties of the objects are described by the values present in an equation generated from some established physical laws, the relation between the objects is also specified. Nevertheless, for a complex scenario with many objects and equations involved, it may be challenging to understand the dependencies between the objects or equations.

## Methodology

The current study on algebraic representation generates algebraic representation for an input word problem in the physics domain. A typical physics word problem may have inconsistencies in several points (such as units, numerical and punctuation). These issues can be handled using standard preprocessing and normalization techniques. The algebraic representation generation is achieved using (i) template generation and (ii) template tagging. In the first step, a pair consists of a word problem and its corresponding equations as input. A template equation is generated from this pair where the slots of the template equations are either known (a number slot) or unknown (an unknown slot). In the second step, these slots are tagged with a variable which denotes identity for a particular object and applied physical law. The tagging is achieved using two approaches: a rule-based approach and a NER-based approach. The rule-based approach develops a rule base from the distribution of the tagged variables seen in a training data set. The same training data set is used to train a NER model.

### Experimental Setup

*Corpus*

We collected a dataset of 75 word problems from the chapter "Laws of Motion" from a physics book authored by Resnick-Halliday, HC Verma and a few sources from the Web. Therefore, the problems show variety in syntactical and linguistic structure, but they are conceptually similar. These problems are then preprocessed and normalized using simple rules. These steps remove the inconsistencies such as different notations for the same unit (such as 's' or 'sec' or 'seconds' or 'sec.' etc.) or number (such as '10' or '10.0' etc.), the presence of indices and complex operations in the number (such as $10^{e^{-15}}$), presence of conversion rules and misplaced punctuations etc. A set of 50 problems is used to train the proposed models, whereas the remaining 25 word problems are used to evaluate the models. Details of the two sets - training set and test set are given in Table 1.

*Template Generation*

A word problem and its associated set of equations are the input for this step. A template is generated based on the presence or absence of the numbers of the equations in the corresponding word problem. A template is formed by substituting an equation's number and unknown slots.

It searches the numbers in the equation in the word problem. The number is substituted for a successful and non-duplicate match with a number slot $n_i$ ($i$ denotes an index number). For a successful and duplicate match, the number is substituted with the same number slot already allotted to the number. If no match is found, that

Table 1. Dataset statistics.

| Training Data | | Test Data | |
|---|---|---|---|
| Number of problems | 50 | Number of problems | 25 |
| Number of sentences | 117 | Number of sentences | 82 |
| Number of words | 6902 | Number of words | 5043 |
| Number of slots | 130 | Number of slots | 87 |
| Mean slots per problem | 2.6 | Mean slots per problem | 3.48 |
| Mean numbers per problem | 1.66 | Mean numbers per problem | 2.56 |
| Mean nouns per problem | 0.94 | Mean nouns per problem | 0.92 |

number is substituted with a new number slot. The unknown slots are one after another, substituted with the unknown slots, $u_i$ ($i$ having the same significance).

For a word problem,

***Example 3.*** *A force of 140 N is applied on a block of mass of 55 kg. What is the acceleration?*

the equation will be: 140 = 55 * a, the template equation will be: $n_1 \ = \ n_2 \ * \ u_1$

*Template Tagging*

In this step, the slots of the template equations are tagged with the physics concept (variables as used in standard physics laws). The tags are manually added to the training and test data sets. The tags are denoted after a pipe or | followed by the associated number or noun in the word problems. For the numbers absent in the word problem, a tag '*c*' (constant) is suggested. For example, considering the physics problem given in Example 2, the word problem after tagging will look as follows:

*A force of 10|F N is applied on a block having a mass of 5|m Kg. What would be the acceleration|a generated?*

The rule-based approach creates a rule base using the training data. It has been noted that a particular object may possess a few units as specified by physical laws (such as the unit of force can be "dyne" or "Newton"). Moreover, for a value mentioned for an object (or some of its features), units are more probable to occur in the following one or two words. The object or the properties of the object whose value is mentioned by a number in the word problem also reside in near-context words. Hence, the rule base is developed based on the tags' distribution for the previous and following words. The rule-base stores all possible patterns of the previous two words and the next word for a word to have a particular tag. When checking whether a word in the test set will get a tag is required, we will check in the rule base. Based on the distribution stored, the tags will be predicted with a weight value for the word. The tags matched for the next word (the units in most cases) criterion is given a weight of 0.5, whereas the match for the previous two words is assigned with a weight of 0.25 each. A weight of 1 means a full match of the previous two words, and the next word, and a weight of 0 means no match. No tags are predicted in case a 0 weight is returned.

The current study uses the Stanford NER to automatically tag the slots of a template equation. A few simple but significant features have been selected based on the variations noted. They are mentioned in Table 2.

Table 2. Selected features used in NER-based approach.

| useNext | useclassfeature | useword | useNgrams |
|---|---|---|---|
| useprefix | noMidNgrams | usedisjunctive | maxNgramlength = 1 |

These simple techniques for tagging the word problems may leave some of the nouns untagged with the corresponding variables in case the object of the question sentence is ambiguous. The reason is not using the information whether a particular word is the object of the question or command sentence.

## Evaluation

The template generation and tagging steps are evaluated separately using the test set of 25 word problems. The performance of the template generation step is presented in the form of three measures: precision (P), recall (R) and F-score (F). Precision measures the number of tags correctly predicted by the model and recall shows the amount of the tags in the test data are correctly predicted. F score offers a balanced measure of overall quality by harmonizing precision and recall. The detailed performance of the template generation step is shown in Table 3.

Table 3. Performance of the template tagging module.

| Precision | Recall | F score |
|-----------|--------|---------|
| 85.07 | 65.51 | 74.02 |

The rule-based and NER-based approaches are evaluated after the template is generated automatically. The detailed performance of these two models is shown in Table 4.

Table 4. Performance of the template generation module.

|  | Precision | Recall | F score |
|--|-----------|--------|---------|
| **Rule-based** | 72.13 | 50.57 | 59.46 |
| **NER-based** | 65.45 | 41.37 | 50.69 |

## Conclusions

The current paper discusses different problem representation approaches attempted in several applications and suggests an algebraic representation generation technique for the physics domain. A corpus of 75 problems from the "Laws of Motion" chapter is collected. Normalization and preprocessing steps are incorporated to tackle necessary inconsistencies. This study is a primary attempt, and there is plenty of scope for improving the performance by using more appropriate formalisms to represent the problems, extending the domain to other related domains and collecting more training data.

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# Reliance on AI Tools and Fostering Creativity among Sri Lankan ESL Learners: Special Focus to ChatGPT

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## Abstract

Artificial Intelligence (AI) is a rapidly advancing field of technology that has proven to be beneficial in various domains, including healthcare and education. AI tools have the potential to greatly enhance teaching and learning experiences. One noteworthy innovation in this field is ChatGPT, which was made available to the public in November 2022. ChatGPT enables interactive learning experiences for learners, and this study aims to explore its potential for promoting English language learning skills among English as a Second Language (ESL) learners in Sri Lanka. The study focuses on investigating how ChatGPT is utilized in their English learning activities and aims to collect quantitative data to achieve its objectives. In May 2023, data were collected from 93 ESL students using Google Forms, employing a simple random sampling method. The collected data were analyzed using descriptive analysis methods to gain valuable insights into students' experiences with ChatGPT. Interestingly, the results revealed that ChatGPT has gained popularity among ESL learners in Sri Lanka, who utilize it as an effective tool for their English language learning while safeguarding their creativity. Based on these findings, the study concludes that there is great potential for leveraging recent technological advancements to enhance the English proficiency of ESL learners in similar contexts.

**Keywords:** Artificial Intelligence, ChatGPT, Sri Lankan ESL learners

## Introduction

Artificial Intelligence (AI) has created new opportunities for engagement and creativity in teaching and learning with the rapid change in technology. At present, educators can use various AI tools for tasks related to teaching and learning. OpenAI (2022) claims that ChatGPT is an AI chatbot that was released to the public in November 2022. ChatGPT is a relatively new AI tool. The report said an average of about 13 million unique visitors used ChatGPT per day in January, an increase of more than twice the levels of December, making it the fastest-growing consumer application in history. ChatGPT, the popular chatbot from OpenAI, is estimated to have reached 100 million monthly active users in January, just two months after its launch, making it the fastest-growing consumer application in history (Hu, 2023). Furthermore, OpenAI (2022) stated that ChatGPT was developed based on the GPT (Generative Pre-trained Transformer) architecture. It is designed to understand natural language and generate human-like responses to text-based communication. ChatGPT is trained on a massive dataset of text, enabling it to generate coherent and contextually relevant responses to a wide range of prompts and questions. Since Socrates' teachings, asking questions has been used as a method of interactive learning (Rospigliosi, 2023). Users interact with the ChatGPT app by asking questions and receiving responses. ChatGPT is designed to facilitate interactions centered on questions and follow-ups. This type of interaction promotes the use of ChatGPT for learning by asking questions and reflecting on the answers, both of which are essential activities in interactive learning.

### Literature Review

AI tools are becoming increasingly popular in higher education, providing innovative ways for both educators and students to improve teaching and learning. Natural language processing (NLP) tools analyze and interpret human language using machine learning algorithms. They can be used to build intelligent chatbots that can answer student questions, offer support, and provide guidance. The opportunities of ChatGPT as a second language learning tool were described by Kim et al., (2023). They stated that ChatGPT responds quickly, allowing for effective learning facilitation in a positive learning environment. According to Zhou et al., (2023), while AI-powered writing tools like ChatGPT are extremely powerful in text writing, they fall far short of human writers when it comes to using advanced inference techniques like deep cohesion. Nghi et al. (2019) tested whether the AI chatbot is effective and useful for enhancing student performance and engagement in learning a specific point of a foreign language. Their

results indicated that the students benefit a lot from a new learning experience with the use of AI chatbots in teaching and that it is an important part of their learning process. The AI chatbot also makes learning exciting and enjoyable for students. Belda-Medina and Calvo-Ferrer (2022) analyzed knowledge, level of satisfaction, and perceptions concerning the integration of conversational AI in language learning. The authors yielded positive results regarding perceptions concerning the integration of conversational agents in language learning, particularly in relation to perceived ease of use and attitudes. Tlili et al. (2023) investigated the concerns about using chatbots in education among early adopters using ChatGPT. The authors' findings revealed that, while ChatGPT is a powerful educational tool, it should be used with greater caution, and more guidelines on how to use it safely in education should be established. Vocabulary is an important part of learning a language and thinking, learning, and communicating about the world. Expanding one's vocabulary provides unrestricted access to new information, especially in a second or foreign language (Qasem et al., 2023). During COVID-19, Qasem et al. (2023) investigated the effect of chatbot use on learning English for Specific Purposes (ESP) vocabulary in online classrooms. This study found that using chatbots helps to improve and learn ESP vocabulary. When students are asked to proofread their academic writing, ChatGPT can assist them in improving it. Caulfield (2023) experimented with sending the same text to ChatGPT and a human editor, asking them to improve the language and style and explain their changes clearly. The results of this experiment revealed that both editors improved the text overall, but the human editor made more extensive and reliable changes, and only the human editor was able to properly explain their changes. However, several disadvantages to using chatbots for educational purposes have been reported. The output of ChatGPT may be inaccurate or biased, for example, by citing invalid article references (Health, 2023). One disadvantage of using ChatGPT is that students may become too reliant on technology to solve problems or answer questions. This may result in a lack of critical thinking and problem-solving abilities (Ray, 2023). It is better not to rely heavily on ChatGPT's results. While students can use ChatGPT to clarify questions during their studies, they should always double-check the answers they receive against other credible sources, as it does not always provide correct information. It is not recommended to use ChatGPT as a source of information. The ChatGPT AI language model is still in the early stages of development and is far from perfect. Incorrect answers, biased answers, a lack of human insight, and excessively long or wordy answers are some of ChatGPT's current drawbacks (George, 2023). ChatGPT, in the end, is not a human. As such, it can only imitate human behavior rather than experience it. ChatGPT is only as good as the data it is trained on. Students may be given incorrect or misleading information if the training data contains bias or inaccuracies.

ChatGPT is a powerful language generation model that can be used to improve teaching and learning in a variety of educational settings. It will assist both English as a Second Language (ESL) and English as a Foreign Language (EFL) learners in learning languages in this context. It can generate conversation practice prompts and even provide accurate grammar correction, spell checking, vocabulary checking, summarization, academic writing, editing, idea generation, multiple choice questions (MCQ), and many more. Accordingly, ChatGPT is a popular AI language model that can respond fluently to a wide range of user prompts.

The objective of this study is to understand Sri Lankan ESL learners' nature of using the AI tool ChatGPT to improve their English proficiency. The following research questions were formed to achieve the above objective:

1. How Sri Lankan ESL learners use ChatGPT in their English learning?
2. What are the perceptions of Sri Lankan ESL learners' about using AI tools for their English learning?

## Methodology

The present study applied the quantitative research approach to collect data and analyze it. Data were collected from 95 ESL students in the second week of May 2023 using a questionnaire survey created with Google Forms to investigate their ChatGPT experiences. The questionnaire consisted of 25 closed-ended questions, with the final question being open-ended to allow students to provide comments on utilizing artificial intelligence (AI) in their studies. The collected data were analyzed using descriptive analysis.

## Results

Table 1 indicates the participant profile of the study. In accordance with, 21% were males and 79% were females. Added to that, 86% of the participants were between the ages of 20-25 years, and 60% of the participants were diploma level, whereas 40% of the participants were undergraduates.

Table 1: Participant Profile

| **Gender** | Male | 21% |
|---|---|---|
| | Female | 79% |
| **Age** | 20-25 years | 86% |
| **Level of study** | Diploma | 60% |
| | Degree | 40% |

Figure 1 illustrates the respondents' awareness of the ChatGPT. It is interesting to note that the majority of the participants are aware of the ChatGPT AI tool. Particularly, 61% of participants who responded to the survey were aware of the ChatGPT. This result is in parallel with the previous study of Belda-Medina and Calvo-Ferrer (2022), where they found AI tools to be popular tools among young learners.
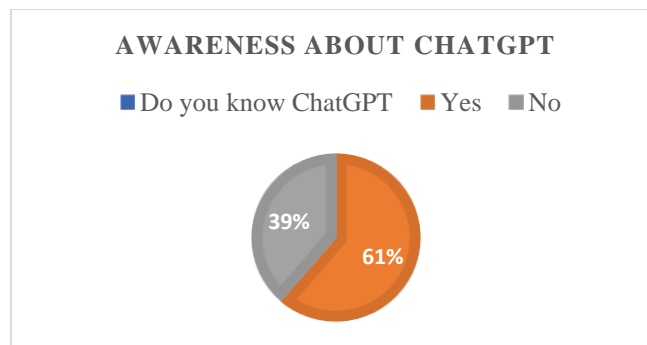


Figure 1: Awareness of the tool

As shown in Table 2, 58% of the respondents utilized ChatGPT for chatting purposes, engaging in discussions on various topics, asking questions, and receiving responses. Further, 39% of participants employed ChatGPT for writing tasks such as essays, reports, or creative writing, including songs, poems, and short stories. When it comes to learning English, 29% of participants relied on ChatGPT to find and learn new words, idioms, and expressions. It is interesting to note that 50% of the participants used ChatGPT to ask for definitions, synonyms, or examples of word usage. Moreover, 47% of the participants stated their use of ChatGPT to seek assistance on specific grammar topics or to seek feedback on their sentence construction. In addition, only 16% of the respondents used the ChatGPT AI tool to discuss pronunciation, intonation, and accent, while 26% of the participants utilized this tool to search for information about English-speaking cultures and customs. The study revealed that 47% of the respondents use ChatGPT as a quick reference tool for English-related queries (ask for explanations of grammar rules, clarification of vocabulary meanings, or recommendations for additional learning resources). Out of 38 students, only 11 student participants used ChatGPT for writing articles, blog posts, social media captions, or creative writing (songs/poems/short stories etc.).

Table 2: Usage of ChatGPT

| **Way of using ChatGPT** | **%** |
|---|---|
| Chat | 58 |
| Writing | 29 |
| Ask definitions/synonyms/examples of words | 50 |
| Check grammar | 47 |
| Check pronunciation | 16 |
| Search about English speaking cultures | 26 |
| Quick reference | 47 |
| Writing blogs/social media captions/creative writing | 25 |
| Getting feedback | 29 |

| | |
|---|---|
| As a search engine | 10 |
| Summarize long texts | 15 |
| Homework assistance | 45 |
| Write emails/formal letters | 25 |

In response to the question, getting suggestions, brainstorming ideas, overcoming writer's block, or getting feedback on their written work from ChatGPT, 29% responded positively. It is interesting to note that the majority of the participants utilized Chat GPT as a conversational search tool to quickly find information on specific topics, similar to a search engine. The study revealed that the majority of the students did not use ChatGPT to summarize long readings. Further, 45% of the participants used ChatGPT to generate ideas for their homework and assignments. Only a small number of participants used ChatGPT to write emails/formal letters, to summarize lecture notes, to get a catchy title for the project, to write abstracts, to get ready for the exams by obtaining questions or model answers, scheduling study plans (requesting a schedule to learn English within 2 months), or rewording /paraphrasing their writing. Additionally, 34% of the participants utilized other AI tools such as Grammarly, Quillbot for their ESL work. Notably, the majority of the participants (89%) expressed the belief that AI is beneficial for their studies. Table 3 provides information obtained from the qualitative content analysis of the open-ended question.

In accordance with the results, it is apparent that Sri Lankan ESL learners exhibit caution when using ChatGPT for their language learning purposes. They primarily prefer to use ChatGPT for chatting, asking definitions, checking grammar, quick referencing, and as a tool for homework assistance. This suggests their low reliance on AI tools. This observation aligns with the findings reported by Tlili et al. (2023) and Ray (2023), which emphasize the need for the same trend. Table 3 provides further insight into the phenomenon, as Sri Lankan learners have identified potential threats to their creativity and self-learning posed by ChatGPT . The findings indicate that these learners prefer to apply their own creativity to their writing while utilizing ChatGPT for necessary support and assistance.

Table 3: Qualitative content analysis

| Codes | Categories | Themes |
|---|---|---|
| Easy to use | Attractiveness | Advantage |
| Very useful tool | | |
| Can interact with the tool in many ways | | |
| Can use to get new English words | Educational Value | |
| Can use as a supervision tool | | |
| Can quickly get more clarification like a teacher | | |
| Can use to improve English vocabulary | | |
| Useful to develop English skills | | |
| Caused us to lose our creativity and self-learning skills | Weakness | Disadvantage |

Furthermore, Sri Lankan ESL learners have recognized ChatGPT as an attractive tool and valuable tool. However, they have also acknowledged that excessive reliance on it can potentially hinder their creativity.

## Conclusions

The study aimed to investigate how Sri Lankan ESL learners utilize the AI tool, ChatGPT to enhance their English proficiency. Data was collected from 95 ESL learners to achieve this objective. Interestingly, the findings of the study revealed that Sri Lankan learners are not only highly aware of ChatGPT but also employ it to improve their English language skills while safeguarding their creativity. Anyhow, it is important to note that the findings should

be interpreted with caution due to the limited sample size. Conducting a large scale mixed study would further validate and enhance the reliability of the findings. Future studies have the potential to expand the sample size and provide a more comprehensive understanding of Sri Lankan ESL learners.

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# Learning science at a distance: it can be done

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## Abstract

At the UK Open University, approaches to learning science at a distance have been pioneered over the past 54 years. In 1969 when the University was founded, there was a great deal of scepticism about whether teaching science could be done at all (e.g. see the account in Pentz, 1982). However, over the period, learning experiences for students have been designed with some success. With the advent and spread of digital technologies and capabilities, more ways of supporting these learning experiences have been developed. This paper describes how the University dealt with the perceived importance of practical work, the accommodations arranged by over time, and the recent approaches to developing science capacities and capabilities for students. In the early days the approaches included home experiment kits, radio and TV programmes and laboratory classes at residential schools (see also Ross and Scanlon, 1995). In recent years the possibilities available to us as teachers have been extended by Technology Enhanced learning methods and these are described along with research projects on teaching science with learners of all ages (see also Scanlon, 2021). Several of these approaches designed to maximise inclusion of students studying science at a distance in practical work are reviewed.

## Introduction

One of the key issues faced by the Open University (OU) in 1969 was the unsolved problem of how to provide practical work at a distance. Since that time there have been many developments in technology which can be applied to help enhance the distance learning of science. As a result, there have been a number of experiments in establishing what works both in terms of providing appropriate learner experiences and investigating in more detail the role of practical work in science courses.

Throughout this period the University has been designing and delivering successful science courses. And in each decade since then by dint of innovations in pedagogy and technology approaches to learning science continue to be developed which allow students to develop appropriate skills and understanding.

### Why is science hard to learn?

Several explanations are provided for why science is hard to learn for many students. For Open University students there were particular challenges. The OU's open entry policy allowed students with no previous qualifications to study science, so learners lacked mathematical skills, along with other prerequisites for study and with the need to build science content knowledge. Providing practical experiences is often cited as a particular problem for studying science at a distance.

### Why is providing appropriate practical experiences important for science students?

A number of reasons are given for this. First, the development of appropriate skills which are said to be key in learning science. Secondly, that whether by illustration or the development of evidence, hard concepts become more understandable. Thirdly, that by engaging in experimental work learners will learn more about the nature of science.

## The development of the OU's approach to practical work

From its inception in 1969, the Open University faced the problem of providing practical work for science learning. Several different approaches to providing students studying science with access to practical experiences were developed. Initially, this involved the incorporation of a variety of media in courses. For example, home experiment kits, radio or audiotapes, TV demonstrations of experiments and laboratory classes at 'in person' day schools were incorporated in the media mix of courses. This approach to teaching using a mix of different media

came from the wish to provide students with different ways of approaching the development of understanding Equally important was the intention to make learning objectives of any practical experience very clear.

Kuluska-Hulme (2023) notes the importance of media mix as

*'teacher trainers and professional learning developers have an ever-growing repertoire of available methods and technologies as well as multiple learning spaces (online and offline) that can be deployed to fulfil their aims. All this seems to represent what can be described as a trend towards "a multiplicity of technologies, methods and modalities" available for a learning experience (Kukulska, 2021) , meaning that several media and modes of communication and delivery can support teaching, learning and assessment across a range of contexts and spaces. It makes for a potentially complex teaching and learning environment where student activity needs to be 'orchestrated',[...]. It has, however, the advantage of offering more options to suit different circumstances and student needs and it can support combining formal teaching and independent or informal learning. Kukulska et al (2023), p 9.*

In the mid 1970's computers were added to the media mix, beginning with the advent of remedial tutorials provided at computer terminals available at local study centres and the use of simulations and modelling available at residential schools. Personal computing allowed multimedia experiences to be provided on CDs and DVDs and advances in communication and conferencing it became possible for students with internet access to work with others.

So at first the students were provided with home experiment kits, residential schools allowed students to work in the laboratories of conventional universities during the summer break, and broadcast TV programmes gave opportunities to observe and to some extent participate int experiments. The provision of multimedia allowed closed observation and the potential for manipulating variables and drawing conclusions.

By the mid-1990s these opportunities increased and for example one science course could offer a global warming simulation for students to interact with, virtual field trips to the Sonoma desert or the Galapagos were available and further work on virtual environments were developed (see e.g. Taylor et al. 1996, Whitelock, 2001, Whitelock and Jelfs, 2005). In 2013, the UKOU with support from the Wolfson Foundation launched the Open Science Laboratory a virtual lab which allows students to carry out experiments online and brings interactive practical science. Online experiments, remote access to scientific instruments and real physical instruments and equipment through robotically controlled experiments, were made available, and included access to tools which can be used in citizen science experiments and networks, access to interactive screen experiments; virtual instruments and labs; immersive 3D experiments and virtual field trips (Garrow et al., 2013; Hatherly et al., 2004; Villasclaras-Fernandez et al., 2013). By 2014, virtual labs were becoming more available in higher education for science and engineering (see e.g. deJong, 2014).

The use of technology tools to allow participation in practical work '*promote enthusiastic engagement with science and give opportunities for participation and learning. For example, the use of simulations allows for hands-on experimental work to take place at any time, in a playful manner and by learning through failure, exploration and experimentation. Simulations lower the barriers to participation and make it easy for people to engage with activities often viewed as determined by scientists'* (Scanlon et al., 2019, p 135).

## Research into teaching and learning science online

As technology enhanced learning techniques and tools became more available, and proved appropriate to help provide practical experiences (see e.g., Scanlon, 2011 for a summary) a programme of research projects was designed to explore and evaluate these possibilities. Identifying the potential of technologies to support learning from practical work designed to be accessed by students at a distance were explored in a number of research projects investigating remote access to laboratories, remote access to instruments such as the virtual microscope, and augmented experiences.

### Remote labs: the PEARL project

From 2000, with funding from the EU IST programme the Practical Experimentation for Access to Remote Learning project (PEARL) investigated the feasibility the potential of remote access to laboratory work (see Cooper and Ferriera, 2002; Scanlon, Colwell & di Paolo, 2004.). Colwell et al. (2003, p. 5) describes the approach as follows:

*'The PEARL system involves a complex structure of network, server, and interface technologies, equipment control technology, video cameras, microphones and streaming media technology, and collaboration tools. These technologies work together to allow students to issue commands from their PC to the remote laboratory, which in turn will carry out the command and send feedback back to the student. The student will be able to see the laboratory equipment being controlled via a video stream, and to communicate with their peers about the experiment'.*

This project investigated the potential of this, in conjunction with 4 European universities, the Universities of Porto, of Dundee, Trinity College Dublin and the Open University. The OU setting was the implementation of one of the experiments provided at an introductory residential school, a spectrometry experiment. This vignette allowed the exploration of how the introduction of technology influenced the design of the experiment to make it effective online. Of particular interest was how the provision of the experiment in this way could support students who for any reason found it difficult to access laboratory work in by conventional means whether due to disability or caring responsibilities. A key insight for us was how design for accessibility could improve the experience for all students.

### Online tools: the Virtual microscope

Virtual Microscopes (VMs) that allow for viewing and manipulation of online images by multiple students were an early example of the potential of such opportunities (Whalley, Kelley & Tindle, 2010). A number of studies have examined waysof using a VM in online and distance learning including combining VM with inquiry learning (Villasclaras et al., 2013), and comparisons between the use of VM in conventional universities where the value of VM as a means to provide hands-on, interactive science experiences to students online as opposed to reading materials and lecturing were considered (Herodotou, Kelley & Scanlon, 2019). '*Teachers saw the VM as being easier to use by manipulating buttons on a website, whereas a physical microscope requires additional training about how the tool functions, for example, how to manipulate magnification and focus or change the field of view*.' p.6. Although students are found to be generally satisfied with the use of VMs, further experiments with teaching and learning approaches will establish how best to support their use and lead to enhanced learning outcomes. (Herodotou et al., 2019).

### Enriched realties: Virtual Field trips and VR

Over a similar period, Universities were also exploring the pedagogical affordances of virtual worlds. One example at the Open University was the Virtual Skiddaw fieldtrip (Argeles et al., 2009; Minocha et al., 2017). Remote participation on field trips offers the possibility of exploring places that would be inaccessible to the learner. In their alternatives to field trips study Grand et al. (2021) interviews with students uncovered more about the complexity of replicating all the purposes of field trips on line.

*'Fieldwork is seen as important for enabling hands-on experience, developing understanding of complexities and being able to 'think on your feet' but also for bonding students with each other and staff. The fluid, less formal ambience of fieldwork enhances relationships between students and facilitators, increasing their feelings of belonging to a group. p 17'*

### Informal learning: citizen science

Another development over this period there has been increasing interest in extending access to science experiences to the wider public. This coincided with the possibility of participation with such studies online. Platforms such as iSpot and nQuire (Scanlon, Woods & Clow, 2014; Herodotou, Scanlon & Sharples, 2017 ) were developed which have provided opportunities for involving students and members of the public in informal learning opportunities.

## Conclusions

The Open University continues to develop its approach to practical work. This paper has only highlighted a few experiences in doing this, pointing both to some opportunities developed for all science students, as well as some more limited research projects exploring future possibilities.

In terms of facilities for students from the inception of the Open Science Lab in 2013, further development and investment extended to formation of the the Open STEM labs incorporating the Open Science Lab, the Open Science Observatories and the Open Engineering Lab (OEL) (see Kukulska-Hulme et al., 2020 for a summary). Access is available to remotely operated optical telescopes based in Tenerife, and a radio telescope based at the UKOU main campus in Milton Keynes. OEL provides practical lab-based teaching at a distance covering engineering, electronics, control, materials, and robotics. Contact with the on-campus labs also allows students to

acquire and practice lab-based skills. Lab and field casts provide an interactive experience by connecting students and lecturers via live web streaming (see also STEM 7th July - What practical skills you learn through the OpenSTEM Labs - YouTube.) A recent development is the funding of a new facility for the incorporation of extended reality in modules OU secures £5.8m to build extended reality studio | Faculty of Wellbeing, Education and Language Studies (open.ac.uk).

Experiments in performance augmentation (Performance Augmentation | Institute of Educational Technology, The Open University), together with research funded on exploring tools for extending design thinking (OU researchers help teachers to harness technology and co-design learning | The Open University ) are among the activities being developed in the research space.

During the pandemic our description of some of these experiences have been useful to other Universities interested in development of their hybrid or blended approaches to teaching science at a distance. We know it can be done.

## Acknowledgements

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# Designing an Innovative Online Accounting Capstone Module to Address Competency Shifts in the Fourth Industrial Revolution

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## Abstract

This paper presents the design of an online accounting capstone module at the University of South Africa (UNISA). The module was designed to respond to the change in the competency framework of the professional body governing chartered accountants in South Africa. The change in the competency framework was motivated by the rapid shift in skills that accountants require to remain relevant in the Fourth Industrial Revolution. The capstone module not only addresses the skills gap but also provides the students with a holistic learning experience by integrating the curriculum, applying accounting principles to real-world scenarios, and promoting students' self-awareness and responsibilities as citizens. The content is transferred against a backdrop of Integrated Reporting and the United Nations Sustainable Development Goals to align with UNISA's vision and support of the United Nations Global Compact.

The paper adopted a qualitative approach and follows a narrative design to narrate the author's (and co-creator's) attempt (process and decisions) to innovatively align the university's qualification to the expectations of the professional body. The paper relied on context-rich processes and actions undertaken in an intensely human activity-driven manner. The paper begins with an overview of the module and an explanation of constructivism theory as the underlying framework. It then outlines the research methodology, emphasizing methodological integrity and trustworthiness. The paper concludes by discussing the research implications, limitations, and avenues for future research.

**Keywords**: Capstone; curriculum development; Fourth Industrial Revolution

## Introduction

With the entry of every industrial revolution there has been a shift in the graduate skills required from industry (Schwab, 2016). The Fourth Industrial Revolution (4IR) is no different where employers take cognisance of the ongoing shift, including employers of chartered accountants. According to a recent article in Forbes Advisor (Gallagher, 2023), chartered accountants are required to be technically savvy, yet also with an increased need for accounting graduates to possess effective communication skills, manage time and be organised, think critically, solve problems and work in teams so as to remain relevant in the 4IR. Based on real world practice, research has indicated the support, and call for, the development of the above skills, termed "4IR / 21st Century skills' (Plant et al., 2019; Lamb et al., 2017; Webb & Chaffer, 2016).

The South African Institute of Chartered Accountants (SAICA), which regulates the chartered accountant profession in South Africa, agrees with the positions of its international counterparts and academic research that in order to remain relevant, chartered accountants in South Africa ((CA)(SA)s) need to strike a balance between technical knowledge gained and non-technical skills that support the utilisation of subject knowledge (Coci, 2020). In order to respond to the Volatile, Uncertain, Complex and Ambiguous (VUCA) world as well as the attendant research conducted on the gaps in graduate proficiency around accounting education, SAICA has formulated a revised competency framework (CA2025 framework) for chartered accountants (Coci, 2020).

The introduction of the CA2025 framework has had all SAICA accredited universities revisiting their offered qualifications for CA(SA)s. The mega online University of South Africa (UNISA), discussed below, is no different and undertook extensive exercises to map the competencies per the CA2025 framework to the current offerings. During the mapping process, certain skill sets were identified as needing attention in a 4IR-responsive curriculum. These skills include communication, teamwork, self-management, and self-development with an emphasis on life-long learning, critical thinking, problem solving and integrated thinking, similar to that which the research has voiced. UNISA's approach to infuse these skills into the current programme offering was to introduce a capstone module for undergraduate students at the exit level of their degree.

This paper provides insight into the curriculum design of such an undergraduate accounting capstone module. It describes the process and decision-making employed for a module that has a large student cohort in an online environment. The paper also narrates the author's attempt to innovatively align the university's qualification to the expectations of the CA2025 framework. The goal of this paper is to support role players who may also be

designing a new accounting online course that respond to 4IR-relevance, based on the recommendations from their respective professional bodies and/or industry stakeholders.

## Methodology

As UNISA matures to be a fully online university, it remains focused on facilitating that the modules delivered are authentically student-centered and that learning is transferred through active learning experiences (UNISA, 2012). Given the inter-relationship between theory and methodology (see, for instance: Williamson et al., 2020), the study follows and harnesses the constructivist paradigm, demonstrating that reality is created through human interactions by those who are experiencing the reality in question, i.e., the co-creators of the research project: the authors and participants (Guba & Lincoln, 1994) The paper follows a qualitative research approach (Guba & Lincoln, 1994) to explore and narrate the textual meanings of the author's (and co-creators) decision-making processes in developing a capstone module for third-year undergraduate accounting students at UNISA. The paper relies on context-rich processes and actions undertaken in an intensely human activity-driven manner.

The research paper relies on reliable data as the curriculum contents and development process were based on established organizational policies and practices. The study is supported by relevant literature and follows a declared and transparent methodology, capturing the insights of purposeful experts throughout the process. The research provides knowledge which has been gained and understood through the author's interpretation of the university's policy and supporting literature (Guba & Lincoln, 1994) as well as the co-creation process with the participants. The study involved narrative design in terms of its creativity which used a co-creative team-based approach as well as how the author herself understood the phenomenon's data narratively (Polkinghorne, 1988; 1995). This means that, in following Polkinghorne (1988;1995), actions are themselves 'storied' accounts of events with their varied, respective meanings, and explaining those actions is done through telling the stories of those actions. Polkinghorne (1995) offers researchers the opportunity to re-tell data either as creative stories in themselves or to convey the storied accounts paradigmatically through narrating a 'smoothed-out' account of a process or event.

## Results

A study by Dowelani and Dowelani (2020) cited that approximately 60% of most university programme offerings are influenced by professional body requirements. Accounting education offerings are also governed in this manner. In South Africa, if a student wishes to qualify as a CA(SA), they must attend a university that is accredited by SAICA as this organisation is the only professional accountancy body that is a registered Education and Training Quality Authority (ETQA) for accountants (SAQA, 2023) within the South African context.

Accreditation of university accounting programmes by the respective professional bodies is a global occurrence (Ballim et al., 2016). Accreditation allows for collaboration between the universities and professional bodies and is considered necessary by all stakeholders involved (Rajeevan, 2020; Plant et al., 2019). Universities would like to ensure that the learning content that they offer is relevant, and at the standard, required by the profession so that they produce employable graduates (Ballim et al., 2016). At the same time, the professional bodies require assurance that graduates applying for membership to the profession are competent and will be able to engage with the integrity and demands of the profession (Ballim et al., 2016).

For South African universities to attain SAICA accreditation, the university must demonstrate to SAICA that its accounting programme develops and assesses dimensions of all the competencies (often called skills) in the CA2025 framework over the duration of the academic programme (SAICA, 2021). However, SAICA is not prescriptive in how universities should develop its programmes and each university should determine how best to approach the CA2025 framework in line with its policies and procedures. UNISA, being an accredited university, had thus commenced to update its curriculum for the changes in the CA2025 framework.

UNISA is an Open Distance and learning (ODL) university meaning educational programmes are offered fully online without any face-to-face contact with students. UNISA also services large student cohorts (UNISA, 2023). Given this unique context in South Africa, the university aims to deliver programmes that are student-centred and responsive to the needs of its various communities. (UNISA, 2012). To achieve student centredness, the tuition policy (UNISA, 2013) sets out guiding principles for the design and development of educational programmes offered. To design and develop the curriculum, in line with policies, the university incorporates a team-approach to bridge the gap between policy and ODL practice (FTA, 2013). Thus, modules are developed by a team consisting of the responsible lecturer and head of department, educational specialists, an external critical reviewer as well as supporting departments such as examinations and language services.

In line with the Framework for a Team Approach (FTA, 2013) that supports module design, the team, for the unit of analysis for this paper, had to determine the learning outcomes that would need to be included/updated in the curriculum to be in line with the CA2025 framework. Consequently, the College of Accounting Sciences, at UNISA, undertook a mapping exercise (Willcoxson et al., 2010) (which the author was a part of) to map the competencies per the CA2025 framework to the current offerings at UNISA and competency gaps were identified. Many of these competencies could be addressed by the current module offerings, however, some competencies, per the CA2025 framework, needed to be addressed explicitly even though they are an inherent part of the nature of distance education (example self-management skills). Research into how local and international counterparts were addressing similar programmes/competencies culminated in the decision to design and develop a new capstone module - CAS3701 'Capstone in Accounting Sciences'. Based on the extant body of knowledge, the specifics of what a capstone module should offer confirmed that the CAS3701 module would address the competency gaps identified. A capstone module is defined as a module that offers the undergraduate students the ability to experience what it means for an education programme to be holistically integrated or 'come together', how to reflect on prior learning and the summative experiences on the programme, as well as prepare students for transition into the workplace (Stanley & Marsden, 2012). Capstone module designs also allow the facilitation of higher order thinking skills (critical thinking, problem solving and decision-making); prepare students for the future of work and give a holistic view of the curriculum (Contessotto et al., 2021).

## THEME-ING THE STORY: Theme 1: Development of the capstone curriculum

The author, through experiencing the process of curriculum and module development, reflected upon the unfolding events and provides paradigmatic narratives (Polkinghorne, 1995) from those reflections. The data are first themed (and theme is an important element of stories, as well as data analysis). Thereafter, each theme has a series of narratives which lead with a heading that follows the traditional conventions of storytelling. Paradigmatic narratives are "generated as reminiscences of how and why something occurred or what led to an action being undertaken". They locate common elements, classify them, and then provide the generalised concepts of the storied notions. (Polkinghorne, 1995).

*Narrating the rationale for the module: setting the scene for the narrative:*

According to UNISA's curriculum policy (2012) the curriculum "is the whole set of learning experiences constituting a particular qualification or module. Curriculum includes key aspects of teaching and learning such as (a) why it is to be learnt – rationale and underlying philosophy, (b) what is to be learnt – content, (c) how it is to be learnt – process, (d) when it is to be learnt – structure of the learning process and (e) how the learning will be demonstrated in creative ways and achievement similarly assessed" (Unisa, 2012). Thus, if a module can demonstrate that these aspects have been encapsulated into its module design it will meet the requirements and quality standards of UNISA and at the same time ensure that the purpose and learning outcomes of the module are met.

Story 1: "Once upon a time…for this module": The first step to developing any curriculum, is determining what the purpose of the module is, and the learning outcomes of the module (Baker, 2011). The capstone module's purpose was to integrate the curriculum and also apply the discipline to real-world, invoking multi-disciplinary scenarios facing chartered accountants in the workplace. Thus, the approach to the module was to build knowledge using the discipline content as a backdrop against which the identified non-technical competencies are facilitated. The non-technical competencies that were identified from the mapping process, discussed above, for inclusion in the capstone module were (a) self-management and self-development competencies with an emphasis on life-long learning; (b) teamwork; (c) communication (d) personal and corporate citizenship and (e) decision-making (comprising critical thinking, problem solving and integrated thinking).

Story 2: "Picture the scene: how the story unfolds": Content is influenced by the competencies that the module aims to achieve (Baker, 2011). The competencies were identified in story 1 above. The CA2025 framework provides content guidelines in that it prescribes minimum content that must be addressed by the accounting programme (SAICA, 2021) for these competencies. However, SAICA does not prescribe how the competencies must be taught, and consequently a structure suitable for the module had to be determined.

Since the capstone module intends to prepare work-ready individuals, it is important that students are more self-aware (Dean et al., 2018). The module therefore begins with an introduction to self-management and self-development with an emphasis on life-long learning. Students discern an awareness of themselves and their capabilities in relation to their academic career and the competencies covered by the module. Students are required to develop a personal development plan to assess their skills and then must action a plan to develop the skills that they lack. The use of a personal development plan is encouraged by Whetton & Cameron (2016) and Bintani (2020) who found that the self-assessment opportunities, given to students, gave students the confidence and direction in making decisions for their career.

The content of learning unit 2 consists of communication and teamwork skills. Communication and teamwork are important to (CA)(SA)s because business employers expect students to be able to interact socially at events, with colleagues and clients. They also expect students to be able to contribute meaningfully to a conversation and to summarise information whether it is when reporting back to their teams or taking minutes of meetings (Cyphert, et al., 2019). These skills amongst others are thus demonstrated in the learning unit.

Students should build an appreciation for their responsibility as citizens. The accounting programme does not exist in isolation. It is part of a greater community and should be responsive to not only SAICA's requirements but also to the vision and mission of UNISA (FTA, 2013) and society as a whole (Tsiligiris & Bowyer, 2021; Baker, 2011). Accounting graduates have a duty to contribute effort and acumen in solving societal and global challenges (Tsiligiris & Bowyer, 2021). This attribute of accountants is in line with the International Federation of Accountants (IFAC) statement/view that accountants not only have a duty to their employer but also to serve the interests of the greater public (even though an accountant is not appointed by the public) (IFAC, 2020). Consequently, the learning unit also includes Integrated Reporting and the UN SDGs as content sections and themes for the module.

Finally learning unit 3 covered critical thinking, problem solving and integrated thinking explicitly and through integration of the discipline contents. The development of critical thinking skills was determined as the overarching competency of the module given the strong emphasis that is placed on the lack of such skills in graduates (Contessotto et al., 2021). To this end the module makes use of case studies to promote the student's critical-thinking and problem-solving skills (Keevy, 2016) and it is hoped that students learn to 'think outside the box' or even 'throw away the box', critique the everyday assumptions they take for granted, and leave the module with more questions than answers.

Story 3: "The Plot thickens…how we 'plotted' the design": The module design follows after the content are determined (FTA, 2013). The module design refers to the design of a learning and teaching strategy and an assessment strategy (story 4) for the module (FTA, 2013).

The teaching strategy for the module was guided by the identification of the module's students and their learning style. 'Who our students are?' impacts or influences 'How do our students learn? and in turn how we teach. UNISA caters for a diverse cohort of students (UNISA, 2013) and so CAS3701's strategy for the module had to reflect the diversity and learning styles of its students. The module design recognises that diversity is more than just differences in race, gender and age but also that students have different economic and cultural contexts influencing their access to resources such as internet and finance; students at UNISA are geographically dispersed, i.e., locally (rural and urban) and internationally; students are both full-time and part-time learners; several students are first-generation university attendees; students have different abilities (including disabilities) (UNISA, 2023).

There are many theories that explain how students learn with a focus on the personality, abilities / disabilities, and experience of students. However, the dominant learning theory governing this module is experiential learning as described by Kolb (1984). This theory indicates that students learn best when they are actively engaged in meaningful, real-world activities that require them to apply their knowledge and skills (Kolb, 1984). Kolb's learning theory aligns with the constructivism framework that underlines this paper by emphasizing the active role of students in constructing knowledge through their experiences and reflection. For the large student cohort expected, it may be presumed that the students taking on the module would also have learning styles that fall outside Kolb's learning theory. The learning design thus fostered a mix of learning activities to cater for the different styles. Other theories also relevant and applied to the module development were (a) cognitive processing which outlines that students must be given opportunities to actively engage with new information and to make connections with their prior knowledge (ed et al., 2000) and (b) social learning: - students learn through observation, imitation, and social modelling (Bandura, 1977). Cognitive processing is achieved because students integrate knowledge obtained from the different subject areas in this module since they refer to their prior and present knowledge base to complete the case studies and simulations presented. Social learning requires that students should be provided with an opportunity to work collaboratively, to discuss and debate ideas with their peers, and to receive feedback and guidance from their teachers and mentors (Bandura, 1977). In the capstone module, teamwork or collaboration is made possible through compulsory group projects and the content is taught through videos, articles, questions, guest speakers and self-reflection. This method of teaching has been found to give students the opportunity to practice and develop critical thinking skills because the activities are scaffolded (Dean et al., 2018).

Story 4: "From Plot to Resolution": Flowing from the learning outcomes of each learning unit, the lecturer, aided by the education specialist, developed assessment criteria for each learning outcome. The assessment criteria were designed in line with Bloom's Taxonomy (Anderson et al., 2001). Not only is Bloom's Taxonomy used universally, but it also allows lecturers to intentionally integrate learning opportunities and promote deep learning (Dean et al., 2018). Through the use of Bloom's Taxonomy, critical thinking skills could also be achieved as

critical thinking skills are considered higher-order skills (analyse, evaluate, and create) (Anderson et al., 2001) which is necessary for exiting students moving into industry (Miller et al., 2010). These skills go beyond remembering, understanding, and applying knowledge but requires students to be able to analyse and evaluate the impact of decisions on cross-sectional areas of a business and be able to come to a workable solution (Miller et al., 2010).

Assessments of the module take the form of group and individual assessments, multiple choice quizzes and webinar attendance. The weight assigned to each assessment ensures that all the module learning outcomes are covered and provides an incentive to students to do all assignments (UNISA, 2021). Group and individual assessments are dominantly case studies as it has been found as an effective measurement tool to assess critical thinking skills (Keevy, 2016). Rubrics are used to assess the student's learning because the use of rubrics achieves acceptable levels of consistency when assessments are scored. (Jönsson & Panadero, 2017). The use of rubrics also promotes independent learning and improved student performance because students are aware of expectations and marking criteria and can thus interpret the requirements better and students can obtain better feedback (Jönsson & Panadero, 2017).

## Conclusions

Highlights - story 1 – change is inevitable: The changes in the accounting curriculum spurred by the 4IR indicates that accountants should not only have technical skills but also non-technical skills such as communication, teamwork, problem-solving, critical thinking, and decision-making skills. The changes adopted by SAICA and in-turn universities, also signifies that students need to prepare themselves for a profession where life-long learning and adaptability is key to remain relevant. The design of a capstone module (CAS3701) proves that the non-technical skills can be taught if students are given the opportunity, space, and know-how.

Highlights – story 2 – challenges of the capstone module: Through the design of the module, the author and co-creators of the module identified that to achieve student centeredness, students must believe that lecturers care enough to listen and are willing to assist with the learning process. Lecturers need to maintain visibility and online presence for students by giving them different avenues to voice their opinions and raise questions and debate. A creative and manageable system of support would be needed.

Managing large student cohorts, especially with cohorts found within the UNISA context and most mega ODL institutions require more staff capacity. UNISA introduced the e-tutor support system where educated and trained e-tutors are recruited on part-time contracts to assist a dedicated number of students with their learning activities within certain modules. Markers are also appointed to assist lecturers with the timely grading of assessments. The lecturing team would need to balance the different skill sets and create a seamless package that ensures that the e-tutors and markers are seen as an extension of the lecturing team.

The lecturers on the capstone module also had to develop themselves to ensure that they had the knowledge to deliver the learning outcomes of the module. The author collaborated with experts (professors internally and seniors in industry) to equip herself with knowledge on the subject content and to be a mentor and advisor when the module is implemented. The lecturers also went on online and other courses for training on the LMS, recording videos and developing rubrics and case studies. This is considered a continuous learning cycle and not once-off to respond to the changes in the systems, content and environment.

Highlights - story 3 – limitations. The capstone module was designed through a constructivism lens. This may be a possible limitation of this paper as the development of the module using other relevant theories could possibly show further effective strategies for transferring non-technical skills to accounting students. The design of the module was captured through a narrative of the experiences and decision-making of the team that developed the module and another methodology, example a quantitative study, could provide a different way of viewing the module. Finally, the capstone module was designed for the needs of large student cohorts at an ODL university, a similar module could be developed by other universities with a different context which could yield positive results.

Highlights - story 4 – insights: The paper aimed to provide insight into the development of a capstone module for undergraduate students at a mega online university. The process and effort are considered transferable and could possibly motivate other lecturers to take on the challenge to address graduate skills in an innovative and creative manner. The task, for any university, is no easy one given the societal problems facing South Africa currently (including but not limited to load-shedding, poverty gaps and inflation) making access to education more difficult. These societal problems motivate the need to introduce accounting students to the concepts of personal, corporate and global citizenship (SAICA, 2021) and reinforce that as accountants they a responsibility to protect the greater public. Despite the challenges being faced, the investment in education is worth the effort because, according to the late President Nelson Mandela, not only is "education the most powerful weapon which you can use to change

the world." but education allows people to perform better at their jobs; improve their health as they are more informed; promote active citizenship and contain violence (OECD 2013).

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# Formation of Methodological Competences in Distance Education of Students, Future Teachers in Technology and Entrepreneurship

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## Abstract

In distance education of students, future teachers, a serious scientific challenge is the formation and development of certain methodological competencies related to planning, organization, management and management of the learning process in a specific subject. The problem becomes particularly significant in connection with the education in the subject of technology and entrepreneurship, which has a practical-applied nature and requires the application of specific pedagogical approaches, requiring active interpersonal communication, group teamwork and the development of technological projects.

The article explores the possibilities of conducting current pedagogical practice outside the real learning environment in the classroom. The potential of microteaching, some simulation computer games and situational didactic modeling has been explored. A model has been developed for electronic remote implementation of teaching and conferring of students from the pedagogy specialty of technology and entrepreneurship education. The model was experimentally applied, and the attitudes of the participating students and their assessment of its effectiveness were studied through a survey.

The obtained results show that the proposed option for the formation of concrete-methodical competences is well accepted and has a number of potential possibilities, but it should not be the only means of practical pedagogical training. It is appropriate to use the model in blended learning, as an initial stage for implementing learning in a real or virtual environment.

**Keywords**:  methodological competences, practical pedagogical training, didactic modeling.

## Introduction

The formation of basic pedagogical competences, in line with the requirements of the 21ˢᵗ century, is a major task facing the preparation of students as future teachers. The concept of competence is multifaceted and multifunctional (Chavdarova - Kostova, 2022). Y. Rasheva-Merdjanova (2012) identifies competence with a conglomeration of abilities and skills, organized and functioning with a view to successful behavior in typical characteristic situations. According to the European Qualifications Framework for Lifelong Learning (EQF), competences are a combination of knowledge, skills, abilities and personal qualities.

Professional competence includes a variety of both individual qualities and abilities, as well as strictly specific knowledge, skills and attitudes for the effective exercise of relevant professional roles and positions (Zdravkova, 2014). Pedagogical competences are a basic element of a teacher's professional qualification. They are related to knowledge and skills for solving educational problems, guiding the learning and personal development of other people.

According to the standards for professional qualification of teachers (MOH, 2021), the competencies for teaching, relationships with students, leadership, educational work and work in a multicultural and inclusive school environment are particularly important for teachers. Teaching competencies primarily reflect methodological knowledge and skills for organizing the learning process in a relevant subject, supporting learning, achieving successful results in mastering certain learning content and the personal development of learners.

The formation of methodological competences implies not only the assimilation of basic pedagogical, psychological and specific methodological and subject knowledge, but also the creation of skills for their application, building value attitudes for exercising the teaching profession and constant professional improvement. A significant share in this process is the practical pedagogical training carried out in the form of teacher observation, ongoing pedagogical practice and internship practice.

The digital transformation of education and the opportunities for global connectivity are reflected on the content parameters of the methodological competences necessary for teaching the subject of "technology and entrepreneurship" and the ways of their formation. A serious scientific challenge is the implementation of practical pedagogical training in distance learning in an online environment. Its effective implementation presupposes the

use of a specific toolkit ensuring the achievement of the set educational goals and building an idea of the way classes are conducted in real classrooms at school.

## Methodology

In the system of professional training of teachers, pedagogical practice, as R. Peycheva (2012), performs communicative, organizational, training, educational, organizational and diagnostic functions. Through practice, specific ideas and professionally cognitive interests towards the teaching profession are built, direct connections between theoretical knowledge and the concrete educational reality are established, skills are formed for the implementation of basic pedagogical activities, analysis and evaluation of observed pedagogical phenomena and processes. Pedagogical practice develops students' creative abilities and provides opportunities to apply creative innovative approaches in planning and conducting lessons.

The content characteristics of the main forms of practical pedagogical training - teacher observation, ongoing pedagogical practice, internship practice require the implementation of activities carried out in a real educational environment (MOH, 2021). Under the direct supervision of professors from higher school, activities related to school visits, observations and analysis of lessons, planning and conducting of lessons, up to the independent participation of the students in the educational process, are carried out.

Achieving the goal and tasks of practical training in distance e-learning for students of pedagogical specialties is an extremely difficult task caused by the need to model a real learning process. For this purpose, different methods and specific approaches can be used to organize synchronous practice exercises.

### Options for remote conducting of current pedagogical practice

The theoretical analysis and the peculiarities of the educational process in technology and entrepreneurship allow to distinguish the following options for the organization and conduct of   current pedagogical practice remote exercises:

*1.      Immediate synchronous (direct) observation of electronic lessons delivered by certain students in the school's virtual classroom (Microsoft Teams, Google classroom, etc.), followed by a conference conducted in a virtual university environment.*

The functions of the training participants are clearly regulated. University Students communicate with real learners, plan, organize and lead a distance learning process in the field of "technology and entrepreneurship". Applying this approach provides opportunities for enriching the methodological knowledge acquired by students for developing lessons in an electronic environment and improving skills for distance teaching and learning management. However, it is only feasible under the condition that school education is conducted online. For the effective implementation of the approach it is necessary to ensure reliable access to all students and students and to strictly comply with the organizational requirements set for conducting the exercises.

The significant number of participants external to the class in the virtual room sometimes makes it difficult to manage communications and the focus of students. In addition, when conducting an educational process in technology and entrepreneurship electronically, the relative share of manipulative and other practical-applied activities related to the processing of heterogeneous construction materials, assembly, design and manufacture of products, is reduced. According to educational standards and curricula, the educational process in technology and entrepreneurship has a practical-applied nature. The leading approaches are learning by inquiry, learning by doing. Technological competence is associated with the use of techniques for manual and machine processing of materials, independent development of projects, laboratory classes, study of good entrepreneurial practices, expression of entrepreneurial initiative. (Ministry of Education and Science, 2015).

In the case of synchronous delivery of distance electronic lessons on technology and entrepreneurship, conditions are not created for improving the methodological skills of future teachers for organization, planning and management of non-digitalized independent practical activities and conducting various types of ongoing instruction.

*2.      Pedagogical observation and analysis of video recordings of lessons taught by students followed by conferencing in a virtual environment.*

In this case each student of the group prepares and delivers in a real or virtual environment a lesson according to the curriculum and calendar distribution in a certain school. Lesson planning consultations and conferencing are conducted remotely. The lessons are recorded and the recordings are presented during the exercises conducted in a virtual environment. The electronic resources presented allow multiple monitoring. During the analysis, it is

possible to stop, discuss, illustrate statements, etc. However, additional time and organization is required to deliver and record the lessons

### 3. *Simulation-based learning through computer didactic games*

T.Dalinger, K.Thomas and others (2020) find that mixed reality simulations are increasingly being used as a method of teaching students in future teacher training programs. Educational simulation platforms provide opportunities for authentic practice in a controlled environment with reduced risk of failure and negative consequences for students. As the cited authors point out, they are a useful but underutilized feature of initial teacher education. The application of this innovative method of teaching students requires the necessary resource provision. It is expedient to create program products in accordance with the educational standards and specifics of training in various subjects. In-depth research and appropriate methodological provision are needed to guarantee the use of the potential of simulation platforms.

The scientific literature presents opportunities to support and stimulate the preparation and in-depth training of teachers by using digital didactic games based on the principle of constructivism. It is concluded that serious games cannot replace practical pedagogical training in its entirety due to the difficulty of reproducing the real learning environment in its complexity and dynamics and the specificity of the learning process, but they can be a useful addition and supporting method for practical pedagogical training. (Peycheva-Forsayt,R., Asenova, A., Yovkov,a B., 2012). Classroom simulations in a virtual environment can create an effective space and tools for the practical training of future teachers.

### 4. *Distance microteaching*

Physical simulations implemented through business games also offer the possibility of modeling and managing a learning process. They can be implemented in person or through online participation. In business games, learning takes place in the process of working together, with everyone solving their own separate task in accordance with their role. The simulation model recreates the conditions and dynamics of reality.

Business games related to testing developed lessons in front of a smaller audience and in a shorter time with subsequent reflection are defined by S. Ledger and J. Fischetti (2019) as micro-teaching. The microteaching strategy is based on situated learning theory and reflective practice. Their combination provides a safe learning environment, modeling the processes in a real environment and conditions for exercising activities related to pedagogical practice.

The potential of modern information and communication technologies (ICT) provides the creation of online environments with specific characteristics of traditional classrooms and means for hybrid learning activities. ICT can be a digital tool for modelling, testing and analyzing models of computer-assisted or web-based learning process in technology and entrepreneurship

**A model for the formation of methodological competences through remote conducting of current pedagogical practice**

When remotely conducting exercises on current pedagogical practice of students majoring in pedagogy of technology and entrepreneurship education, it is possible to apply one or more of the approaches listed above, but it is especially appropriate to use remote micro-teaching and computer simulations through synchronous work of the whole student group.

From a structural point of view it is expedient to separate logically connected macro-elements ensuring adaptation to real professional activity, independent implementation of an educational process, development of skills for pedagogical observations and analyses.

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┌─────────────────────┐      ┌─────────────────────┐      ┌─────────────────────┐
│                     │      │                     │      │   Microteaching or  │
│    Preliminary      │ ──▷  │   Organizational    │ ──▷  │  watching videos of │
│    preparation      │      │   preparatory part  │      │  conducted lectures │
│                     │      │                     │      │                     │
└─────────────────────┘      └─────────────────────┘      └─────────────────────┘
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┌─────────────────────┐      ┌─────────────────────┐      ┌─────────────────────┐
│                     │      │   Generating ideas  │      │     Conferencing    │
│  Formation of       │ ◁──  │   for optimizing    │ ◁──  │ (discussion and     │
│  theoretical        │      │   the tested        │      │  analysis of        │
│  generalizationsя   │      │   versions of       │      │  presented          │
│                     │      │   lessons           │      │  simulations or     │
│                     │      │                     │      │  electronic         │
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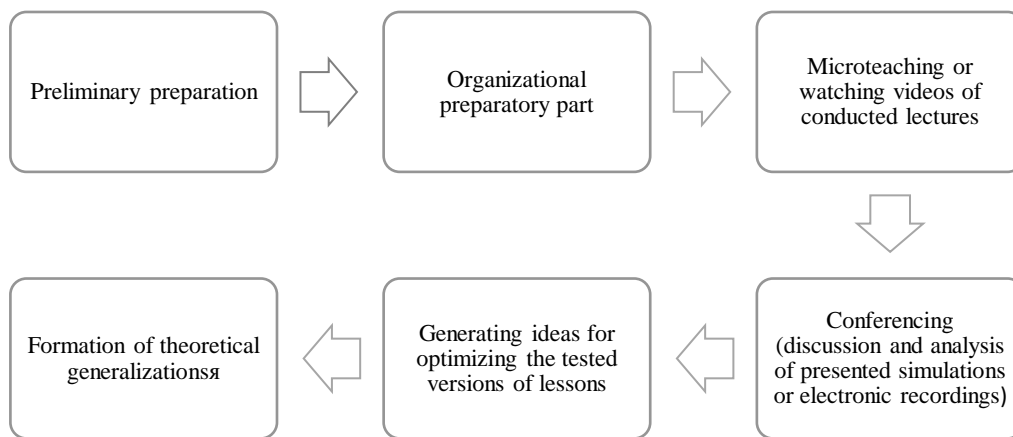
Fig. 1 Structural stages of remote current practice pedagogical exercises

Before conducting the synchronous exercises, each student must update the necessary theoretical knowledge and carry out methodological and practical preparation for planning a lesson on technology and entrepreneurship. The topics of the lessons are determined according to the annual thematic allocations in the basic educational institutions. The methodological preparation is related to the design and development of a specific pedagogical design reflected in the Lesson plan for the implementation of the organizational form. Selection and creation of the necessary didactic provision of the designed learning process is also required. The preliminary methodical preparation is guided and supported through counseling by the assistant leading the current practice and by a mentor teacher. Consultations are carried out electronically through synchronous and asynchronous communications.

The organizational-preparatory part is related to clarifying the purpose and tasks of the respective exercise. Under the guidance of the assistant leading the practice, an algorithm of work is explained, the readiness of individual students is checked, roles are assigned, and functions performed are specified.

The third stage involves students' participation in situational didactic modeling through micro-teaching, realized with electronic means. At this stage, one student assigned to fulfill the functional role of teacher performs moderating functions, and the other students are expected to react as learners. The moderator has all the tools of the virtual classroom to recreate the learning design he/she designed and guides the planned and situational electronic communications. Conference connectivity platforms typically provide opportunities to showcase active learning methods and approaches used in technology and entrepreneurship education. By creating virtual team rooms, the group teamwork characteristic of learning the subject is feasible. The skills to organize and support team activities are an important component of the methodological competences of future teachers necessary for professional realization. In order to achieve realism, objectivity and quality modeling of a real learning process, active participation of those performing the role of learners is necessary in accordance with the psychological and pedagogical characteristics of the students from the lower secondary education stage.

A mandatory stage conducted after testing the developed didactic models of organizational forms of technology and entrepreneurship education is the subsequent analysis and discussion moderated by the head of practice. At this stage, students are required to perform analytical, evaluative and prognostic activities. Conferencing is realized by applying methods such as active discussions, sharing of analytical written information, expressing evaluations through a web survey, etc. When conferring in a virtual environment, in a short time one can get an idea of the evaluation skills of all participants as well as identify individualized strategies for improving their methodological competences. The recording of the session provides an opportunity for repeated review by each participant, deeper exploration and self-reflection.

An important stage of the remotely conducted exercises according to current practice is the generation of ideas for optimizing the presented situational didactic models.

In conclusion, theoretical summaries are made under the methodological guidance of the teacher from higher school based on the observed pedagogical phenomena and processes.

# Results

A model for the formation of methodological competences through remote conducting of current pedagogical practice was applied to electronic distance learning of students from the specialty "pedagogy of technology and entrepreneurship" at the South-West University" Neophyt Rilski" - Blagoevgrad during the academic year 2020/2021. The exercises were conducted through the BigBlueButton electronic system. The effectiveness of the conducted experimental research and the students' attitude towards the applied approach for organizing practical pedagogical training in a virtual environment were investigated by surveying 18 students.

The results of the survey, as seen in Fig.2, show that there is a dominant positive attitude towards the proposed approach for the presentation and discussion of technology and entrepreneurship lessons in a virtual environment.
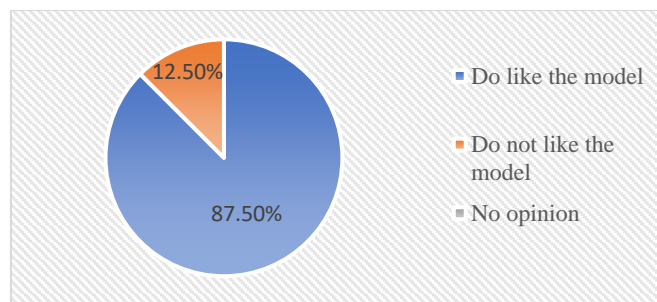


Fig. 2. Attitude to the applied model

The testing of didactic models in a remote environment has the potential to enrich the basic pedagogical competencies of future teachers according to 66.7% of the participants in the experimental study.

Students are aware of the distinctive features of the learning process implemented at a distance in an electronic environment and the need for specific planning of lessons conducted online. This statement was noted in the answers of 83.3% of the respondents. The features of the remote form had an impact on the design of didactic training tools for 44% of the participants in the study, 38% took into account the specifics of the form when selecting and content of the assigned tasks and used training methods.

Students recognize the positive potential of e-learning in technology and entrepreneurship, but also find existing negative features. According to 70.59% of those carrying out current practice, the process of leading practical student activities characteristic of learning the subject, is difficult.

The obtained data show that through the remote conduct of current practice, an understanding of certain methodological knowledge and the formation of skills for planning and managing a learning process in an electronic environment have been achieved. Opportunities are provided to check the effectiveness of innovative pedagogical technologies. Half of the participants - 50% - feel more confident in their own strengths and capabilities.
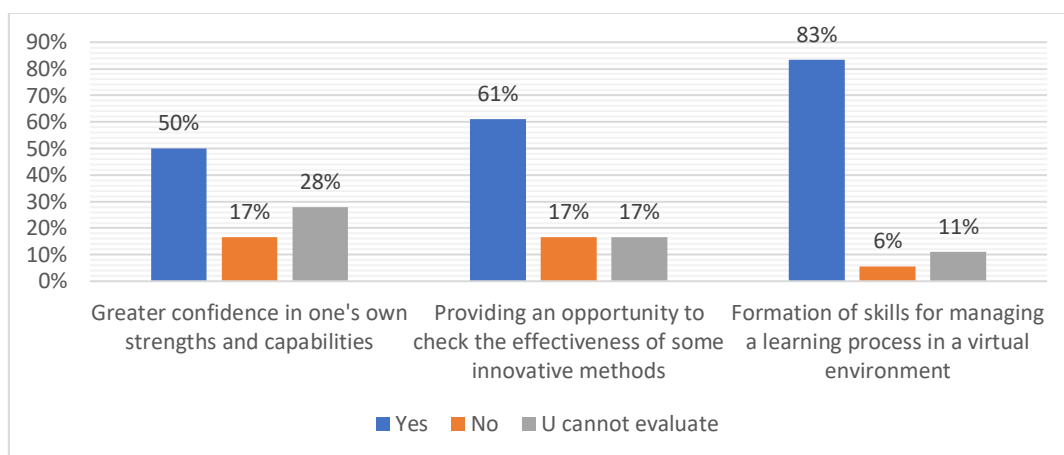


Fig. 3. Assessment of the extent to which certain educational outcomes have been achieved

Regardless of the positive attitude and achieved results, 50% of the respondents stated a preference for conducting the current practice in a real learning environment. This relative share shows not only personal preferences for certain methods of learning, but above all the difficult modeling of the learning process, providing for practical activities using a variety of materials and instrumental technical means and the need for direct communication with real students.

## Conclusions

In the conditions of distance e-learning, there are various possibilities for the formation of methodological competences through practical pedagogical activities. The proposed model for organizing current pedagogical practice based on situational didactic modeling and micro-teaching in an online environment has significant educational potential.

Web-based pedagogical practical training allows mobility, the possibility of active participation of students from different devices from different places. The recording of presented micro-lessons provides an electronic resource for repeatedly observing the entire development or individual structural components. The research tools ensure the manifestation of evaluative functions by all present and opportunities for individual support of the methodical preparation of each learner.

The implementation of exercises using forms of electronic implementation of pedagogical functions contributes to the enrichment of knowledge, skills and professional personal qualities that are significant for the conditions of digitization of education. To a large extent, the skills for managing a learning process in a virtual environment are improved. Conditions are created for a specific methodical interpretation of new methods, models, digital tools, pedagogical technologies, without directly affecting students and without fear of failure.

Greater confidence of future teachers in their own strengths and capabilities is achieved. Initiative, striving for relevance, innovation and constant professional improvement are developed. The manifestation of digital creativity and digital entrepreneurship aimed at providing the learning process with digital resources and innovative pedagogical technologies is stimulated.

The specificity of training in the subject of technology and entrepreneurship shows that synchronous exercises for pedagogical practice have a great educational capacity, but cannot completely replace teaching in a real learning environment. The effective formation of basic methodological competences is possible through the combined application of the various forms described.

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# Identifying the Level of Teacher's Maturity in the Impactful Gamification Use (IGU) in Abu Dhabi Public Schools

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## Abstract

This study aims to identify the maturity level of science and math teachers in Impactful Gamification Use (IGU) in Al Dhafra region public schools in Abu Dhabi. The researcher used concurrent triangulation mixed methodology research design, the research is conducted on a sample selected through a purposive sampling method from the population of public schools' science and math teachers from Al Dhafra region in Abu Dhabi. The results indicate that teachers have a high level of maturity in the impactful use of gamification, Thus, the findings from this research were used to suggest a framework rubric for measuring and improving Impactful Gamification Use (IGU), which can be used by education professionals to achieve better results using educational gamification technologies practically and to enhance the learning of their pupils. The implication of this research is anticipated to be beneficial for teachers, school senior leadership teams, and educational governing bodies to promote and to create a better understanding of how to achieve impactful use of educational gamification technology, and to harness its positive effects on education. The researcher concludes that higher levels of teacher's maturity result in creating and establishing the conditions of the IGU and that using the educational gamification framework rubric can help educators to achieve IGU. Future research can help in testing and improving on the findings of this research and also to apply it to other learning subjects.

**Keywords**: Gamification, Impactful Gamification Use (IGU), Educational technologies, etc.

## Introduction

Gamification is defined as the application of gaming mechanisms to engage users (Cunningham & Zichermann, 2011). Gamification is also characterized by Sailer et al. (2017) as applying gaming techniques and components outside the gaming context. The definition has been extended through the years to include everything that elicits actions, like games in a non-gaming environment that impacts motivation. Gamification, in this research, is defined as applying game design, elements, and characteristics with game mechanics, to non-game educational contexts. Gamification is not a product in its own right; instead, it is the result of educators who incorporate game elements into lessons to change the existing process and how it influences their students and the teaching process. Science and math educators have stated that adding gamification to the learning equation will improve learning outcomes positively and motivate students (Cunningham & Zichermann, 2011). a survey by Vann and Tawfik (2020) argue that participants partake in an activity more fully if it feels exciting and engaging. And to take advantage of this practical aspect, several research studies have explored how Impactful Gamification Use (IGU) leads to improved learning outcomes within education. However, even with all the fancy gamified solutions, the results of implementing gamification in an education context are not that much different from the results gained from implementing other educational technologies, as shown in the work of many researchers, such as Ntokos (2019). he stated that gamification has varying effects on the learning process, and the research by Hanus and Fox (2015), which stated that game mechanics does not lead to improved educational outcomes and instead damage motivation, satisfaction, and empowerment, as an example, he proposed that rewards systems adversely affect motivation. Thus, using gamification without a robust framework that gives teachers a clear road map to achieve impactful use of gamification, and engage students in a way that could lead to the positive improvement on student learning will result in wasting teacher time and resources.

## Methodology

The research design used in this research project was the concurrent triangulation design because it is the best method for carrying out research when both quantitative and qualitative data needs to be collected individually but at the same time (Edmonds & Kennedy, 2017). Other reasons for using concurrent triangulation design are the limited time for the study, also, both qualitative and quantitative information is important to reach a deep understanding of complex systems such as education, and because the researcher approaches this research with a pragmatic approach based on a pragmatic worldview, with the purpose to overcome the weaknesses of the methods that use one type of data, and to achieve a greater understanding of the subject of the research.

The concurrent triangulation design used for this research is a mixed-method design, which incorporates both qualitative and quantitative approaches. The approach entails collecting both types of data simultaneously, but at the same time and the results from their analysis will be concurrently triangulated to provide results. The concurrent triangulation design has four steps; Firstly, data collection, and in this step both quantitative and qualitative data are collected separately but at the same time. Secondly, data analysis and presentation, and in this step the collected data is analyzed, and the results are presented separately for both sets of data. Thirdly, triangulation, and in this step the accumulated results from both quantitative and qualitative arms from previous step are triangulated together and from this triangulation a convergence, complementarily and dissonance of results related to research questions occurs, Fourthly, Interpretation, and in this step the researcher interprets results from the previous triangulation step to reach to final findings.
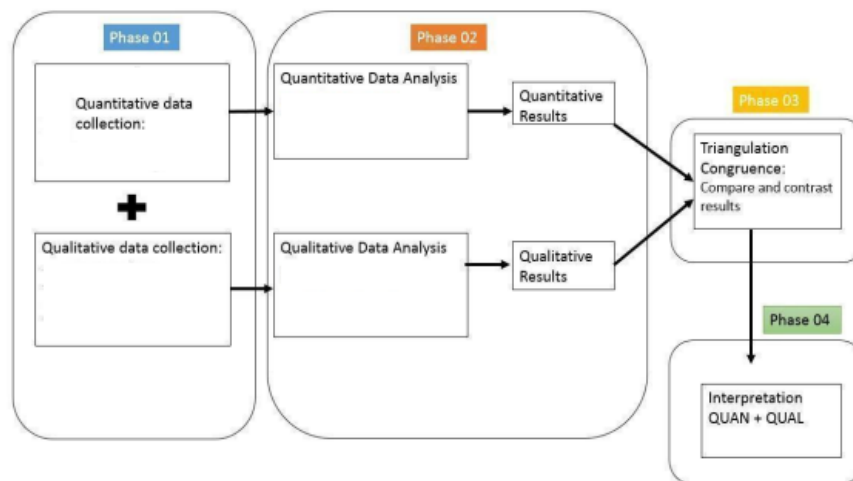


Figure 1. Concurrent triangulation design.

The researcher used purposive sampling, a non-probability method, with a critical-case sampling structure (Tongco, 2007), to select science and math public school teachers in Abu Dhabi with at least two years of experience in using the educational technologies which are provided by the ministry of education in their daily teaching practices. The sample includes 89 teachers. The qualitative research sample size was determined using guidelines by Dworkin (2012), which proposes the recommendation of five to fifty respondents. However, a sample size of ten can be highly productive and yield applicable results (Shetty, 2022), thus the researcher used ten participants for both the interviews and lesson observations. The researcher identified teachers based on purposive criteria, considering gender balance due to UAE's separate school system.

Data collection was conducted through different research instrument, quantitative data was collected using teacher questionnaire which was prepared by the researcher based on the New Combined Flow Framework (NCFF) (Hamash, 2023), which combined factors from the Octalysis framework (Chou, 2014) and the ITU framework. The second sourse of quantitative data was collected from lesson observations using the observation rubric. Qualitative data was collected from teachers interviews and lesson observation. The research instrument was validated by two experts, Moreover, the researcher conducted a pilot study to test the internal consistency and he used the collected feedback from the participants in the pilot study to improve the research tools.

# Results

The analysis of the level of teacher maturity in Impactful Gamification Use (IGU) was conducted using descriptive statistics for the collected quantitative data and thematic analysis for the collected qualitative data. The analysis of the IGU E scale revealed that 76 teachers (85.3%) found that the used gamification tools helped them to use points as gamification elements frequently, while only 13.6% reported using points occasionally. 72 teachers (80.9%) found gamification tools to help them use badges frequently, while only 19.1% used leaderboards. 78.6% of teachers used performance graphs frequently. The gamification tools helps teachers use performance graphs, meaningful stories, avatars, teammates, and competition at high frequencies. Teachers report increased frequency of using meaningful stories, avatars, teammates, and competition.

Table 1. Frequency and percentage of response from teachers for scale (IGU E).

| Statements of Scale IGU E | Never F (%) | Rarely F (%) | Sometimes F (%) | Often F (%) | Usually F (%) | Always F (%) |
|---|---|---|---|---|---|---|
| How frequently are Points used | 3 (3.4) | 1 (1.1) | 9 (10.1) | 14 (15.7) | 23 (25.8) | 39 (43.8) |
| How frequently are Badges used | 3 (3.4) | 5 (5.6) | 9 (10.1) | 17 (19.1) | 33 (37.1) | 22 (24.7) |
| How frequently are Leaderboards used | 3 (3.4) | 2 (2.2) | 12 (13.5) | 21 (23.6) | 27 (30.3) | 24 (27) |
| How frequently are Performance graphs used | 3 (3.4) | 4 (4.5) | 12 (13.5) | 31 (34.8) | 20 (22.5) | 19 (21.3) |
| How frequently are Meaningful stories used | 8 (9) | 6 (6.7) | 22 (24.7) | 18 (20.2) | 24 (27.0) | 11 (12.4) |
| How frequently are Avatars used | 7 (7.9) | 7 (7.9) | 15 (16.9) | 21 (23.6) | 20 (22.5) | 19 (21.3) |
| How frequently are Teammates used | 8 (9) | 7 (7.9) | 11 (12.4) | 23 (25.8) | 28 (31.5) | 12 (13.5) |
| How frequently is Competition used | 0 (0) | 0 (0) | 9 (10.1) | 18 (20.2) | 27 (30.3) | 35 (39.3) |
| How frequently is Progress (feedback)used | 0 (0) | 2 (2.2) | 5 (5.6) | 9 (10.1) | 25 (28.1) | 48 (53.9) |

The IGU A scale found that 81 teachers strongly agreed that the gamification tool's elements positively impact student learning, while 84 teachers agreed that they effectively enhance learning. 78 teachers agree that the gamification tool prepares students for 21st-century skills and attitudes, while 83 teachers agree that gamification is easily used within the available tools. The gamification tool's elements are positively affecting teachers' performance and productivity, with 78 teachers strongly agreeing and 80 89.9% agreeing. The gamification tool's elements engage all student types and preferences, with the lowest items focusing on overall performance and productivity.

Table 2. Frequency and percentage of response from teachers for IGU A.

| Statements of Scale IGU A | Strongly Disagree F (%) | Disagree F (%) | Neither agree nor Disagree F (%) | Agree F (%) | Strongly agree F (%) |
|---|---|---|---|---|---|
| Impact student Learning In a positive way. | 3 (3.4%) | 1 (1.1%) | 4 (4.5%) | 31 (34.8%) | 50 (56.2%) |
| Effectively enhance student learning. | 4 (4.5%) | 1 | 0 (0%) | 45 (50.6%) | 39 (43.8%) |
| Prepare students for 21st-century skills and | 4 (4.5%) | 1 (1.1%) | 6 (6.7%) | 32 (36%) | 46 (51.7%) |

| | | | | |
|---|---|---|---|---|
| attitudes. | | | | |
| Used easily by teachers and students within the program procedures and implementation. | 3 3.4% | 1 (1.1%) | 2 (2.2%) | 49 (55.1%) | 34 (38.2%) |
| Increase the overall performance and productivity of the program. | 4 (4.5%) | 0 (0%) | 7 (7.9%) | 37 (41.6%) | 41 (46.1%) |
| Engage students and teachers to adopt the Gamification elements | 4 (4.5%) | 0 (0%) | 5 (5.6%) | 43 (48.3%) | 37 (41.6%) |
| Engage all student types and Preferences. | 4 (4.5%) | 1 (1.1%) | 8 (9%) | 36 (40.4%) | 40 (44.9%) |

The IGU Oct scale reveals a significant frequency of occurrences of the Octalysis main drives in the observed lessons. The frequency of occurrences of epic meaning, empowerment, social influence, unpredictability, and avoidance was also found to be high. The IGU Oct scale reveals that teachers using the Octalysis framework often achieve conditions for the framework, with 50% of lessons being to very large extent and 48% being to large extent. The highest frequency of occurrence is found in items two, eight, and nine, which focus on empowerment, ownership, and accomplishment.

Table 3 Frequency and percentage of Lesson observation for (IGU Oct) scale.

| Statements of Scale IGU Oct | To a small Extent F (%) | To some Extent F (%) | To a large Extent F (%) | To a very large extent F (%) |
|---|---|---|---|---|
| Epic Meaning (Emotional entailment) | 0 (0) | 0 (0) | 5 (50) | 5 (50) |
| Empowerment | 0 (0) | 0 (0) | 1 (10) | 9 (90) |
| Social influence | 0 (0) | 0 (0) | 7 (70) | 3 (30) |
| Unpredictability | 0 (0) | 1 (10) | 7 (70) | 2 (20) |
| Avoidance | 0 (0) | 0 (0) | 7 (70) | 3 (30) |
| Scarcity | 0 (0) | 0 (0) | 8 (80) | 1 (10) |
| Ownership | 0 (0) | 0 (0) | 2 (20) | 8 (80) |
| Accomplishment | 0 (0) | 0 (0) | 1 (10) | 9 (90) |

Teachers and students are using educational gamification technology more effectively than before, with a significant increase in frequency and impactful gamification use. The core drive of gamification is evident, driving student empowerment and engagement. The frequency and impact of gamification use are favourable, with teacher

responses favouring an increase in impactful gamification use and improvement. The observer noted regarding impactful gamification use that the gamification tool's unpredictability and scarcity core drives need improvement, while the social influence core drive relies on teacher efforts and creativity. A stable balance between core drives is crucial for impactful gamification use.

# Findings

The triangulation of teacher impactful gamification use (IGU) shows a significant positive increase in classroom frequency and impactful use, with most teachers achieving gamification core drives. The positive effect is consistent with frequency increase. The triangulation results show a significant positive increase in teacher classroom frequency of using educational gamification elements, with most teachers achieving the Octalysis framework's core drives. This indicates high teacher maturity in IGU. The gamification tool effectively uses gamification in the classroom to achieve Impactful Gamification Use (IGU) by creating eight motivation core drives. Support and professional development are crucial for teachers' success. Improvement points include collaboration, communication, choice, creativity, and innovation. The gamification tool provided should improve engaging all types of students, especially socializers, and addressing predictability, avoidance, and scarcity. Finally, the final interpretation is that teacher in Abu Dhabi public school who are using gamification tool provided to them by the ministry of education have a high level of maturity in Impactful Gamification Use (IGU).

# Conclusions

The Impactful Gamification Use (IGU) conditions in education, particularly in math and science, can be achieved through a balanced approach using educational technology and gamification. The Abu Dhabi public school teachers who are using gamification tool provided to them by the ministry of education are achieving these conditions, with some improvement needed for IGU programs and tools. Improving these conditions will enhance teachers' maturity in using educational gamification, ultimately improving the tools and programs level. Achieving all IGU state conditions practically and systematically requires aligning technology use with certain conditions. The research also shows that higher teacher maturity in IGU could positively impacted student achievement and interest in math and science subjects.

The effect of IGU enhances the learning process. However, further research and analysis of successful programs are needed to develop a more precise framework. The combined flow framework is valuable for education systems and educators worldwide, particularly in the math and science subjects learning environment. Future research should include other learning systems and models to achieve a format that can be used by teachers worldwide with minimal resources and tools.

# Acknowledgements

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# Examination of Alimerdan Bey Topchubashov's Educational Thoughts within The Framework of The Articles in The Newspaper "Kaspi"

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## Abstract

The aim of this research is to examine the approach to education within the framework of the articles of Alimerdan Bey Topchubashov in the newspaper "Kaspi", which has an important place among the media organs broadcasting in Russian in Baku at the end of the 19th century and the beginning of the 20th century. The research was designed in survey model and document analysis was preferred in data collection. The collected data were analyzed by content analysis. In 1897, the editorial was given to Alimerdan Bey Topchubashov (1898-1907), a well-known public figure and a great intellectual. Alimardan Bey Topchubashov, in the "Kaspi" newspaper, brought up the issues of the formation of the national consciousness process in the minds of the Azerbaijani people more seriously and regularly and worked as an enlightener of his age. According to the research findings, Topchubashov is the author of many works on educational problems and pedagogical thought. "Baku trade school", "On opening of trade school in Baku", "Opening of general education courses", "Secondary education in Baku", "Educational crisis in Baku", "Our secondary schools", "Islamic seminary", "Liberty and school", "Muslim renaissance period", "Why is Japan strong" are the articles that reflect the pedagogical view of the period and the most diverse problems of education. It is seen that he argues that the salvation of fallen people depends on understanding the importance of school and non-formal education. As a result, Topchubashov`s practical activities and theoretical meetings about the problems in the history of enlightenment and education of Azerbaijan are important pages of pedagogical thought. From the first days of his editorship, he gave "Kaspi" a tough and necessary struggle to protect the education rights of the population, to remove undesirable intentions against religious separatism, to establish the education and lifestyle of the population in accordance with the times.

**Keywords**: Alimerdan Bey Topchubashov, "Kaspi" newspaper, Azerbaijan.

## Introduction

At the end of the 19th century and the beginning of the 20th century, the newspaper "Kaspi" occupied an important place among the Russian-language media in Baku. The newspaper operated from 1881 to 1919. In addition to Russian-speaking journalists, well-known Azerbaijani intellectuals took an active part in the pages of the newspaper. Haji Zeynelabdin Tagiyev took over the publishing life of the "Kaspi" newspaper from 1897 and the editorial was given to Alimerdan Bey Topchubashov (1898-1907), a well-known public figure and a great intellectual. In "Kaspi" the Azerbaijani intellectuals of that time - Hasan Bey Zardabi, Muhammed Aga Shahtaktli, Ahmed Bey Agaoglu, Firudin Kocherli, Sultan Mecid Ganizade, Ali Bey Huseyinzade, Nariman Narimanov, Celil Mammedguluzade, Teymur Bey Bayramalibeyov, Ceyhun Hajibeyli, Mahmudbey Mahmudbeyov. In addition to talking about its daily life, language, traditions, psychology, literature and ideas, they also discussed education and upbringing in a wide manner.

The newspaper "Kaspi" was a center of social movement that organized the struggle for national ideals, the ideology of Azerbaijanism, the liquidation of national identity and the formation of national bigotry. "Kaspi" superstitions, vulgarities, superstitions, outdated customs and traditions raise their voices against the extreme "loyalty" of the scholastic worldview of the people who are oppressed by outdated traditions, and therefore their conservatism against the demands of the changing and updated. In other words, they tried to lay the foundation stones of national ideology, to illuminate the way to national awakening and the rise of national consciousness.

Alimerdan Bey Topchubashov, in the newspaper "Kaspi", brought the issues of the formation of the national consciousness process in the consciousness of our people to the agenda in a more serious and regular way and discussed it as an intellectual of his time. Topchubashov not only talked about the national consciousness of the Azerbaijani people, but also discussed the issue of the national identity of Russian Muslims and Turkish-speaking peoples and defended their struggle against tsarist tyranny. In his journalistic writings during the leadership of the Russian Muslim-Turkish fraction in the Baku City Duma and the All-Russian Duma, Topchubashov's struggle for national awakening, freedom and national independence was a new stage of his socio-political activity.

In the newspaper "Kaspi" Topchubashov was able to clearly define the way to strengthen national consciousness. In his writings, his call to understand the importance of school and education in educating people who, due to ignorance, succumbed to superstition and ignorance and mastered a new way of thinking, was distinguished by its social and pedagogical essence. The ideal that Topchubashov carried throughout his life and fought for, was to convey the Turkish identity in terms of nationality and Islamic values in terms of religious affiliation to his people and large masses. Topchubashov expressed his national and religious views as an aphorism: "Our strength is our Turkish roots and our Islamic faith."

The research was designed in survey model and document analysis was preferred in data collection. The collected data were analyzed by content analysis.

## Findings

Topchubashov took on the task of constantly promoting the spread of education among the entire population of the Caucasus and incessantly struggling in this direction, writing: "We will try in every possible way to convey to our compatriots the need for the idea of opening general education and technical schools for children of both sexes". Out of ignorance, "We will convey to them the fact that it is possible to gradually get rid of ignorance and poverty, both materially and spiritually, only with the help of school. We will spread the idea that only school can turn them into well-rounded citizens." [1, pp.18].

Topchubashov saw the establishment of educational institutions and the proper organization of educational activities as a common task. He wrote that it is everyone's sacred duty to help the development of educational institutions through philanthropic activities and to help improve their educational and material base within their means.

Topchubashov described the very important task of helping to properly organize education and training in the school. He showed that this task falls first of all to those closest to the school - our teachers. Teachers should be aware of all the good and bad aspects of the school. Self-sacrificing teachers love their jobs and keep the teacher's flag high, and work hard in the upbringing and education of our youth.

Topchubasov regularly followed the issues related to school and education in general, conveyed his views to the pedagogical environment through the media and shared them with the educated population. Drawing attention to such an issue, he said, "For now, the decisions of the commission headed by the Minister of National Education will be discussed not only by the authorized institutions, but also in the media. Every fresh word spoken about such serious issues will enable the reform to be approached from all sides and thus help to solve the problem correctly. Especially in cases where the school has special requirements for its own needs due to its local characteristics, such help is necessary and important. In this respect, the Caucasian school needs the most detailed research. There are so stark differences in the relationships that naturally affect the inner life of the high school, such as tribe, religion, etc. These features should be considered primarily from a pedagogical point of view." [2, pp.105].

Topchubashov defended the inclusion of Azerbaijani and Georgian, which are widely used in Caucasian schools, among the subjects taught. The geography and history of the Caucasus region, the state of trade and industry, etc. drew particular attention to the need for more detailed study of these areas. He also paid special attention to the subject of textbooks more suitable for the age and knowledge level of young children. The issues related to the Caucasian school have their own characteristics and it is necessary to give instructions for these issues to be

covered in the media and to be implemented in the current period under the conditions of the reorganization of the secondary school. The author pointed out that Caucasian teachers should be given a say in these issues, who will use the appropriate moment between them to contribute to the big tasks set for the reconstruction of the secondary school and thus fulfill the determined tasks [2, pp.105].

While talking about the "Kaspi" ceremony in 1807, Topchubashov commented on the benefits of education and school for general development, and wrote that as a thinking pedagogue, it is a sacred duty no matter what happens to the "Kaspi". It sets a duty to continuously promote national and religious affiliations, financial situations, education and development among the entire population of the Caucasus and to struggle in this direction without returning. "We will try to convey to our citizens in every possible way the necessity of the idea of opening general education and technical schools for children of both sexes. We will convey to them the fact that getting rid of ignorance and poverty, both materially and spiritually, is only possible with the help of school. We're just going to spread the idea that the school can turn them into well-rounded citizens." [3, pp.18].

At the same time, Topchubashov showed the ways of raising "citizens provided in every way" with his pedagogical intuition. According to him, "In order to influence the population in the specified directions, it is extremely necessary to first examine the current lifestyle, spirituality, traditions, religious beliefs, in short, the daily life and livelihood of our people. Also, we think that enlightening them in the historical development process in order to understand and understand the events of modern reality in depth can provide greater benefits." [3, pp.18].

Renovation of existing schools, being the guarantor of future development of time and society, fundamental changes in the entire education system were the problems that preoccupied Topchubashov. Issues important for the radical reconstruction and reform of the entire Russian society occupied a special place in his advertising. The official decrees of the tsarist government on education, the orders and decrees of the Ministry of Public Education of Russia as state documents were the documents that the newspaper paid special attention to. These documents were discussed in the pages of the newspaper, interesting suggestions and recommendations were made. Thanks to his brilliant talent, Topchubashov personally expressed his thoughts and ideas in discussions on these issues, and won the sympathy and respect of the social and pedagogical environment. Topchubashov, who published the detailed report of the commission organized by the Russian Ministry of Education on the improvement of secondary schools in the issue of the newspaper dated July 18, 1901, in the journal of the Ministry of Education of Russia, published a large-scale newspaper. The article on this report was made a day later - on July 19, 1901.

Based on the commission`s discussion, Topchubashov first raises the issue that the results of government commissions are usually not announced or published. It is the secondary school's duty to keep everyone informed of the progress of the work of the government-appointed conversion commission of the Ministry of National Education. The school may discuss its commission's recommendations at its meetings. But this is not enough. Public discussion of such official documents is almost never done in the press or in other cultural and educational institutions. Such a situation causes the documents to lose all meaning for the public [4].

As a lawyer, public figure, journalist and educator-pedagogue, Topchubashov was adept at uncovering the most important problems of education and upbringing and finding ways to solve them. He specifically pointed out that even though we do not yet have a compulsory education system, educational institutions are few and far between and education itself is still the prerogative of a small minority of the wealthy. The interest and need for school in different parts of the population is getting stronger. This should be the sphere of public life. It is necessary to cover the entire population with education, regardless of "person, rank and state". In studies carried out in line with educational institutions, the wishes and needs of each resident should be taken into account. At the same time, we must suffer to overcome the difficulties faced by the school and rejoice in its growth and well-being. The great educator has repeatedly expressed this belief that the school is the most reliable guarantee of the general well-being of people, the true victory of good that God has given us on earth over evil and aggression [4].

Topchubashov is the author of many works on educational problems and pedagogical thought. "Baku trade school", "Opening a trade school in Baku", "Opening of general education courses", "Secondary education in Baku", "Education boom in Baku", "Our secondary schools", "Islamic clergy", "Education and school", "Muslim

Renaissance period", "Why is Japan strong" and other articles reflecting the pedagogical view of the period and the most diverse problems of education. These articles made it possible to learn about the educational needs of Azerbaijanis and Caucasian Muslims and the distribution areas of schools. Ali Mardan Bey Topchubashov explained and introduced the struggle of our people on the need for education, the activities of the national school and the examples of applied activities in this field with his journalistic skills and high research knowledge.

Topchubashov`s articles "Opening of General Education Courses", "Secondary Education in Baku", "Our Secondary Education Institutions", "Towards the Learning Crisis in Baku", "Freedom and School" are pedagogical examples of the state of secondary education institutions. He enthusiastically welcomes the opening of general education courses, which, as in previous times, are distinguished by signs of innovation in the field of education, and expressed his confidence and hope that the city of Baku will be a successful event in the field of education. Topchubashov wrote: "General Education Courses" are opening today. This is one of the educational initiatives. Fortunately, Baku became rich with such an educational institution in the next academic year. As it is known from the information published in our newspaper, these courses were established by intellectual circles and are currently operating in the Baku Men`s Classic Sports Hall building. Branches opened in Kara city and Balakhani. Since it is open to the public, the courses are created for both genders. Classes will begin six months later, from 8 am to 22 pm daily from October 15 to December 20 and from January 7 to May 1. [3, pp.157].

The flat fee for listening to lectures was 1 ruble per lesson for six months. 5 rubles were to be paid for each lesson up to five subjects. More than five lessons would be paid 5 rubles. This feature has been applied to everyone. Individual visitors (free listeners) had to pay 10 kopecks for each lesson. Lessons were to be conducted on the basis of pictures, charts, and experiments to be demonstrated by appropriate persons. The article also provides a list of lectures that will be offered during the course. This list shows the following topics: 1) arithmetic, 2) algebra, 3) geometry, 4) trigonometry, 5) astronomy, 6) general mechanics, 7) physics, 8) botany, 9) chemistry, 10) geology, 11) bacteriology , 12) childhood hygiene, 13) hygiene and emergency first aid, 14) oral hygiene, 15) physiology (animals), 16) Russian literature history, 17) foreign language history and literature, 18) Russian history, 19) art history and aesthetics, 20) applied mechanics, 21) French, 22) German, 23) Tatar (Azerbaijani).

These courses included lectures on the following topics: 1) zoology, 2) geography and ethnography, 3) physiology and human anatomy, 4) general history, 5) Eastern history, 6) history of philosophy, 7) cultural history, 8) industrial history, 9) economics and statistics, 10) psychology, 11) law, 12) pedagogy, 13) accounting, 14) petroleum technology, 15) music theory and practical music, 16) English [2, pp.158].

In the article, the author took into account such a topic that it is important to take into account the requirements of local conditions. The general education program of the course should be future-oriented. The absence of private lessons on "Caucasian studies" cannot be a pity in the broadest sense of the word. The author explained to the leaders of the working group the geography, ethnography, history of the Caucasus, etc. problems will not be able to be overcome. Topchubashov later wrote that it may not be possible to study the Caucasus later. Because with the Caucasus region in detail: the geology and geography of regions that are sharply different from each other, the ethnography and history of a large number of Caucasian peoples, each of them has its own national characteristics, religious and cultural values.

He was a great pedagogical theory and school education specialist of his time. He examined the Western General Education Courses model at an appropriate level and was able to distinguish the unique features of both educational institutions, and succeeded in revealing their similarities and differences. Topchubashov wrote that these training courses are comparable to public universities in Europe and America. According to him, this type of education is designed to disseminate scientific knowledge. Public conferences are not just about disenfranchised people. People with secondary education, those with physical disabilities, even high school graduates, those who want to refresh their forgotten knowledge, and those who want to acquire new knowledge in unfamiliar sciences can attend as listeners. The author wrote that the General education courses that will start today will undoubtedly be very useful and effective in self-education. Therefore, we welcome the opening of these courses and express our belief that these courses, which will gain the sympathy of our society in the near future, will function as one of the necessary educational institutions. [2, pp.160].

Topchubashov did not overlook the incomparable services of the great mahdi Haji Zeynalabdin Taghiyev to the education of girls in order to realize the hopes of the people for the future. Even if Haji Zeynalabd Taghiyev was not educated, the importance of establishing this school stems from his intellectual structure, his devotion to his people and his love. Topchubashov described Tagiyev's sensitive and compassionate attitude towards raising the cultural level of his people as the basis of his philanthropic activities and wrote: "The peak of Tagiyev`s educational and philanthropic activities so far is undoubtedly the Russian-Muslim girls` school opened in Baku, and only 200,000. The main thing is that she gave great importance to the girls` school, understood and appreciated the role that the first girls' educational institution would play in the future spiritual development of Muslims" [5].

In general, Topchubashov highly appreciates the role of women in public life and the preservation of the existence of the people: "It is true that the number of our women who are active in public affairs and in public affairs is not very large. However, in the oppressed situation that the Muslim woman is currently in, contrary to the decree of qadar and the rules of shari`a, her It is quite remarkable that some of its representatives enter the sphere of public activity, because they should be seen as the pioneers who managed to break through the impenetrable fence surrounded by mediocrity and ignorance for the first time. He draws plans for the future without breaking his ties with the present" [6].

## Conclusion

Like Hasan Bey Zardabi, Topchubasov also paid special attention to the activities of classical and real gyms operating in Azerbaijan. The fact that Azerbaijani children are in the minority in these educational institutions has always worried the great educator. He considered it important to do some things to prevent such a situation and tried to increase the interest of Azerbaijanis in these educational institutions in various ways and ways.

Topchubasov`s practical activities and theoretical meetings on the problems of our enlightenment and education history are important pages of our pedagogical thought. The education of the Azerbaijani people and Russian Muslims in general was an important aspect of Topchubashov's activity. From the first days of his editorship in "Kaspi", he managed to wage an irreversible and consistent struggle for the protection of the education rights of the people, against undesirable intentions against religious separatism, for the education of the population, for its adaptability. adapted their lifestyles to the times and incorporated it into the social action plan. The study and use of Topchubashov`s pedagogical meetings can have a positive effect on the activities of today's educational workers and teachers and create an incentive for the intensive development of scientific pedagogical theory.

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# The Impact of Using the Technology-Based Platform by The School Leadership on the Teachers' Evaluation

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## Abstract

The theory of change emphasizes the importance of school leadership in driving change and development, and the need for school leaders to be aware of the importance of using educational technology as part of the classroom sessions. This research aims to examine the impact of school leadership's use of technology-based platforms on teachers' evaluation. It was conducted in 10 public schools in the Western Region of Abu Dhabi, UAE, focusing on cycles two and three. A mixed-method research approach was used, involving a survey and interviews. The survey was sent to 19 school leadership, and the results were analyzed. The interviews were conducted with the school leaders to gain further insight into the research topic. The results showed that school leadership's awareness of educational platforms and their understanding of the educational goal of each platform used in the school lead to significant development in teachers' performance, as it affects the evaluation process during the observation that the school leader determines. This research has implications for the successful implementation of educational technology in schools, as it emphasizes the importance of school leadership's awareness of educational technology and its impact on the development of teachers and the educational process.

The chapter also analyzed the classification levels of teachers in Abu Dhabi and their relationship to teachers' evaluation. It was found that school principals are responsible for evaluating teachers and heads of departments in their schools, and the Abu Dhabi Education Council's electronic performance evaluation system is used.

The researcher used descriptive and thematic analysis to analyze the data collected from 17 school leaders via questionnaire and 5 school leaders via face-to-face interviews. The results showed that 15 of the 17 items had mean scores higher than 3.5, indicating a general agreement among the respondents. The mean per item index score for the systems intervention subscale was 4.41, while the training subscale had the lowest mean per item score of 3.76.

It is recommended that future research focus on evaluating the role of school leaders in activating educational technology in their schools, and the role of school leaders in motivating the teacher to raise the level of evaluation, The role of school leaders in activating educational platforms in their schools.

**Keywords**: Leadership, Education, Schools education platform, Evaluation, Teachers.

## Introduction

School leaders play an important role in the success and continuity of the educational process by providing motivation and support to teachers in the effective implementation of technology and strategies. Teacher evaluation is used to assess whether instructional goals are being met and should be used to provide feedback to teachers and guide professional development. Digital lessons are online learning strategies that allow learners to thrive in a virtual environment, and awareness of such technology is important for educational institutions to succeed.

**Research Context:**

This research seeks to explore the role of educational technology in the public school system in the UAE, specifically in the Western region of Abu Dhabi. It will investigate the awareness of school leadership on the importance of educational technology, the impact of professional development on teachers, and the effect of educational technology on teachers' evaluations. The research will focus on 10 public schools in the West region in Abu Dhabi, all these schools contain the cycle 2 and cycle3 that use various educational platforms ,so in this research we will target school leadership in these schools to determine the extent awareness leadership of the importance of educational technology and the impact that professional development has on teachers and the educational process, and the impact of using these platforms on teachers' evaluations.

**Problem statement:**

The researcher explored the role of school leadership in developing digital literacy skills and its impact on teachers' performance. It was found that creating conditions for the use of digital technologies in classrooms by school leaders can support the implementation of digitized curriculum and help teachers to get higher evaluations during the observation process. However, technical issues, lack of teacher support, and lack of time to prioritize digital technologies were found to be the major challenges encountered by school leaders. Therefore, school organizers need to support school leaders' practices in creating beneficial conditions for technology-enhanced learning.

There is a big gap between the requirements of the twenty-first century in education and what is offered in schools that adhere to the traditional style of education in schools. According to Williams (2008) it is the responsibility of school leaders to adopt several policies. The results of the Program for International Student Assessment (PISA) of the Organization for Economic Co-operation and Development (OECD) showed that bringing together education leaders from high-performing and rapidly developing educational systems to explore the extent to which educational success goes beyond some policies related to specific success was an attractive idea. The US Department of Education, the OECD, and Education International hosted "The Second International Teaching Profession" summit in March 2012 in New York to discuss matters such as digital learning. The summit brought together ministers of education, union leaders and other teacher leaders from high performing, rapidly improving education systems, as measured by PISA, to review how to improve the quality of teaching through school leaders. The summit was organized around three interrelated themes: (1) Developing influential school leaders, (2) preparing teachers to teach 21st-century skills, and (3) matching the teacher's request with the offer (Schleicher, 2012). School leaders have an important role in improving teachers' performance, advancing the level of their schools, and applying digital learning lessons. By completing digital lesson training, school leaders support progress and performance, and motivate teachers to use best practices in their classrooms.

According to the Abu Dhabi Education Council, teachers should be classified into five categories after their evaluation, including "the initial establishment, foundation, upgrading, empowerment, and proficiency." A source in the council confirmed that school principals are responsible for evaluating teachers and heads of departments in their schools, and the council's electronic performance evaluation system is used. He explained that the evaluation policy, which was approved this year, is based on four standards, including the professional standard and includes self-expression, performance development, cooperation and leadership, the curriculum standard and includes educational knowledge, the use of learning resources, planning and preparation, and evaluation, and the third standard includes the semester, and includes Effective teaching and learning methods, Differentiated learning, classroom management, creating a safe learning environment, and the last criterion is for the community, and includes relationships with parents, reporting, communication skills, and the local community, pointing out the existence of performance indicators in order to measure each criterion, and confirmed evidence from It would clarify what should be done in the classroom, as the teacher aims to master the teaching and learning strategies directed at students at the highest possible levels (Abu Dhabi, 2016)

**Methodology**

The purpose of this research project is to investigate the impact of technology-based platform use by school leaders on teacher evaluation. Furthermore, the research objectives are:

1- Measuring leadership awareness of the technology-based platform.

2- To analyse the effect of technology-based platform use on teacher evaluation.

3- Discuss the relationship between school leadership's awareness of the technology-based platform and teachers' performance.

**Design of the research:**

The following subsections will explain the practical procedure used for sampling, data collection and recording. For both quantitative and qualitative datasets in this research. The researcher will use a sequential illustrative design, and this research design includes both qualitative and quantitative approaches. This sequential approach will allow the researcher to conduct the research in two phases. During the first phase of the research, questionnaires will be administered by the researcher and then analyze the data collected from all school leaders in the Al Dhafra region. The second research phase will be conducted through conducting interviews that will be determined based on the first phase. The interviews will be conducted with research samples of school leaders in

the Al Dhafra region of Abu Dhabi. The researcher will analyze the quantitative data collected and compare them with the results reached from the second research phase.

Its type would be a sequential illustration design, the purpose of a sequential illustration design is often to use data to explain and interpret numerical results, especially those that are unexpected. Conceptually, logistically easy to



implement, easy reporting), and its emerging approach (Qualitative phase design can be based on quantitative phase results) according to Walker. This was also confirmed by his research (Almeida, 2018).

(Figure1): Sequential Explanatory Design (Almeida, 2018)

**Research Phase 01 - Quantitative Data and Analysis:**

The mixed method will be used in this research, with quantitative data collected from a questionnaire created on Google Forms and qualitative data gathered through interviews and observations. The quantitative data will be coded on a Likert scale and analyzed using IBM SPSS software, while the qualitative data will be organized into coherent groups based on the research questions. A backup of all gathered data will be created and saved both on the hard drive and on the cloud, with it being stored securely with a password and then deleted after the research ends. Approval from a committee of two doctorate holders has also been obtained for the research tools used. An experimental sample of 6 people was also taken to confirm the validity of the questionnaire and the method of answering it. Cronbach Alfa in SPSS was used to confirm the internal stability of the questionnaire, which showed satisfactory results.



(Figure2). Cronbach Alfa

**Sampling**: A sample is a group of individuals who participate in research by agreeing to answer a questionnaire or to conduct an interview. To get correct results, we will choose Probability sampling methods, including simple random Sampling, which allows us to make strong statistical inferences about the entire group. This is in the quantitative stage. (McCombes, 2019) To determine the sample size, I will rely on the Krejcie & Morgan table (KENPRO, 2012). The people targeted in the research are a total of 10 schools and 20 leadership, Their experience ranges from one year to more than 10 years in school leadership, and the sample includes male and female school leaders, and based on the table, the sample will be 19 school leadership.as show in (Table 1) All these schools consist of the cycle (2, 3) ,Cycle(1) schools were excluded due to their lack of technology use and lack reliance on educational platforms, This sample of schools is located in the western region of Abu Dhabi.

| N | S | N | S | N | S |
|---|---|---|---|---|---|
| 10 | 10 | 220 | 140 | 1200 | 291 |
| 15 | 14 | 230 | 144 | 1300 | 297 |
| 20 | 19 | 240 | 148 | 1400 | 302 |
| 25 | 24 | 250 | 152 | 1500 | 306 |
| 30 | 28 | 260 | 155 | 1600 | 310 |
| 35 | 32 | 270 | 159 | 1700 | 313 |
| 40 | 36 | 280 | 162 | 1800 | 317 |
| 45 | 40 | 290 | 165 | 1900 | 320 |
| 50 | 44 | 300 | 169 | 2000 | 322 |
| 55 | 48 | 320 | 175 | 2200 | 327 |
| 60 | 52 | 340 | 181 | 2400 | 331 |
| 65 | 56 | 360 | 186 | 2600 | 335 |
| 70 | 59 | 380 | 191 | 2800 | 338 |
| 75 | 63 | 400 | 196 | 3000 | 341 |
| 80 | 66 | 420 | 201 | 3500 | 346 |
| 85 | 70 | 440 | 205 | 4000 | 351 |
| 90 | 73 | 460 | 210 | 4500 | 354 |
| 95 | 76 | 480 | 214 | 5000 | 357 |
| 100 | 80 | 500 | 217 | 6000 | 361 |
| 110 | 86 | 550 | 226 | 7000 | 364 |
| 120 | 92 | 600 | 234 | 8000 | 367 |
| 130 | 97 | 650 | 242 | 9000 | 368 |
| 140 | 103 | 700 | 248 | 10000 | 370 |
| 150 | 108 | 750 | 254 | 15000 | 375 |
| 160 | 113 | 800 | 260 | 20000 | 377 |
| 170 | 118 | 850 | 265 | 30000 | 379 |
| 180 | 123 | 900 | 269 | 40000 | 380 |
| 190 | 127 | 950 | 274 | 50000 | 381 |
| 200 | 132 | 1000 | 278 | 75000 | 382 |
| 210 | 136 | 1100 | 285 | 1000000 | 384 |

Note.—N is population size.    S is sample size.
Source: Krejcie & Morgan, 1970

(Figure 3): Leadership school sample size table

**Research Phase 02: Qualitative data and analysis:**

Based on the results of the first phase (questionnaire), in the second phase the interviews will be set with school leaders, for those who showed in the questionnaire that they have awareness and understanding of educational technology and the use of educational platforms. Approvals will be taken from school leaders and the purpose of these interviews will be clarified. The questions are in Arabic and English, and there will be room for impromptu questions that the researcher feels necessary to ask during the interview depending on the answers of school leaders. Using tools like Dovetail and Thematic Analysis, you can identify, analyses, and interpret qualitative data patterns. (Hotjar, 2022). Validity: The validity of a measurement method refers to its accuracy. A high validity research study produces results that are in line with real-world characteristics and changes. (Middleton, 2022). There are several types to validate the research. Parallel or alternate forms: This method compares the results of different forms of the same test. We used the questionnaire and the interview to validate the information in this research. And the School leadership will provide accurate and correct answers when they have a clear reason and goal so the goal will be formulated in a clear and simple language.

## Results

Most school leaders in the UAE had positive experiences with the Electronic Maturity Program. The majority had received more than six hours of training in educational technology and deemed it sufficient for their needs. They found the courses useful for developing their skills in using educational platforms and stated that it had increased their awareness of and directed them towards digital learning in their schools. Additionally, the program provided them with criteria to evaluate the application of educational technology in their schools. School leaders play an important role in motivating teachers to use educational technology-based platforms by providing them with appropriate training, setting priorities for each platform, conducting lightning visits to check for progress, and by setting an example of their own. Multiple interviews suggest that the greater the awareness and knowledge of school leaders in educational technology, the more motivated teachers are to use it. The results of a questionnaire conducted about the role of school leaders in motivating teachers to use educational technology showed an agreement with a mean result of 4.71%.

School leaders have a big impact on the teachers' use and application of digital lessons and technology-based education platforms. Increasing school leadership awareness of educational technology platforms will push teachers to take courses and move away from traditional to digital learning to use the best practices for using educational technology. Results from both interviews and the questionnaire suggest that school leaders' awareness of technology-based education is important for the development and application of digital lessons during classes. School leaders' awareness of and knowledge regarding the use of educational technology greatly affects teachers' evaluations during classroom visits. The study concluded that increasing the awareness and understanding of school leadership in this area can motivate teachers to adopt and use the best practices and receive better evaluations.

The study found that school leaders who are knowledgeable about educational technology and its impact on improving teacher evaluation are more likely to motivate teachers to utilize educational technology and improve their performance during observation sessions. School leaders who understand the potential of educational technology to improve teaching evaluation are more likely to provide resources and support to teachers to help

them better understand and effectively use educational technology. Additionally, they are more likely to provide teachers with positive and constructive feedback on their use of the education technology, which can lead to improved teaching practices and improved student outcomes. Finally, school leaders who are aware of educational technology and its impact on improving teacher evaluation are more likely to assess teacher performance more accurately, as they can better identify areas where teachers could benefit from additional training and support.

**Conclusions**

School leaders play a crucial role in the success of the educational process, as they are responsible for the management of school programs and the development of educational technology. Teacher evaluation is an important tool in evaluating whether educational objectives have been achieved, providing feedback and guiding teachers' professional development. In light of the world's trend towards digital learning, especially after the Corona pandemic, the Arab country of AUE began to follow up the application of educational technology in all schools within the country and intensify efforts in training school leaders and teachers to use educational platforms based on educational technology, here a gap and difference began to appear in the level of use of technology Education between schools for several reasons, the most important of which is the awareness and awareness of school leaders of the importance of using educational technology and applying the digital lesson during their classes.

Based on this, the aim of this research was to study the effect of using the technology-based platform by school leaders on teacher evaluation. By measuring leadership awareness of the technology-based platform. And analysing the impact of using the technology-based platform on teacher evaluation. And discussing the relationship between the school leadership's awareness of the technology-based platform and teachers' performance. By answering the research questions

- How does school leadership's use of the technology-based platform affect teacher performance and evaluation?

- How does teacher promotion and improvement in applying the technology-based platform affect their assessments?

The researcher reached the results and answered the questions by analyzing the data he collected from the questionnaire in the first stage and the interviews in the second stage through the research sample. The sample included school leaders in 20 schools in the Al Dhafra region in Abu Dhabi. The researcher concluded that the awareness of school leaders has a great role in implementing Education technology, supporting, and motivating the teacher to use it and presenting the best practices during their lessons, and this will be reflected in the level of the educational process in their schools. The teacher is always interested in obtaining an excellent evaluation, which will apply what the school leaders adopt during his class, and thus will affect the teacher's evaluation. It is worth noting that the evaluation forms now used in all schools contain clear clauses for the use of educational platforms and educational technology, so if the teacher's presentation of his class did not reach the level School leadership awareness will not get a good evaluation, and this confirms the role of school leaders in the great contribution Supporting digital learning and increasing their awareness and knowledge will affect the level of teacher evaluation if its use is not at the required level. The world is now moving with great force towards digital learning, so this approach must be strengthened, and education technology should be taken as a primary source for the learning process, and school leaders should be supported with continuous training to inform them of what is new in educational platforms because they are in a state of continuous development.

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# A Case Study of EFL Teacher's Attitude Toward Online Teaching in Albania

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## Abstract

Everyone is interested in technology, and every field of study acknowledges its significance. Nowadays, technology is widely used to better the teaching process of the English language as a foreign language. In this concern, in this paper, a case study on the opinions of EFL teachers in Albania, our purpose is to discover the effectiveness of online teaching and the difficulties Albanian teachers faced. To achieve this aim, a questionnaire with close-ended questions and one open-ended question asked about the teacher's contribution to effective online teaching. The questionnaire utilises the Likert scale. The number of participants in our study is 50 teachers in public high schools in Tirana. The findings demonstrate that teachers had a positive attitude toward online teaching as it proved convenient during the pandemic despite the challenges encountered. The findings also demonstrate that teachers need technological skills and training to achieve teaching objectives and have effective online instruction.

**Keywords**: online teaching, EFL, effectiveness, attitudes, institutional.

## Introduction

In this new era, the role of the teacher is changing, bringing with it new problems and obligations. The tradition of English education has significantly changed due to the incorporation of technology. Thanks to technology, many options are available to make learning more enjoyable and effective.

Almost all schools and institutions worldwide were forced to switch from face-to-face classroom instruction to online instruction during the pandemic. Google Meet, Zoom, Skype, Viber, What's Up, Microsoft Teams, and other online platforms provided the necessary technological support to assist EFL teachers in Albania in doing online teaching. Online education became the sole substitute for all schools in this unique situation. As a result, there is a need to investigate the effectiveness of online courses in the pandemic context to see how much we can rely on this kind of teaching in our country.

Although EFL teachers were provided with theoretical and practical instructions to help them perform well while teaching online classes, they received lower evaluations from their students than when teaching face-to-face. Inadequate training and support for online teaching may result in lower student ratings in the coming years, and we might soon feel the effects of this process. Unaware of the differences between online and face-to-face instruction, many EFL teachers in Albania who had yet to take formal training frequently taught their online courses as they taught in traditional classroom settings. Moreover, the skills required in online teaching are distinct from those in face-to-face teaching. In addition, more obligations are placed on the EFL teacher when teaching online because it calls for expertise in course content and technological skills.

To get some insight and practical implications for online teaching, this research explores teachers' perceptions of the effectiveness of EFL online teaching concerning the delivery of online courses.

## Theoretical Background

Online language teaching has become increasingly popular thanks to advancements in computer-assisted language learning, which include more applications of course management sites and other diverse online tools (Enkin & Mejías-Bikandi, 2017). Today, several tools exist that we can use for online teaching. These tools have been identified as facilitators of e-learning. They are believed to contribute to the effectiveness of online teaching.

Studies show that e-learning is effective when compared to traditional methods of learning, and this is supported by the comparative studies in different fields which assessed the effectiveness of the e-learning method against the traditional method of learning.

Lee et al. (2005) reviewed the literature on learning language through the online system and noted that the online learning environment should: (a) provide authentic activities within context; (b) provide multiple points of view

and abundant information; (c) benchmark experts' performance and thinking; (d) provide cooperative construction of knowledge; (e) offers the opportunity for practical reflection; and (f) facilitate coaching and allow for clarification of thinking. González (2010) suggested that e-learners provide information to learners, offer occasional communication among learners, support knowledge-building tasks and engage learners via online discussions. According to Smith (2001), e-learning makes education easier for slow learners as they require more response time to participate.

Others (McCombs & Vakili, 2005) identified reasons that compel many educational institutions to embrace e-learning. First, the e-learning platform provides a consumer-centric approach to knowledge delivery, allowing learners greater control of their learning process. Secondly, online technologies and digital learning stimulate rich interactive and highly simulative experiences for learners. Third, e-learning can be broadened, allowing many students to learn within physical boundaries like classrooms. E-learning is also considered appropriate for meeting the needs of the complex and changing world (Hartnett et al., 2011). First, e-learning helps students overcome spatial and temporal restrictions that characterise traditional education settings. Second, it offers learners the freedom of constraints, including freedom of space, access, medium, and relationship development. Elsewhere, O'Donoghue and Groves (2009) opined that e-learning has several benefits: (1) the ease of adaptability to a variety of learning techniques; (2) being learner centred; (3) offering a pressure-free zone that allows learners to be in charge and learn at a comfortable pace; (4) easily personalised by learners and can be tailored to meet learners' needs; (5) affordable; (6) productive; and (7) mobile and global.

Despite the overwhelming support for the e-learning system's adoption, barriers to its adoption by institutions of higher learning have been identified and reported to be affecting its adoption rate and effectiveness. For example, Jenkinson (2009) identified the following as barriers to adopting e-learning: costly to produce; new skills required; unaffordability; and minimal social interaction.

However, while digital technologies can be crucial for building effective, cost-efficient, and flexible learning solutions, previous research has argued that despite these benefits, there has been limited use of digital tools among educators and students (Amhag et al., 2019). This is because online teaching creates substantial changes in content delivery, content aggregation, people collaboration, interactive discussion, information sharing, idea development and validation, access to resources, project development, simulation, and prototyping (Secundo et al., 2020). In addition, the digital competencies and skills related to distributing learning materials through digital platforms, or communicating, interacting, and monitoring learning outcomes are crucial for adopting the new mode of teaching and learning (Al-Awidi & Aldhafeeri, 2017).

## Methodology

The methodology employed in our study seeks to understand how online teaching has impacted the students' achievements and their perspective on online learning. A questionnaire was conducted with 50 high school EFL teachers in Tirana, which involved nine closed-ended questions and one open-ended question to consolidate teachers' feelings, whether they thought online teaching was effective or not, and to express their difficulties in using and owning any technological devices which helped them to deliver their classes. The questionnaire was designed so responses to questions could be scored, analysed and summed to measure the respondents' opinions and attitudes towards e-learning. They allowed the anonymity of respondents.

## Results and discussions



**Which of these methods did you use to teach your students?**

- Individual assignment
- Small groups
- Lagre groups
- Projet-based learning

60% — Individual assignment
24% — Small groups
9% — Project-based learning
7% — Large groups
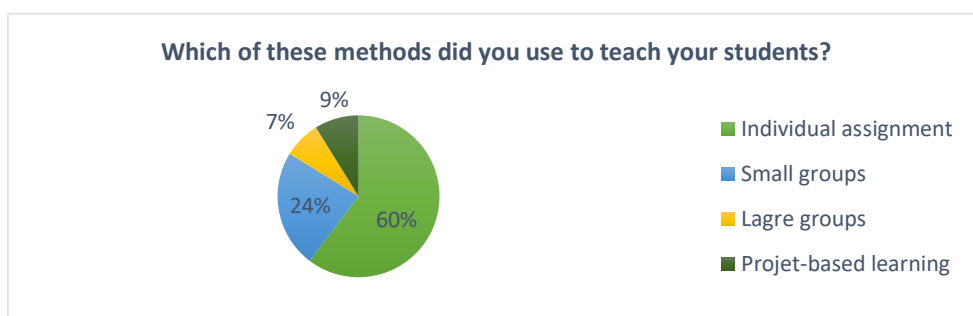
Table 1.

The first question aims to understand the methods teachers used while teaching online. 60% of teachers answered that they use individual assignments, 24% small group, 9% project-based learning, and 7% large group activities. It is worth mentioning that teachers who used the large group method stated they faced many difficulties with

voice interference during the lesson as there was much noise around their students. The shift to online teaching was immediate, and students were unfamiliar with it. Initially, they needed help to get used to the idea that they could e-learn and make their homes appropriate environments for this process.



**Which of the digital approaches do you think made your students more motivated?**

- Animations — 25%
- Powerpoint presentation — 54%
- Digital whiteboard — 21%
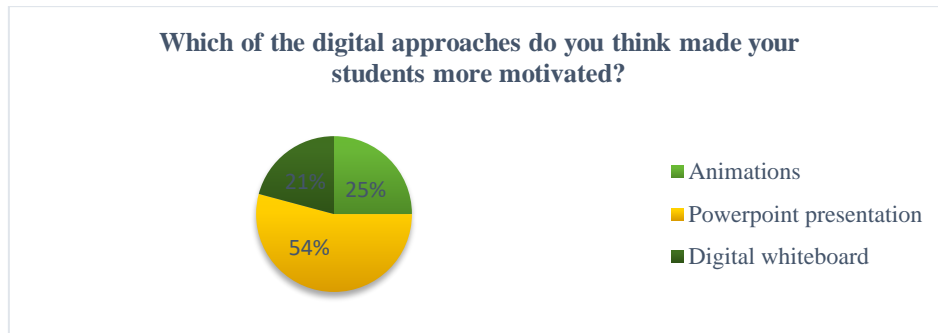
Table 2.

54 % of teachers said they used PowerPoint presentations as a more motivating and effective approach, 25% used animations, and the other 21% favoured the digital whiteboard. The percentages of the answers to this question demonstrate teachers' unfamiliarity with the new technological tools, relying mostly on PowerPoint, the easiest and most familiar digital approach teachers used.



**My experience with online teaching from home:**

- My class delivery was similar to the one face to face. — 47%
- I had difficulty with my network connectivity. — 51%
- I was distracted by various activities at home. — 2%
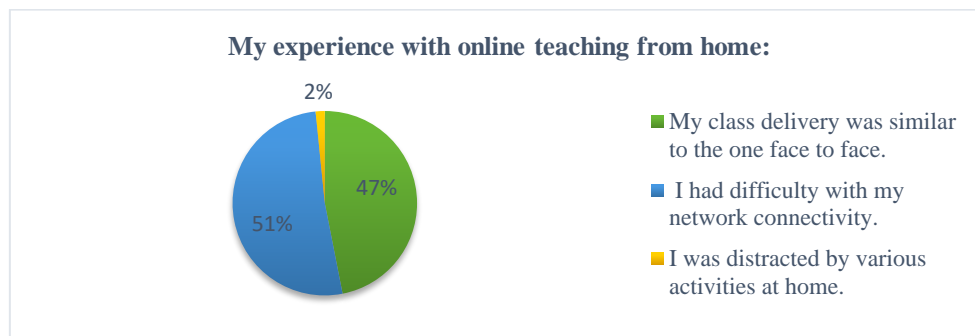
Table 3.

Teaching from home was a struggle for most of the teachers. 51% answered that they could have explained the lesson better if they did not have problems with the internet connection, 47% answered that the teaching process was good, but they did not see any progress, and students were not attentive at all. 2% answered that they were distracted from other things at home like housework, family members, TV noise, or their family members were sick, so they had to take care of them. Some teachers also mentioned that even their children attended classes online at home. They found it difficult to concentrate because of the noise they made with their devices as they lived in small apartments, and it was impossible to stay far from noise.



**Which type of recorded video presentation was more effective explaining the lesson?**

- Delivered by my educational institution. — 72%
- Downloaded by free apps on the phone or PC — 28%
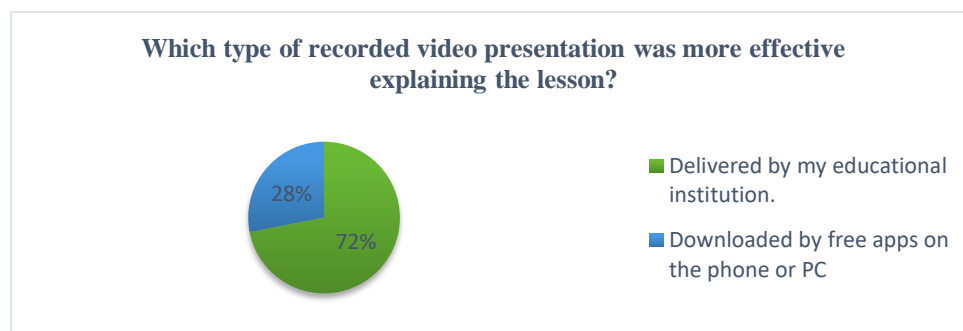
Table 4.

72% of teachers mentioned that they used more the institution's app to explain the lesson, and 28% answered that they used different apps more, like Zoom, google meet, or What's Up Messenger, to stay connected with the students about different information, and questions that they might have had.

**Which type of quiz is more effective for testing the understanding?**

- Traditional; pen and paper
- Assignment check
- Online short quizzes

14%
29%
57%
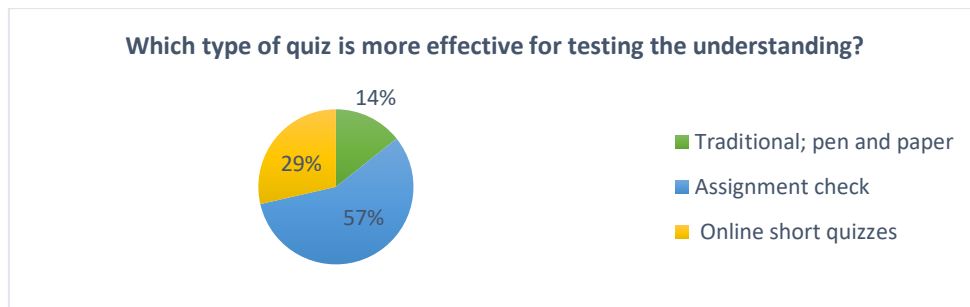
Table 5.

Tests were a big challenge to face. 57% of teachers uploaded assignments to test their students' knowledge or understanding of the lesson, 29% thought that short online quizzes shared by link were more effective, and 14% preferred the traditional method (pen, paper). Teachers who preferred the traditional method were the ones who thought that this was an effective way and prevented the students from becoming lazy. They stated that even though the technology was helping them during that challenging time. It will always help them throughout their teaching career; they did not want technology to become an addiction.

**Online teaching took place effectively because:**

- Every student could hear and understand the lesson clearly.
- PPTs were available and uploaded.
- Students could ask without much hesitation.

20%
32%
32%
16%
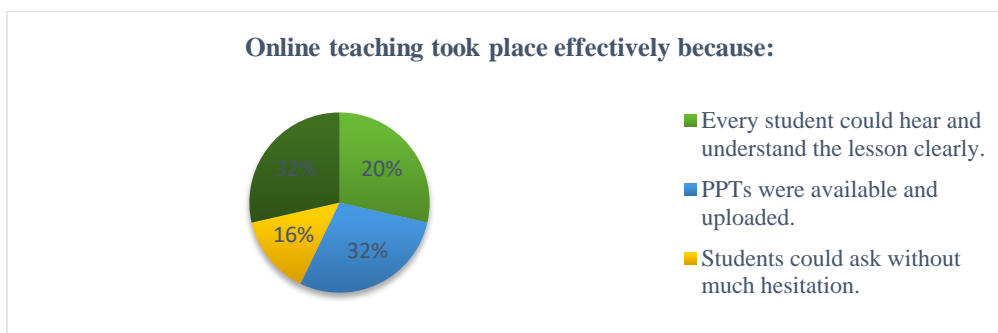
Table 6.

There were different points of view about the effectiveness of online teaching. 32% of teachers thought that online learning was effective because PPTs were uploaded, and students could find the materials with the key points easier and anytime they wanted without any difficulty. 32% answered that students could listen to the lessons clearly and also record them if needed, 20% of teachers thought that students that lived far from school did not need to be late or absent due to distance reasons, and the other 16% thought that with online communication students freely asked questions that they had about the lesson and the other.

**What was your most preferred method for clearing doubts that students had?**

- Ask my students during/after an online class.
- Check on their assignments.
- Had a quiz with 4 basic queastions after every new unit.

43%
43%
14%
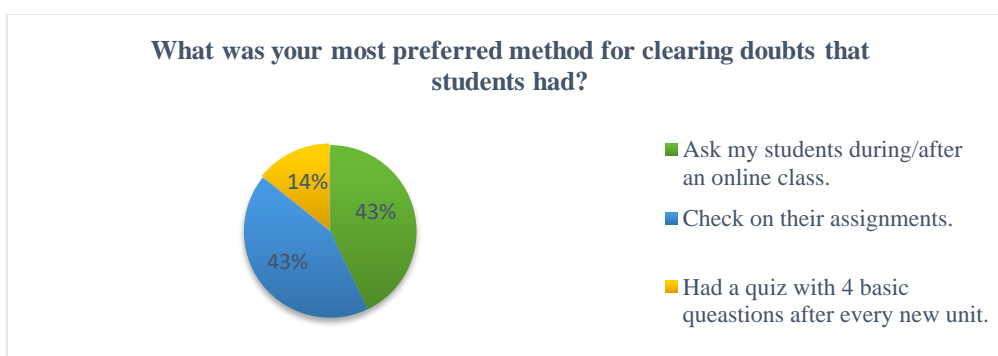
Table 7

Clearing doubts that students might have consisted extra work during online learning. 41% of teachers answered that they had to check the assignments to see if their students had understood the lesson, 40% asked their students during and after the English class, and 19% did apply the method of quizzes, having four basic questions after every unit.

**Which of the following devices did you use for your online teaching?**



- A laptop/desktop
- A tablet
- A smatphone

19%
13%
68%
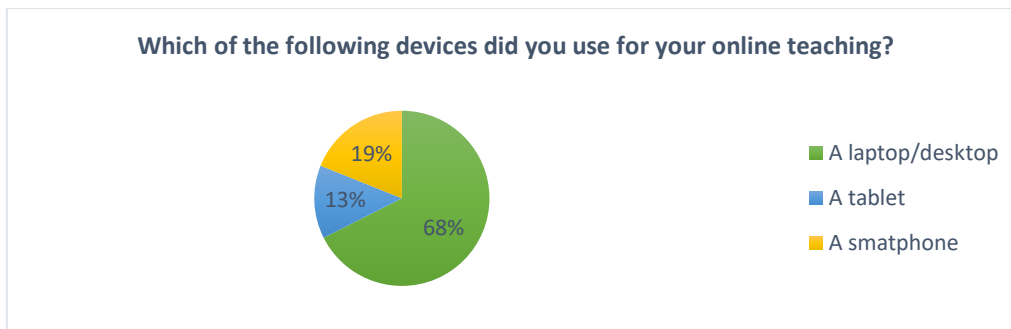
Table 8.

Teachers also needed help with using the right device to explain the lesson. 43% of teachers answered that they used a laptop/computer, 43% a smartphone and 14% a tablet. Some teachers even said that they needed to learn how to use the platform their school provided properly, and if it were not for their family members who helped them out and showed them how to use it, they could not have made it.

**How stressed were your students while learning remotely during the pandemic?**



- Very
- Slightly
- Not at all

19%
40%
41%
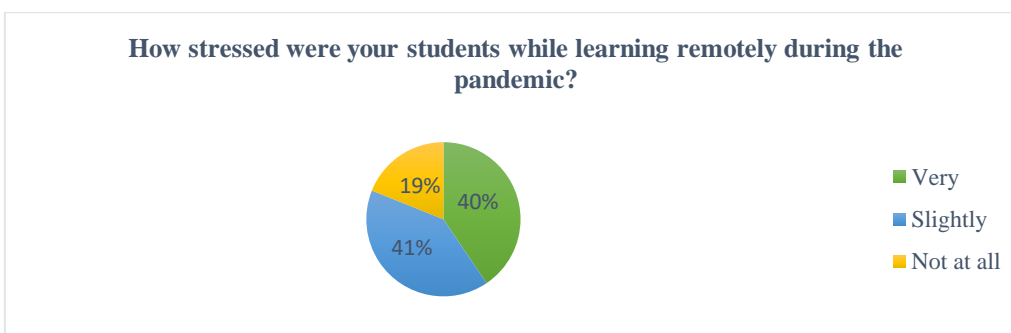
Table 9

Teachers were like family members to their students during the difficult period that we went through. Besides teaching the students, they also had to care for their student's mental well-being. 41% replied that their students felt slightly stressed, 40% replied incredibly stressed, and 19% were not stressed.

**Were your students learning as much now as they were before switching to online learning?**



- Yes most of the time
- Not at all
- Even more than before

14%
29%
57%
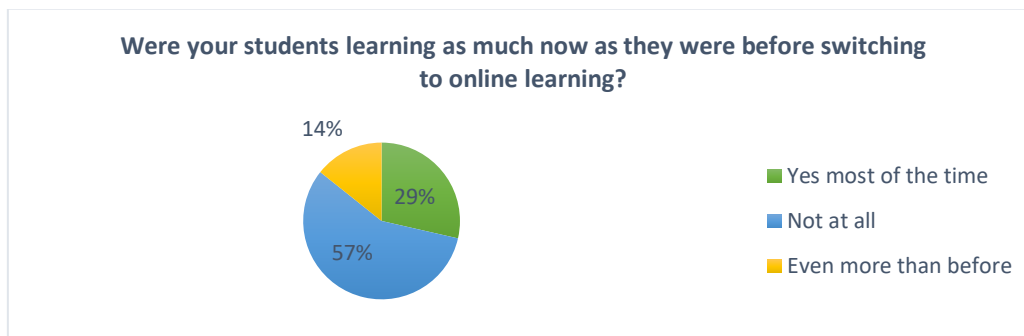
Table 10.

57% said that their students were feeling lazier and did not learn at all, 29% said that most of the time, their students were learning more virtually than physically, and 14% spotted that their students were more attentive, productive and understood the lesson better.

## Conclusions

Albanian education needed to be made aware of these recent changes, making it difficult to follow the flow. The study reveals that teachers' overall attitude toward online teaching was positive as it proved to be convenient during the pandemic despite the challenges encountered, such as the Internet network was not good enough, some of the teachers did not have the equipment to adequately support e-learning, as a lot of them used their mobile phones for e-learning rather than a PC or laptop and some teachers lacked the technological skills to use the online platforms or applications properly and at times failed to deliver an effective class. These challenges made some of them think that up close and physical learning is more effective than distance learning. Based on these difficulties,

to ensure the best possible use of online platforms and applications, schools had to be equipped with the necessary technological devices for the teachers, and teachers should have received support through training programs to help them use technology effectively in the teaching process online.

There were also some limitations to this study. One of the limitations of our research is the geographical distribution of the subjects. All the respondents were from Tirana. Therefore, future investigations should examine more respondents from Albania, especially in rural areas. Another limitation of this work is that the respondents were surveyed between November 2021 and February 2022.

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# Perception of Armed Forces Personnel towards Online Learning: A Case Study of India

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## Abstract

Enhancement of professional competency improves the skills of an employee, which results in newer opportunities and career advancement. Advancing skills, traits and competencies that contribute to improved performance and success of a person in the workplace. Owing to their flexibility, accessibility and credibility, online degrees are becoming widely popular in recent times. Online learning mode is convenient for those who does not want to restrict themselves with compulsions of physically attending college. For Armed Forces personnel, who are unable to pursue their education in a regular mode, online learning is a great option. With an aim to shape a bright future, Armed Forces personnel can pursue an online degree that will help upskilling themselves without modifying work schedules and commitments. In the conventional regular mode and distance education, there is a dependence on books and reference material, whereas the learning management system in the online earning mode allows the Armed Forces personnel to study from a laptop, tab or a mobile phone and have continued access to online study material.

The purpose of the present study is to understand the perception of the Armed Forces personnel towards online learning in India.

## Introduction

Owing to their flexibility, accessibility and credibility, online degrees are becoming widely popular in recent times. Online learning mode is convenient for those who does not want to restrict themselves with compulsions of physically attending college. For Armed Forces personnel, who are unable to pursue their education in a regular mode, online learning is a great option. With an aim to shape a bright future, Armed Forces personnel can pursue an online degree that will help upskilling themselves without modifying work schedules and commitments.

Since the basic eligibility for a person to join the Armed Forces in ranks is matriculation or higher secondary level education, most Armed Forces personnel do not get the opportunity to pursue an undergraduate or a master's degree. The requirement of a specialized qualification come in play for technical posts. This is the reason Armed Forces personnel opt for various learning modes to upskill themselves and to enhance their academic and professional qualifications.

Open and distance learning or pursuing a course through correspondence became popular among armed forces because it allows them to pursue their education remotely and appear for exams. Distance education doesn't require physical attendance in classes and candidates can carry out self-study at the place of their choice.

With the advent of technology and accessibility to Internet, online learning has become more popular these days. By applying for an online course, you get the liberty to study anywhere, anytime. Online degrees are a perfect fit for Armed Forces personnel who want to obtain professional degrees or a degree of their choice enabling them to expand their knowledge, enhance their skills, and achieve their professional breakthroughs.

During peacetime, Armed Forces personnel who are posted in undisturbed areas do have time to study and this time can be best utilised if they enrol for an online learning program. Online learning offers convenience and accessibility to them which are one of the biggest boons. With the availability of an Internet connection, they can study anywhere, anytime and has a facility of revisiting recorded classes in case they miss live sessions.

In the conventional regular mode and distance education, there is a dependence on books and reference material, whereas the learning management system in the online earning mode allows the Armed Forces personnel to study from a laptop, tab or a mobile phone and have continued access to online study material.

### Rationale

Bell & Reigeluth (2014) stated that a new military education and training paradigm is emerging in which individuals will enjoy unprecedented access to learning facilitated via computers, virtual environments, and hand-held mobile devices. That learning will be individually tailored using advanced learning management systems, and the resources will be updated not only by "instructors" but also by individual service members based on real-time changes to tactics, techniques, and procedures as they occur in operational environments.

Most of the educational institutions today offer online programs that help a learner acquire required skills that are in demand in the market today. In-demand specializations that help you hone your skills in the field you choose are being offered by various educational institutions. The focus of online learning is on producing future-ready professionals who can contribute to the success of any organization. The transition from the regular mode of education to the online mode of education has generated the question of acceptance of the change.

## Review of Literature

Fitch & Kirby (2000) stated that learning is also developmental so far as the ultimate goal is to help students move to new levels of cognitive development. Masie (2000) stated, that 88% of learners and 91% of managers want an instructor to guide them in their online course and they are not likely to pursue the course if the instructor is not present.

Goodyear et al. (2001) stated that it is imperative to recognize the similarities between conventional face-to-face teaching and online teaching. One must not understand that there is no correlation between conventional teaching skills and online teaching skills. Also, the ways in which "good teaching" is expressed may be very different in the two settings of face-to-face teaching and online teaching. Bell & Reigeluth (2014) observed that just like any other transformation, changing the paradigm of military education and training is a complex activity that must occur within an incredibly complex system.

According to Anches (2018), personalized learning will also place new challenges on the instructors. They will have to be prepared to deal with widely divergent levels of learner knowledge and experience on a continuous basis and their role will need to change from "sage on the stage" to "guide on the side".

Kearsley (2002) stated that in the initial phase of growth of online learning, it was difficult to convince most students, teachers and administrators that it was a legitimate form of education. It has also been observed that due to the flexibility and convenience of online learning, it appeals to most of the students, but not all students are suited to online learning. It requires a lot of self-discipline and initiative in completing an online course. One has to follow a strict time schedule for studies to achieve the overall aim. Performance of students lacking these abilities are well reflected in the results of the online courses.

Computer literacy is of most relevance while studying in online mode. An online course requires a basic understanding of computers, including use of various applications like Word, Power point and Excel and the knowledge of how the Internet works. A large section of students does not possess this basic level of literacy and are not good at using computers.

Distance education relies on special techniques of course design, special instructional techniques, special methods of communication by electronic and other technology, as well as special organizational and administrative arrangements thus making it unique. (Moore & Kearsley, 1996).

Kim (2004) stated distance education is categorized into three types of service delivery: traditional distance education, computer- based education, and online education. Traditional distance education utilizes audio- and videotapes or paper-based materials though the postal service. Computer-based education is based on a hard drive or CD-ROM material. When computer-based education is offered though the World Wide Web, it can be considered online education.

Varkonyi (2017) stated Massive Open Online Courses (MOOC) have swept through universities and professional development institutions. "A massive open online course (MOOC) is an online course aimed at unlimited participation and open access via the web. In addition to traditional course materials such as filmed lectures, readings, and problem sets, many MOOCs provide interactive user forums to support community interactions among students, professors, and teaching assistants (TAs).

## Research Gaps

Based on the extensive literature review, the following research gaps have been identified: -

   (i)      Educational institutes launch their own programs in the online mode but they hardly incorporate the needs and wants of the Armed Forces Personnel.

(ii)     There is hardly any literature on the perceptions of the Armed Forces Personnel towards online learning.

(iii)    Inadequate measures for Armed Forces personnel deployed in remote areas without internet connectivity.

## Research Questions

This research has examined following questions in the context of perception of Armed Forces personnel towards online learning: -

(i)      What is the basis of an Armed forces personnel applying for an online course?

(ii)     Do the Armed Forces personnel possess necessary skills to handle computers for doing an online course?

(iii)    Do the Armed Forces personnel understand the difference between the conventional regular mode of education vis a vis online mode of education?

(iv)    Do the Armed Forces personnel understand the difficulties posed by the geographical and remote location of their work place for furthering their education through online mode?

(v)     Which delivery model of an online course is preferred by an Armed Forces personnel?

## Research Objectives

Based on the research questions, the following objectives have been identified in context of perception of Armed Forces personnel towards online learning: -

(i)      To analyse the responses and understand the requirements of the Armed Forces Personnel.

(ii)     To suggest measures for effective online Learning for the Armed Forces Personnel.

## Research Methodology

The study adopted purposive sampling for data collection and used primary data and secondary data to draw lessons from the effect of selected parameters by floating the questionnaire to the Armed Forces Personnel.

### Research Design

The cross sectional research design was used in the study. The cross sectional study involves the study at one specific point in time. It involves the collection of data where cases under consideration are more than one. In this, the study is conducted at a single point in time to collect the data from people who are similar in some respect but different in some respect like education, subject area etc. It is used to detect the pattern of connection/ correlation between variables (Bryman & Bel, 2011).

### Sampling Frame

The sampling frame comprised of the randomly selected section of serving and retired Armed Forces personnel. The reason behind taking this population is that they are the most involved stakeholders in this study.

### Sample & Sample Size

The sample was collected from selected section of serving and retired Armed Forces personnel by administering a questionnaire in form of Google Forms. The completed and reliable responses constituted the sample for this research. Sample size was around 150.

### Sources of Data Collection

To achieve the above stated objectives of the study primary data and secondary data was taken into consideration. The data was collected as follows: -

### Primary Data

For the research, the primary data was collected through questionnaires. The questionnaire will be administered to the selected section of serving and retired Armed Forces personnel being the primary stakeholders in this study.

### Secondary Data

The secondary data was collected from the following: -

Official websites

Resources like JSTOR

Blogs on Online Learning

IGNOU's Akashdeep Website

## Data Analysis

The data was analysed by applying statistical tools like Frequency Analysis and Cluster analysis.

## Analysis

We have administered the questionnaire on Google form to the selected group and received 153 responses. The following analysis was done: Frequency Analysis and Cluster analysis to classify the questions into categories based on the responses.

**Online learning does not require a person to be at a certain place at a specific time and date**

|  |  | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Agree | 69 | 45.1 | 45.1 | 45.1 |
|  | Disagree | 3 | 2.0 | 2.0 | 47.1 |
|  | Strongly Agree | 81 | 52.9 | 52.9 | 100.0 |
|  | Total | 153 | 100.0 | 100.0 |  |

45.1 % respondents agreed and 52.9 % strongly agreed that Online learning does not require a person to be at a certain place at a specific time and date. Over all it is 98%.

**Online learning overcomes the geographical constraint.**

|  |  | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Agree | 33 | 21.6 | 21.6 | 21.6 |
|  | Neutral | 6 | 3.9 | 3.9 | 25.5 |
|  | Strongly Agree | 114 | 74.5 | 74.5 | 100.0 |
|  | Total | 153 | 100.0 | 100.0 |  |

74.5% respondents agreed that Online learning overcomes the geographical constraint.

**Student studying in online mode spend less money and time and still get great results.**

|  |  | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Agree | 60 | 39.2 | 39.2 | 39.2 |
|  | Disagree | 27 | 17.6 | 17.6 | 56.9 |
|  | Neutral | 42 | 27.5 | 27.5 | 84.3 |
|  | Strongly Agree | 24 | 15.7 | 15.7 | 100.0 |
|  | Total | 153 | 100.0 | 100.0 |  |

45.1% respondents stayed neutral or disagreed that Student studying in online mode spend less money and time and still get great results.

**Online learning is flexible and convenient. It allows flexibility to study on the schedule that fits a student's life.**

|  |  | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Agree | 72 | 47.1 | 47.1 | 47.1 |
|  | Disagree | 6 | 3.9 | 3.9 | 51.0 |
|  | Strongly Agree | 75 | 49.0 | 49.0 | 100.0 |
|  | Total | 153 | 100.0 | 100.0 |  |

96.1% respondents agreed that Online learning is flexible and convenient. It allows flexibility to study on the schedule that fits a student's life.

**I am pretty good at using the computer.**

|  |  | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Agree | 60 | 39.2 | 39.2 | 39.2 |
|  | Disagree | 3 | 2.0 | 2.0 | 41.2 |
|  | Neutral | 12 | 7.8 | 7.8 | 49.0 |
|  | Strongly Agree | 75 | 49.0 | 49.0 | 98.0 |
|  | Strongly Agree, Agree | 3 | 2.0 | 2.0 | 100.0 |
|  | Total | 153 | 100.0 | 100.0 |  |

88.2% respondents strongly agreed or agreed that they are pretty good at using the computer.

**I am comfortable communicating electronically.**

|  |  | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Agree | 69 | 45.1 | 45.1 | 45.1 |
|  | Neutral | 12 | 7.8 | 7.8 | 52.9 |
|  | Strongly Agree | 72 | 47.1 | 47.1 | 100.0 |
|  | Total | 153 | 100.0 | 100.0 |  |

92.2% respondents strongly agreed or agreed that they are comfortable communicating electronically.

**Learning is the same in class and online mode on the Internet.**

|  |  | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Agree | 18 | 11.8 | 11.8 | 11.8 |
|  | Disagree | 81 | 52.9 | 52.9 | 64.7 |
|  | Neutral | 30 | 19.6 | 19.6 | 84.3 |
|  | Strongly Agree | 6 | 3.9 | 3.9 | 88.2 |
|  | Strongly Disagree | 18 | 11.8 | 11.8 | 100.0 |
|  | Total | 153 | 100.0 | 100.0 |  |

72.5% respondents stayed neutral or disagreed that Learning is the same in class and online mode on the Internet.

**I believe that learning on the Internet outside of class is more motivating than a regular course.**

|  |  | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Agree | 15 | 9.8 | 9.8 | 9.8 |
|  | Disagree | 66 | 43.1 | 43.1 | 52.9 |
|  | Neutral | 57 | 37.3 | 37.3 | 90.2 |
|  | Neutral, Disagree | 3 | 2.0 | 2.0 | 92.2 |
|  | Strongly Agree | 6 | 3.9 | 3.9 | 96.1 |
|  | Strongly Disagree | 6 | 3.9 | 3.9 | 100.0 |
|  | Total | 153 | 100.0 | 100.0 |  |

80.4% respondents stayed neutral or disagreed that learning on the Internet outside of class is more motivating than a regular course.

**I feel that face-to-face contact with my instructor is necessary for learning to occur.**

|  |  | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Agree | 66 | 43.1 | 43.1 | 43.1 |
|  | Disagree | 30 | 19.6 | 19.6 | 62.7 |
|  | Neutral | 33 | 21.6 | 21.6 | 84.3 |
|  | Strongly Agree | 24 | 15.7 | 15.7 | 100.0 |
|  | Total | 153 | 100.0 | 100.0 |  |

58.8% respondents strongly agreed or agreed and 41.2% stayed neutral or disagreed that face-to-face contact with their instructor is necessary for learning to occur.

**I am able to manage my study time effectively online and easily complete assignments on time.**

|  |  | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Agree | 93 | 60.8 | 60.8 | 60.8 |
|  | Disagree | 6 | 3.9 | 3.9 | 64.7 |
|  | Neutral | 39 | 25.5 | 25.5 | 90.2 |
|  | Strongly Agree | 15 | 9.8 | 9.8 | 100.0 |
|  | Total | 153 | 100.0 | 100.0 |  |

70.6% respondents strongly agreed or agreed and 25.5% stayed neutral that they are able to manage their study time effectively online and easily complete assignments on time.

**Online earning provides unlimited access to your courses in which material will be easy to access and resources will be open internationally.**

|  |  | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Agree | 90 | 58.8 | 58.8 | 58.8 |
|  | Neutral | 12 | 7.8 | 7.8 | 66.7 |
|  | Strongly Agree | 51 | 33.3 | 33.3 | 100.0 |
|  | Total | 153 | 100.0 | 100.0 |  |

92.1% respondents strongly agreed or agreed that Online earning provides unlimited access to their courses in which material will be easy to access and resources will be open internationally.

**Online learning allows you to choose the course which is right fit for you.**

|  |  | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Agree | 75 | 49.0 | 49.0 | 49.0 |
|  | Disagree | 6 | 3.9 | 3.9 | 52.9 |
|  | Neutral | 39 | 25.5 | 25.5 | 78.4 |
|  | Strongly Agree | 33 | 21.6 | 21.6 | 100.0 |
|  | Total | 153 | 100.0 | 100.0 |  |

70.6% respondents strongly agreed or agreed and 25.5% stayed neutral that Online learning allows them to choose the course which is right fit for them.

**Rather than missing important class sessions, students in online courses can always attend by participating in Discussion Boards or Chat Sessions.**

|  |  | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Agree | 84 | 54.9 | 54.9 | 54.9 |
|  | Disagree | 15 | 9.8 | 9.8 | 64.7 |
|  | Neutral | 33 | 21.6 | 21.6 | 86.3 |
|  | Strongly Agree | 21 | 13.7 | 13.7 | 100.0 |
|  | Total | 153 | 100.0 | 100.0 |  |

68.6% respondents strongly agreed or agreed and 21.6% stayed neutral that rather than missing important class sessions, students in online courses can always attend by participating in Discussion Boards or Chat Sessions.

**Online learning gives students the opportunity to plan study time around the rest of their day.**

|  |  | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Agree | 90 | 58.8 | 58.8 | 58.8 |
|  | Disagree | 6 | 3.9 | 3.9 | 62.7 |
|  | Neutral | 18 | 11.8 | 11.8 | 74.5 |
|  | Strongly Agree | 39 | 25.5 | 25.5 | 100.0 |
|  | Total | 153 | 100.0 | 100.0 |  |

84.3% respondents strongly agreed or agreed and 11.8% stayed neutral that online learning gives students the opportunity to plan study time around the rest of their day.

**Online learning helps students balance work and responsibilities with their education.**

|  |  | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Agree | 99 | 64.7 | 64.7 | 64.7 |
|  | Agree, Neutral | 3 | 2.0 | 2.0 | 66.7 |
|  | Disagree | 3 | 2.0 | 2.0 | 68.6 |
|  | Neutral | 9 | 5.9 | 5.9 | 74.5 |
|  | Strongly Agree | 39 | 25.5 | 25.5 | 100.0 |
|  | Total | 153 | 100.0 | 100.0 |  |

90.2% respondents strongly agreed or agreed that online learning helps students balance work and responsibilities with their education.

**Service commitments restricts a student to pursue a full time regular education course.**

|  |  | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Agree | 99 | 64.7 | 64.7 | 64.7 |
|  | Disagree | 3 | 2.0 | 2.0 | 66.7 |
|  | Neutral | 3 | 2.0 | 2.0 | 68.6 |
|  | Strongly Agree | 48 | 31.4 | 31.4 | 100.0 |
|  | Total | 153 | 100.0 | 100.0 |  |

96.1% respondents strongly agreed or agreed that service commitments restrict a student to pursue a full time regular education course.

**Remote location of an Armed Forces personnel's work place poses difficulty to enroll in regular courses.**

|  |  | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Agree | 66 | 43.1 | 43.1 | 43.1 |
|  | Strongly Agree | 87 | 56.9 | 56.9 | 100.0 |
|  | Total | 153 | 100.0 | 100.0 |  |

100% respondents strongly agreed or agreed that remote location of an Armed Forces personnel's work place poses difficulty to enrol in regular courses.

**Geographical and remote location of an Armed Forces personnel poses internet connectivity problem.**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Agree | 84 | 54.9 | 54.9 | 54.9 |
| | Neutral | 6 | 3.9 | 3.9 | 58.8 |
| | Strongly Agree | 63 | 41.2 | 41.2 | 100.0 |
| | Total | 153 | 100.0 | 100.0 | |

96.1% respondents strongly agreed or agreed that geographical and remote location of an Armed Forces personnel poses internet connectivity problem.

**General perception of the employers is that Online Course is not as good as Offline Course.**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Agree | 90 | 58.8 | 58.8 | 58.8 |
| | Disagree | 6 | 3.9 | 3.9 | 62.7 |
| | Neutral | 9 | 5.9 | 5.9 | 68.6 |
| | Neutral, Disagree | 3 | 2.0 | 2.0 | 70.6 |
| | Strongly Agree | 45 | 29.4 | 29.4 | 100.0 |
| | Total | 153 | 100.0 | 100.0 | |

88.2% respondents strongly agreed or agreed that general perception of the employers is that Online Course is not as good as Offline Course.

**Preferred delivery model required for online learning programs are Massive Open Online Courses, Open Education Resources, Online Lectures, Online Study Material and Study Material and lectures in form of a CD.**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Agree | 87 | 56.9 | 56.9 | 56.9 |
| | Disagree | 9 | 5.9 | 5.9 | 62.7 |
| | Neutral | 27 | 17.6 | 17.6 | 80.4 |
| | Strongly Agree | 24 | 15.7 | 15.7 | 96.1 |
| | Strongly Agree, Agree | 3 | 2.0 | 2.0 | 98.0 |
| | Strongly Disagree | 3 | 2.0 | 2.0 | 100.0 |
| | Total | 153 | 100.0 | 100.0 | |

72.6% respondents strongly agreed or agreed that preferred delivery model required for online learning programs are Massive Open Online Courses, Open Education Resources, Online Lectures, Online Study Material and Study Material and lectures in form of a CD.

## Cluster Analysis

Here we have used Cluster Analysis. Hierarchical cluster analysis separates each object into a cluster. Attempt is made to link the two most similar clusters until all of the objects are joined in a complete classification tree. Distance is the criteria for clustering. Objects that are near each other should belong to the same cluster, and objects that are far from each other should belong to different clusters. Measure for calculating distance is the Euclidean distance measure. Here we have found that data is classified into 5 or 4 clusters.

The responses to variables are clustered as per the following table:-

**Cluster Membership**

| Case | 5 Clusters | 4 Clusters |
|---|---|---|
| Online learning does not require a person to be at a certain place at a specific time and date." | 1 | 1 |
| Online learning overcomes the geographical constraint. | 1 | 1 |
| Student studying in online mode spend less money and time and still get great results. | 2 | 2 |
| Online learning is flexible and convenient. It allows flexibility to study on the schedule that fits a student's life." | 1 | 1 |
| I am pretty good at using the computer. | 1 | 1 |
| I am comfortable communicating electronically." | 1 | 1 |
| Learning is the same in class and online mode on the Internet." | 3 | 3 |
| I believe that learning on the Internet outside of class is more motivating than a regular course." | 4 | 3 |
| I feel that face-to-face contact with my instructor is necessary for learning to occur." | 5 | 4 |
| I am able to manage my study time effectively online and easily complete assignments on time." | 1 | 1 |
| Online earning provides unlimited access to your courses in which material will be easy to access and resources will be open internationally. " | 1 | 1 |
| Online learning allows you to choose the course which is right fit for you." | 1 | 1 |
| Rather than missing important class sessions, students in online courses can always attend by participating in Discussion Boards or Chat Sessions." | 1 | 1 |
| Online learning gives students the opportunity to plan study time around the rest of their day." | 1 | 1 |
| Online learning helps students balance work and responsibilities with their education." | 1 | 1 |
| Service commitments restricts a student to pursue a full time regular education course." | 1 | 1 |
| Remote location of an Armed Forces personnel's work place poses difficulty to enroll in regular courses." | 1 | 1 |
| Geographical and remote location of an Armed Forces personnel poses internet connectivity problem." | 1 | 1 |
| General perception of the employers is that Online Course is not as good as Offline Course." | 1 | 1 |
| Preferred delivery model required for online learning programs are Massive Open Online Courses, Open Education Resources, Online Lectures, Online Study Material and Study Material and lectures in form of a CD." | 1 | 1 |

We see that most of the variables got member ship of cluster 1, Variable "Student studying in online mode spends less money and time and still get great results" got the membership of cluster 2. Variable "Learning is the same in class and online mode on the Internet" got the membership of Cluster 3. Cluster 4 comprises of variable, "I believe that learning on the Internet outside of class is more motivating than a regular course". Variable, "I feel that face-to-face contact with my instructor is necessary for learning to occur" is in Cluster 5. This explains how the responses to these variables differ from others.

## Horizontal ICICLE

Icicle plots display information about how cases are combined into clusters at each iteration of the analysis. Orientation allows you to select a vertical or horizontal plot. This Chart shows how cases are merged into clusters. At the right no cases have been merged, as one reads right to left cases that are merged are indicated by an X on bar in the column between them whereas different cluster is indicated by white space between them.
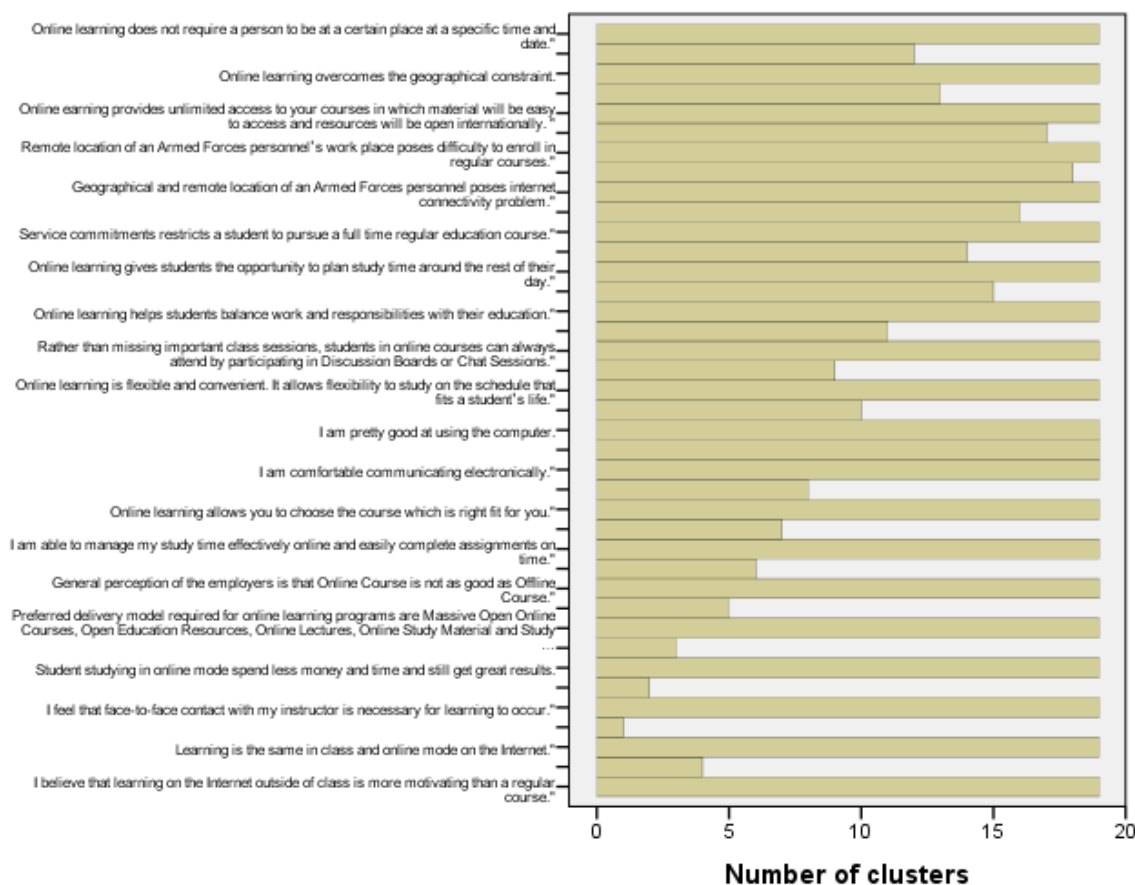
**Most of the variables (questions) are grouped in cluster 1 thus showing similarity.**

## Conclusion

The study summarizes the plethora of recent research being conducted on challenges faced by the Armed Forces Personnel to attend to online learning. The study provided results regarding the perception of the Armed Forces Personnel towards the online learning. In this specific context the respondents were serving or retired Armed Forces Personnel who are the primary stakeholders.

The Armed Forces Personnel resort to online learning to upskill themselves where due to their service commitments or geographical and remote location of their workplace do not permit them to enroll for regular courses. Online learning is flexible and convenient and allows them flexibility to study on a schedule which fits their life.

Majority of Armed Forces Personnel possess necessary skills to handle computers and are proficient in communicating electronically. They understand the nuances of online learning and disagree that learning outside of class is more motivating than a regular course. Majority is in favour of face to face contact with their instructor for learning to occur. However, they agree that online learning allows them to manage their study time effectively and progress with the course with ease. It also allows them easy access to various online resources. Pursuing a course through online learning mode helps them balance work and responsibilities with their education. They agree that service commitments and geographical and remote location of their workplace restricts them to pursue a regular course and also poses internet connectivity problems while studying via online mode. It is agreed by them that preferred delivery model for online learning programs are Massive Open Online Courses, Open Education Resources, Online Lectures, Online study material and study material and lectures in form of a CD.

## The way ahead

Massive Open Online Courses (MOOCs), & Open Education Resources (OER) should be developed by the Educational Institutes specific to the requirements of Armed Forces Personnel. Learning should be offered in hybrid mode (Online + Offline) considering the exigencies of service. Examination should be organized in

online mode. Recognition of online degree should be at par with the regular degree in order to increase the employability.

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# Towards a more humanistic and culture-sensitive approach to ICT-enhanced engineering education in developing countries

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## Abstract

Technology offers a great potential to transform higher education and make it more accessible, adaptable and inclusive of heterogeneous populations of learners. In spite of this, the adoption of these technologies by educators in developing countries remains relatively slow, compared with their proliferation within leading universities in the western world. If this trend continues, the digital divide might increase as rapid advances in ICT and individual competencies accelerate unevenly between world regions. In addition, it is not clear how ICT can be integrated into existing curricula for the benefit of both learners and teachers within the context of specific academic disciplines. In this work, we argue for the need to problematise ICT-enhanced learning by approaching it from a humanistic perspective, integrating both individual and social dimensions of the process of knowledge acquisition and transformation. To this end, we propose the utilization of social representations theory in order to characterize the disciplinary and socio-cultural landscape within which an educational technology is to be implemented. The ultimate objective being to enhance the sustainability of such innovations and to ensure their positive impact on the quality of STEM education in different countries. Here, we use engineering education within the context of an Algerian university as an example. We also discuss the limitations and perspectives of such endeavours for the advancement of ICT-enhanced education research, especially in the context of developing countries.

**Keywords**: Engineering education, STEM education, Technology-enhanced learning (TEL), ICT, Developing countries, Culture-based instructional design, Innovation

## 1    Introduction

The growth of Information and Communication Technologies (ICT) has been phenomenal in recent years and the Covid-19 pandemic has raised awareness of the strategic advantage of having an operational ICT-based back-up system. However, the degree of adoption and effectiveness of these technologies varies between countries and for different types of ICT. Beyond technological barriers, socio-cultural and linguistic barriers should not be neglected from a holistic human development perspective. These barriers may delay the development of socio-culturally adapted educational contents and delivery systems to support the transformation to knowledge societies in developing countries. Socio-cultural differences influence educational philosophies as predominantly individualistic cultures such as the Western culture tend to value autonomous learning whereas collectivist cultures such as Eastern cultures emphasise group harmony and respect to instructors as authority figures (Goodall, 2014). Also, given that modern higher education institutions are organised around clusters of specialized knowledge domains, these clusters become socializing microcosms which encapsulate distinctive epistemological beliefs, pedagogical practices and professional identity determinants of the academic discipline to the extent that it has been observed that researchers experience cognitive and epistemic difficulties in conducting interdisciplinary research (Boon & Van Baalen, 2018; Endrizzi, 2012).

Historically, technology adoption has mainly focussed on ergonomic considerations which inform the design phase of these technologies. Research on the social acceptability is more limited in comparison and has traditionally been studied with reference to social psychology framework, especially the Technology Acceptance Model (TAM). However, current research suffers from the following limitations:

1.  It is shaped by the assumption that learning technologies and their adoption are desirable and overlooks insights into the motivations and decision making process of those who do not utilise learning technologies in the way that others think they should,

2.  It treats technology adoption as an essentially binary phenomenon (adopt or not adopt), whereas it is dynamic and adaptable. The process of adoption and the context-specific path academics take to individual- and group-shaped adoption that serves their professional practice should not be underestimated,

3.  Most published literature presupposes that technology adoption automatically stimulates improved educational practice, but this is not established in practice.

Social psychology is a pertinent framework to address these issues, but the choice of the research method is key as not all methods offer the same sensitivity to socio-cultural variations. There are two distinct traditions in social psychology research: the American tradition represented by the TAM and the French tradition represented by social representations theory. There is a large body of literature using the TAM, however, this approach has a psychometric predictive nature and tends to be centered on users as individuals. In contrast, social representations consist of a qualitative appraisal of values, practices, ideas, and beliefs that are collectively shared in a society or group. In this work, we apply the central core theory of social representations (Abric, 2003) to assess commonly held beliefs about ICT-supported learning and the meaning derived from its implementation in a higher education setting by Algerian faculty. This is justified by the fact that higher education institutions place a high value on academic freedom and educational excellence and hence the pedagogical implementation of ICT will not succeed if faculty fail to perceive the benefits of such technologies with regards to their teaching or research performance (Skoumpopoulou et al., 2018). Also, the significant development of social representations research in developing countries is noteworthy in comparison to the more object-oriented research paradigm that is predominant in Western works dealing with the use of ICT in education. According to Denise Jodelet, one of the most recognised authors in the theory of social representations, this trend demonstrates the relevance of this theory to "*open new fields of research that are adapted to the demand of developing countries and suited for application in domains such as community, health and education, as well for intervention and change in social fields*" (Jodelet, 2008).

We also discuss the methodological limitations and research perspectives in this area and argue for the importance of promoting studies on the role of social representations of the human actors involved in the educational process in the effectiveness of the teaching/learning process. The increasing demand from teacher training institutions for alternative approaches to learning and teaching and the growth of research on adult and life-long personalised learning offer exciting opportunities for the development of social representations as an alternative theory for understanding learning in different academic disciplines and among diverse and multi-cultural groups of learners (Chaib, 2015).

## 2    Methodology

In this work, we use social representations theory to probe the attitudes, beliefs and concerns of engineering faculty about technology-enhanced learning of their academic discipline. The structural approach to studying social representations developed by Abric posits that a social representation is composed of 3 parts: (i) Central Core zone: stable consensual beliefs, (ii) Potential change zone: elements which may induce a change in the social representation and (iii) Periphery zone: individualistically held beliefs (see figure 1).

So by adopting this approach, we have performed an exploratory case study involving 27 academics from an Engineering faculty in Constantine, Algeria. A word association questionnaire, around main concepts elicited by stimulus phrase: "Using ICT in teaching chemical engineering", including word ranking by importance according to respondents, followed by structural analysis based on the method by Abric (2003). "Core beliefs" and "Potential change zones" were thus identified as illustrated in table 1.
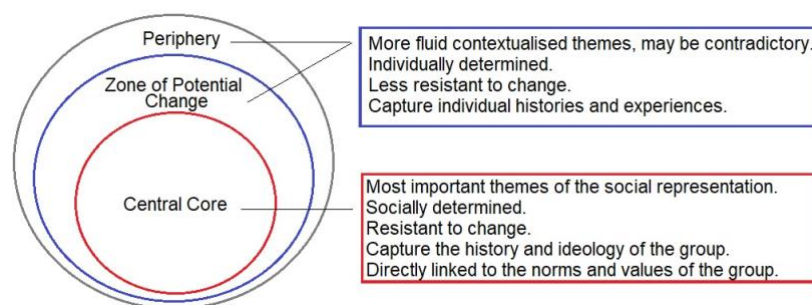


Figure 1. Structural components of a social representation (Abric, 2003).

Table 1. Analysis of social representations by the rank-frequency method (Abric, 2003)

| Frequency | Rank | |
| --- | --- | --- |
| | Low | High |
| High | Core Zone | Potential Change Zone |

| Low | Potential Change Zone | Periphery |
|---|---|---|

## 3   Results

Our results, shown in table 2, show that core beliefs of the surveyed sample were that educational technology is a supporting tool in chemical engineering education, serving to concretize abstract notions and help students translate them into more tangible representations.

Table 2. Structure of faculty members' social representation about the use of ICT in chemical engineering education (based on the central core theory)

| > 8.3% | < 1.9 $\quad$ MR = 1.9 $\quad$ > 1.9 | |
|---|---|---|
| MF = 8.3% | Class enrichment (16.7%, 1.78)<br><br>Quality of learning (15.6%, 1.45)<br><br>Technological artefacts (9.1%, 1.67) | Student attitude towards learning (15.6%, 2.2)<br><br>Efficiency (savings in time and resources) (9.1%, 2.0) |
| | Simplifying teacher's work (7.8%, 1.63)<br><br>Information/ Documentation (6.5%, 1.6) | Communication/ Contact (6.5%, 2.2)<br><br>Technical proficiency (5.2%, 2.75) |
| < 8.3% | Professional development (3.9%, 1.83) | |

As to the potential change zone, our case study revealed that the most salient element in this zone is the attitude of students towards ICT-enhanced learning, followed by the efficiency achieved when using these tools and their potential to simplify faculty's work, especially when preparing or updating material for large numbers of students.

We have also triangulated the findings based on social representations by interviewing faculty about what they perceive as the main advantages and constraints (for the student and for the teacher) of using ICT in teaching chemical engineering (table 3). Triangulation with the results of the social representations analysis reveals that the elements of the social representations identified in the previous section are reproduced in the benefits and advantages reported by the respondents. In particular, internal human factors such as the acceptability of ICT-enhanced learning by the students, innate resistance to change, lack of confidence in IT-skills of faculty or students are a source of concern for faculty. External factors such as the lack of technical support and training for faculty members and the unreliable quality of Internet services on campus are also perceived as constraints by the respondents. This latter preoccupation is based on equity considerations given that not all students have personal means to access the Internet, especially those who live in remote villages. The lack of educational resources in Arabic is also regarded as a potential barrier to the success of this mode of teaching, as fundamental education is delivered in the Arabic language in Algeria, whereas chemical engineering is taught in the French language in most Algerian universities. Hence, it appears from the collected data that chemical engineering faculty perceive the use of ICT in education as complementary to conventional face-to-face education and not as a necessity that might be dictated by didactical, pedagogical or employability considerations. In particular, faculty do not perceive the use of ICT as necessary for teaching core chemical engineering modules, which rely heavily on mathematical and problem solving skills. In their view, ICT would be more useful for discovery or transversal modules such as foreign languages, scientific communication or research methodology.

Table 3. Internal, external and discipline-related factors influencing faculty beliefs and attitudes about using ICT in teaching chemical engineering

| *Internal factors* | *External factors* | *Discipline-related factors* |
|---|---|---|
| Perceived acceptability of the technology by the students | Lack of technical support and training for faculty members | ICT is not adapted to teaching core chemical engineering skills |

| Perceived threat by technology to faculty professional identity | Unreliable quality of Internet services on campus | ICT enhanced learning is a support tool within conventional teaching methods |
|---|---|---|
| Lack of confidence in IT-skills of faculty or students | Equity considerations* | ICT enhanced learning is more adapted to transversal modules such as languages and IT skills |
| | Lack of educational resources in Arabic | |

* Not all students have personal means to access the Internet, especially those who live in remote villages.

## 3.1 This preliminary exploratory study can serve as a basis for extending the survey to a larger group of faculty and students and identifying possible best practices for streamlining the use of this method and testing its reproducibility. Comparative studies between countries, or different groups of learners using social representations theory would also be interesting for the same academic discipline, particularly to examine if misconceptions about science and engineering vary between different cultures or social groups. Another interesting perspective of this study would be to conduct longitudinal studies to examine how social representations of an educational technology evolve with time (ex. before and after Covid-19 pandemic) within the context of a specific academic discipline.

## 3.2 Discussion

### 3.2.1 Limitations of social representations studies

The main limitation of this study is the small sample size which limit the generalizability of these results. However, this study can constitute a preliminary step to a more extended study involving a larger number of faculty and students. Some authors have pointed out that interviewing methods may influence the obtained responses such that a theme can become part of the periphery instead of the central core (Dany et Apostolidis, 2007). In addition, as content identification is a fundamental preliminary step for all social representations studies, researchers using this method are faced with a compromise between reliability and feasibility. The content of the representational field of the object under study should be identified first through different materials (verbal, iconic, ...*etc*). This first step should then be completed by a structural diagnosis. The hierarchical evocation method used in this study partially circumvents this by combining the frequency and rank of the evoked themes in a single step. However, this method only addresses hypotheses of centrality because there are no standard criteria for the determination of rank and frequency thresholds to ensure centrality (Lo Monaco et al., 2016). This weakness was acknowledged by Abric (2003) who insisted that the centrality of an element should not be defined by its mere presence in the central core, but also by its significance within that representation . In this perspective, several centrality check methods were developed such as the attribute-challenge technique, the call-into-question technique and the Basic Cognitive Schemes (BSC) model (Cristea et al., 2020).

Another limitation pertains to the meaning attributed by the participants to the inductor phrase and to their word associations. In this study, a definition of what is meant by ICT was given to the participants, however, it would be more prudent to use specific terms to describe a single type of educational technology. With regards to the meaning given by the participants to their word associations, this can be clarified by follow-up explicitation interviews as was performed in this study. However, this method would be impractical for big samples. In addition, it is generally impractical to use raw frequencies of all words generated and a preliminary phase of thematic grouping is often necessary. This step consists of grouping terms that have similar meaning and it is a critical step because both morphological and semantic proximity of the terms are used depending on the context of the study. Although using morphological proximity poses fewer issues, resorting to semantic aspects can introduce a form of bias in data interpretation because it presupposes knowing what is the exact meaning given to the words and what is the meaning attributed to the relationship between the associated word and the inductor (Lo Monaco et al., 2016). To the best of our knowledge, there is no consensus on best practices to adopt in such cases.

### 3.2.2 Potential applications of social representations in educational technology research

Despite its practical methodological limitations, social representations theory offers a very useful framework for probing human aspects surrounding implementation of educational technologies in a specific academic context. As a qualitative method, it captures more nuances, is more sensitive to socio-cultural and discipline-specific

variations and is more adapted to exploring the meaning of learning and instruction and explaining their processes in different ethnographic, sociological and academic discipline contexts. Transposing conventional educational research methods on technology-enhanced learning and instruction might not be the best approach as these have mostly been based on psychological theories of development and cognition. Much less attention has been devoted to the explanation of human learning from a cultural, sociological or socio-psychological perspective, especially via informal and nonformal mechanisms such as social media. This is a serious knowledge gap as educational technologies offer great promise for individualized, informal, nonformal and life-long learning which takes place everywhere, sometimes without the learner's awareness (Chaib, 2015). This is in marked contrast to formal learning which is more controlled and organized as it takes place in conventional classroom settings.

Recently, the theory of social representations has been successfully applied to studying teachers' perceptions about inclusive education (Muñoz Oyarce, 2023), representations of "teachership" by the students and teachers and how it might affect learning (Martikainen, 2019), representations of teachers about "weak pupils" and its implications on learning performance (Frieberg, 2021). Generally, social representations theory has mostly been used in analysing collective beliefs of teachers and students about various objects such as teaching practices, educational policy, environmental education, professional training and identity, especially in Latin America where this theory is very popular (Cristea & Valenciac, 2016). However, studies using social representations theory in the context of a specific academic discipline are relatively sparse and have focussed mostly on disciplines where the taught subject might give rise to ambiguities or controversies in interpretation such as history (Páez et al., 2017). Arguably, social representations might have a stronger impact on learning subjects which are inherently subjective and socially-negociated such as history or literature than in the case of more "neutral" subjects such as STEM subjects. However, some studies have shown that even mathematics is not as "neutral" a subject as commonly perceived (Chaib, 2015). The language in which teaching is performed is also an important factor from the perspective of social representations as demonstrated by Castellotti & Moore (2002). By studying social representations of language and teaching, they concluded that shared beliefs within a social group or society about other people and their languages can have significant effects on the attitude towards those languages, and ultimately on learners' interests in the subjects taught in that language (Castellotti & Moore, 2002 cited by Chaibi, 2015). This might bear relevance to our study, where the French language, which is still perceived by some Algerians as the language of the former colonizer, is the instruction language of STEM disciplines in Algerian universities.

Another potential application concerns the remediation of learners misconceptions about science. These misconceptions can originate from society, the mass media or the Internet. Numerous studies have discussed the problem of prior misconceptions as barriers to the correct understanding of STEM subjects. This problem is aggravated by the fact that these misconceptions tend to be very resistant to conceptual change by teaching, as they are usually imbedded in a system of logic and justification that is deeply rooted in everyday experience (National Academies of Sciences, Engineering, and Medicine, 1997). Current theories of conceptual change have been criticized for not incorporating didactic analysis. This limitation can be addressed by the study of social representations within the framework of the academic discipline. By becoming part of the didactic analysis, social representations can offer a potent diagnostic tool which can help designing effective conceptual remediation strategies in teaching STEM subjects (Castorina, 2017).

# 4    Conclusions

From a knowledge acquisition and transformation perspective, social representations theory has proved useful in research problems requiring the exploration of cultural, social and psychological phenomena. However, its application to exploring learning and instruction processes remains limited despite its pertinence to understanding how knowledge is transformed to practice within collective professional or social contexts (Chaib, 2015). In this paper, we have attempted to explore the social representations of engineering faculty about using ICT to teach their academic discipline. These studies can be useful for examining the role of such representations in the transmission of knowledge to various groups of learners and may be extended to exploring how the social representations of the students about the taught discipline might influence their learning. The design of effective ICT-supported learning activities that are adapted to the socio-cultural and disciplinary contexts should therefore benefit from such studies. Social representations theory is inherently adapted to exploring the dynamic and collective processes of teaching and learning as it is primarily concerned with the process of knowledge acquisition and communication and the role of mass media in this process. As the knowledge acquired through formal instruction is constantly challenged by the knowledge acquired via the Internet and social media, as well as traditional socialization mechanisms, any successful attempt to design effective didactical tools has to factor in the significant interference of these media in the learning process. Hence, the development of social representations research is important for advancing human-centered education research and improving the quality of teaching and learning, especially when supported by technology.

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# Shaping the Future of Teacher Learning

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## Abstract

The presentation associated with this proceedings paper explored access to quality education during the recent pandemic when millions of children missed in-class instruction due to school closures. In particular, this paper offers a series of broad goals and specific objectives for teacher education to better prepare practitioners to facilitate online learning effectively. The authors provide past examples of distance education during school closures, and highlight the lack of preparedness exhibited by school systems prior to COVID-19 despite previous warnings from governments and education departments. They conclude by emphasizing the certainty that there will be future disruptions, and ponder whether schools will finally learn from these recent experiences and be better prepared to ensure continuous learning opportunities for students the next time.

**Keywords**: teacher education, teacher preparation, K-12 online learning, remote learning, virtual learning, emergency preparedness

## Introduction

The United Nations Sustainable Development Goal 4: Quality Education, included that "by 2030, ensure that all girls and boys complete free, equitable and quality primary and secondary education leading to relevant and Goal-4 effective learning outcomes" (United Nations, "Goal 4 targets"). We have recently seen that there can be obstacles to access to quality education, even in the most developed countries. During the COVID-19 outbreak, the United Nations estimates that "147 million children missed more than half of their in-class instruction over the past two years" (United Nations, para. 3) and "at the peak of the COVID-19 pandemic, 1.6 billion learners were affected by school closures across the globe" (UNESCO, 2021, p. v). COVID-19 disrupted schools world-wide, but there are also regional or local disruptions to schools; for example, due to natural disasters. Thus, there is an ongoing need to have education systems that can maintain continuity of instruction during disruptions of normal operations.

Recognizing that there are many elements required to maintain continuity of instruction (i.e. government policy, electronic infrastructure, etc.), the focus of this presentation is recommendations for teacher preparation to enable teachers to gain the skills and knowledge required to facilitate learning online. Bond et al. (2019) noted prior to the COVID-19 pandemic that preservice teachers often do not receive adequate preparation with technology. Lahr and Welch (2023) indicated that the preparation of pre-service and in-service teachers for teaching in K-12 online and blended environments is "nowhere near universal, and the curriculum of teacher preparation for online teaching [was] murky at best" (p. 162). In this proceedings paper the authors summarize recently published recommendations for teacher preparation for K-12 online and blended learning, and outline how past evidence from scholarly literature and popular media - as well as recommendations from government bodies - have previous failed to prompt teacher education to better prepare practitioner and schools in general to better plan for the provision of continuity of learning during prolonged school closures.

## Context

In early 2022, the Journal of Technology and Teacher Education issued a special call for papers titled "A 2025 Vision for Technology and Teacher Education." This call sought to shed light on the significant impact of the COVID-19 pandemic on teacher education, bringing to the forefront the challenges faced in online education, the

commendable strengths exhibited by teacher educators in adapting to a changing world with caring pedagogy, and the various opportunities for continued growth and development in the field.

Potential authors were invited to explore three key questions, with one question specifically focusing on the formulation of tangible and achievable goals for teacher education programs to address the issues that arose due to COVID-19 or other related events by the year 2025. As a response, we collaborated with Rick Ferdig to propose two achievable goals and six objectives to address these issues raised by the pandemic.

Over subsequent scholarly efforts, we have refined our recommendations to two goals and six objectives:

1. Scholars need funded efforts to develop promising practices and frameworks that teacher education programs can use and be evaluated against.
   a. Validated, research-based standards must be developed.
   b. Metrics and instruments must be created or refined to further assess and support growth of pre-service teachers knowledge, skills, and attitudes of teaching in K-12 online and blended learning.
2. Teacher education programs, specifically for online teaching, need to provide teachers with experience in designing, delivering, and facilitating instruction, as well as learning themselves online.
   a. There must be sufficient course work to give pre-service teachers access to knowledge,skills, and attitudes related to K-12 online and blended learning.
   b. Teacher candidates should have experiences as online learners.
   c. Teacher education programs must include field experiences in online and blended learning.
   d. Have accrediting bodies and state agencies require that all pre-service teachers have meaningful and useful preparation to deliver online and blended learning. (Barbour & Hodges, in press)

However, this situation begs the larger question of why there was a need for this special issue, and the specific suggestions that we offered in the first place?

## Distance Education and Pandemic Preparedness

Exploring this question is of significant importance as the existing literature on the use of distance education to ensure continuity of learning during school closures far surpasses the awareness of most teacher education faculty. There are numerous examples that can shed light on the effectiveness and challenges of distance education in these circumstances, offering valuable insights for teacher educators to enhance their practices and adapt to evolving needs. As teachers aim to navigate unprecedented situations like prolonged school closures, examining this literature becomes even more crucial in equipping them with evidence-based strategies and informed decision-making, ultimately benefiting both educators and students alike. Let us consider some examples in the literature.

There were the 2003 school closures in Asia and in countries with high levels of migration to and from Asia due to SARS (Alpert, 2011; Borja, 2003). Later, in 2008 there were additional school closures in countries such as Bolivia, Hong Kong, and Singapore due to H1N1 (Barbour, 2010; Barbour et al., 2011; Latchem & Jung, 2009). There have been school closures due to earthquakes (Baytiyeh, 2018; Mackey et al., 2012; Samson, 2020), as well as wildfires, flooding, hurricanes, polar vortexes, and other natural disasters (Jackson & Ahmed, 2020; Miller & Hui, 2022; Rush et al., 2016; Schwartz et al., 2020) - all of which are likely to be magnified in the future due to human-induced climate change. With regard to climatic conditions, distance learning has frequently emerged as a potential substitute for short-term school closures necessitated by adverse weather conditions (Ferdig, 2018; Gibson et al., 2008; Hawkins et al., 1996; Hua et al., 2017; Lamarre, 1999; Milman, 2014; Swetlik et al., 2015).

Further, individual students often miss school due to personal health issues (Black et al., 2022; Fernandez et al., 2016; Thompson et al., 2012). These published examples simply reference scholarship from the past 30 years! They do not include examples popular media authors have found of telephone being used during the Spanish flu of 1919 (McCracken, 2020), or correspondence education and educational radio being used during the polio

epidemic in New Zealand in 1948 (German, 2020). Given this history, some of which was quite recent, why were schools so unprepared?

## Warnings Without Action

However, it was not just the academic literature and popular media that raised concerns about the need for educators to prepare for prolonged school closures. The U.S. government also issued several warnings in this regard, well before the COVID-19 pandemic. The U.S. Department of Health and Human Services and the Centers for Disease Control and Prevention (CDC) (2006) released a document titled *Pandemic Flu: A Planning Guide for Educators*, which advised educators to create continuity of learning plans. Similarly, the U.S. Department of Education (2007) released the "Basic Components of Pandemic Planning" document, urging school leaders to plan for continuity of learning or instruction by considering alternate learning strategies and potential restructuring of the school calendar.

During the H1N1 pandemic, the CDC (2010) emphasized the need for schools to plan ahead for ways to continue educating students who stay home. They suggested using methods such as instructional telephone calls, homework packets, internet-based lessons, and other distance-based learning approaches. In collaboration, the U.S. Department of Education (2010a) provided more specific guidance to educators, including the use of hard copy packets and online learning. They also encouraged educators to address certain key questions in their plans.

1. How will affected parties communicate during individual or prolonged absences or during school-wide dismissals?
2. How will students understand and access available academic resources and other supports from home?
3. What equipment and other resources are available or need to be acquired to enable school and district learning continuity plans?
4. What additional training or experience is required to prepare all parties to respond appropriately when needed? (p. 2)

The Department of Education (2014) updated this guidance four years later. In fact, the National Center for Education Statistics (2020) reported that "data from the 2017–18 SSOCS [School Survey on Crime and Safety] show a strong majority of the nation's schools have a written plan for certain emergency scenarios, such as natural disasters, active shooters, and bomb threats, but fewer than half have a written plan for a pandemic disease" (para. 1), and that 46% of those surveyed had heeded the guidance from these warnings and did have written plans in the event of a pandemic. Given these warnings, and the fact that almost half of schools claimed to have listened, why were schools so unprepared?

The repeated guidance from federal agencies in the U.S. were not the only bodies that advised the need for educators to be prepared for the kind of transition to remote learning demanded by COVID-19. As early as the '2010 National Education Technology Plan,' the U.S. Department of Education (2010b) advised teacher education programs that:

> 3.5 Develop a teaching force skilled in online instruction.
>
> As online learning becomes an increasingly important part of our education system, we need to provide online and blended learning experiences that are more participatory and personalized and that embody best practices for engaging all students. This creates both the need and opportunity for educators who are skilled in instructional design and knowledgeable about emerging technologies. Crucial to filling this need while ensuring effective teaching are appropriate standards for online courses and teaching and a new way of approaching online teacher certification. (p. xix)

The '2017 National Education Technology Plan' included similar language (U.S. Department of Education (2017). Given these calls for teachers to be prepared to provide online instruction, why were educators so unprepared? There is some recent evidence that schools are working toward more preparedness as the pandemic wanes. For example, Peetz (2023) reported that according to a January 2023 report from the National Center for Education Statistics, approximately 82 percent of public schools had developed a pandemic disease plan.

Moreover, 93 percent of these schools expressed feeling "somewhat" or "very" prepared to manage a pandemic situation. It would be interesting to know how they have prepared, and more importantly if that level of preparation is better than the 46% of districts who said they had written plans back in 2017-18.

## Conclusions

The likelihood of mass school closures occurring again in the not-too-distant future remains uncertain but cannot be entirely ruled out as a possibility. The emergence of new infectious diseases or virus variants pose significant health risks to students, teachers, and the community at large, and there are non-disease events such as severe hurricanes, earthquakes, wildfires, flooding, or other natural disasters could lead to the closure of schools for safety reasons. Unforeseen events such as political unrest or acts of violence may also prompt the need for temporary school closures.Given these realities, what can be done to ensure that history doesn't repeat itself once again? The need for comprehensive teacher preparation to ensure continuous learning during disruptions in education has become evident. In this paper, we offer a series of broad goals and specific objectives for teacher education to prepare practitioners better to facilitate online learning effectively. The proposed goals emphasize the need for funded efforts to develop effective practices and frameworks that teacher education programs can utilize and evaluate. Additionally, we emphasize the importance of establishing validated, research-based standards to guide teacher preparation in K-12 online and blended learning. The six objectives outlined encompass various aspects of teacher education, including the creation and refinement of metrics and instruments to assess and support the growth of pre-service teachers' knowledge, skills, and attitudes in online and blended teaching. Furthermore, the recommendations call for comprehensive coursework that equips pre-service teachers with the necessary knowledge and attitudes related to K-12 online and blended learning. To enhance their readiness, teacher candidates should experience online learning firsthand and engage in field experiences specifically focused on online and blended learning contexts. A final goal is to have accrediting bodies and state agencies mandate meaningful and practical preparation in online and blended learning for all pre-service teachers, furthering the commitment of teacher education to preparing teachers to deliver quality education despite any potential disruptions.

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# Ways to use Artificial Intelligence in Education

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## Abstract

Artificial Intelligence in Education (AIED) is a new emerging field that uses artificial intelligence technologies in education. By using means that use artificial intelligence, the aim is not to replace teachers with a machine or robot in traditional classrooms, but to use advanced tools and technologies that help educational actors to respond to learning needs and provide personalized education. We are therefore talking about the support that artificial intelligence can bring to the learning process. The purpose of this paper is to present ways of using artificial intelligence in education in general, with a focus on STEM education. The goals of the article are to present resources and tools that use artificial intelligence that can be used in the classroom and to create a digital library. For this purpose, Internet research was conducted to create a library of educational resources in the form of a website, which can be accessed by teachers, students, or parents. AIED systems can have several advantages, such as the use of virtual laboratories, conducting experiments in the virtual environment, evaluation, administration of the educational process, planning of didactic activity, personalized learning. Among the disadvantages we can list: the lack of personalization, the potential for errors and the fear of job loss by teachers, errors in individualized learning needs or assessment. Errors in AI recommendations or faulty feedback can affect learning outcomes. Last but not least, students no longer practice their memory and creativity.

**Keywords**: Artificial Intelligence, education, AIED, STEM education, digital library, educational resources.

## Introduction

Artificial intelligence (AI) means how machines, using various software, can perform cognitive processes such as learning, understanding, and interacting. Artificial Intelligence is a field of computer science that deals with the creation of intelligent agents, which can be defined as systems that can reason, learn, and act autonomously. AI has the potential to revolutionize many fields of learning, including education. There are many ways to use AI in education, including using AI to help teachers teach more effectively, to create learning platforms that are more interactive and engaging, and to develop learning algorithms that are more effective at detecting and teaching skills. In addition, AI can be used to create personalized learning plans for students, to identify and prevent cheating, and to create more accurate historical records. Artificial intelligence has an important potential to transform society, bringing with its use a multitude of benefits, but also potential unknown risks for health, the harmonious development of the intellect, human rights, or the labor market. In the 2020s, AI tools began to be widely used in industry, market economy, services, such as industrial robots, autonomous transportation, predictive medicine, intelligent personal assistant, and education. By Artificial Intelligence we mean how machines, using various software programs, can perform cognitive processes such as learning, understanding and interaction.

Some of the AI tools that can be used in education are: adaptive learning systems; supporting learners with disabilities; supporting emotional well-being; learning foreign languages; automatic writing assessment; biometrics; chatbots; collaborative learning environments; dialogue-based guidance systems; e-proctoring; educational data mining; robotics; emotion and behavioral detection; exploratory learning environments; intelligent interactive learning environments; intelligent training systems; learning network orchestrators; learning analysis; personalized learning systems; plagiarism checking systems; intelligent curation of learning materials.

Learning with artificial intelligence involves the use of artificial intelligence-based tools in teaching and learning and includes: the use of artificial intelligence to directly support learners, involving tools known as intelligent instructional systems, dialog-based tutoring systems, exploratory learning environments, automatic writing assessment and chatbots; using artificial intelligence to support administrative systems (such as recruitment, calendaring and learning management); using artificial intelligence to support teachers directly (although, except for intelligent management of learning materials, there are few examples).

Another classification of the use of artificial intelligence in education is (COE, 2022): „learning with AI; using AI to learn about learning; learning about AI (AI literacy). Regarding the definition of the terms, we have: „Artificial intelligence and education (AI&ED): The various connections between AI and education that include what might be called "learning with AI", "learning about AI" and "preparing for AI". Learning with AI has also been called "artificial intelligence for education". (COE, 2019); Artificial intelligence in education (AIED): An academic field

of enquiry, established in the 1980s, that primarily research AI tools to support learning (i.e. learning with AI)”. (COE, 2022)

International institutions such as UNESCO and the Council of Europe are concerned with the ethical aspects regarding the use of artificial intelligence in society and implicitly in education.

So, UNESCO's recommendation regarding the use of AI considers both the advantages and the risks it implies in terms of human rights. The digital transformations introduced by AI must contribute to the achievement of sustainable development objectives, targeting aspects such as transparency, responsibility, confidentiality in terms of data governance, education, culture, work, health, economy. These refer to: data protection; banning social scoring and mass surveillance; help in the monitoring and evaluation process; protecting the environment (UNESCO, 2021)

AI ethics raises a variety of complex issues centered on data (consent and data privacy) and how that data is analyzed (transparency and trust), but not only. Investigating the ethics of AIED data and computations is necessary but not sufficient, as we speak about the application of AI techniques and processes in education. Thus, it must also consider the ethics of education, which has been the focus of debate and research for more than 2000 years. (Holmes W. et all, 2021) Pertinent issues that the ethics of AI in education must address include: the ethics of teacher expectations, resource allocations (including teacher expertise), gender and ethnic biases, the behavior of educational actors and discipline, the accuracy and validity of assessments, what constitutes useful knowledge, of teacher roles, of power relations between teachers and their students, and particular approaches to pedagogy. (COE, 2022)

Using AI to learn more about learners and their learning style is not strictly AI (which almost always means some kind of automation) but involves analyzing data like that used by "AI learning" tools and using similar analytical techniques. AI tools and available data are used to inform teachers about how students learn and also to provide students with self-reflection dashboards or to support educational practices. This field is known as learning analytics or educational data mining. Learning about AI involves increasing the AI knowledge and skills of learners of all ages (primary, secondary to tertiary) and their teachers, covering AI techniques (machine learning) and AI technologies (natural language processing), along with the statistics and coding on which it all depends (Miao & Holmes, 2021a). Preparing for AI involves making sure all learners are prepared for the potential impacts of AI on all our lives – helping them understand issues such as AI ethics, data bias, surveillance, and the potential impact on jobs. "AI learning" systems are currently being used in various educational environments/contexts such as: Adaptive Learning Systems; AI to support learners with disabilities; AI to support well-being; AI-enabled Language Learning; Automatic Writing Evaluation; Biometrics; Chatbots; Collaborative learning environments; Dialogue-based Tutoring Systems; Educational Data Mining; Embodied AI and Robotics; Emotion and behavioral detection; e-Proctoring; Exploratory Learning Environments; Intelligent interactive learning environments; Intelligent Tutoring Systems; Learning Network Orchestrators; Learning Analytics; Personalized Learning Systems; Plagiarism checking systems; Smart curation of learning materials; Speech to Text.

AI is growing rapidly in the field of education and is becoming a particularly lucrative global market due to its ability to transform many aspects of teaching-learning-assessment processes. Artificial intelligence can create immersive virtual learning environments, produce "smart content," reduce language barriers, bridge the gaps between learning and teaching, create specialized plans for each student, and more. Many innovative companies are creating AI tools to achieve these results.

## Methodology

The purpose of this paper is to present ways of using artificial intelligence in education in general, with a focus on STEM education.

The goals of the article are to present resources and tools that use artificial intelligence that can be used in the classroom and to create a digital library. For this purpose, Internet research was conducted to create a library of educational resources in the form of a website, which can be accessed by teachers, students, or parents. The platform used to create this site is Webnode.

## Results

We used the Webnode platform to create a library of AI tools that can be used in the educational field. The project page is https://ways-to-use-artificial-intelligence-in-education.cms.webnode.page/

This site is an AI library which offers access to quality resources. The site is under development and will be supplemented with other AI resources as they are found/appear.

**Mindclass** promotes the learning process with the help of artificial intelligence in the modern digital age. The platform brings together AI-powered eLearning, development, skills and interactive capabilities such as gamification and augmented reality into a personalized user experience.

AI Enhancer is a new advanced functionality of **LIVRESQ** that incorporates OpenAI GPT-4 artificial intelligence technology, enabling teachers and trainers to create unique and high-quality content for their e-learning courses and interactive lessons. Components recently launched in 2023 are AI Text Rephraser (15.06.2023) and AI Text Generator (15.06.2023).

**Paraphrasing Tool - QuillBot's** AI-powered paraphrasing tool helps students and professionals rewrite, edit, and change the tone of text to improve the clarity of the message being conveyed. QuillBot tools have specific uses, such as correcting grammar or paraphrasing sentences.

**Creative Fabrica** platform can revolutionize the learning experience and provide students and educators with more creativity, productivity, and innovation. With the two powerful AI tools - CF Spark Art and CF Spark Writer - students and teachers can create visually stunning images and write engaging texts with ease, unlocking a world of possibilities for education. The teacher can use the CF Spark Writer book idea generator to generate assignments for students such as essays or creative pieces. Students can also use CF Spark Writer's rewriting tool to ensure that there are no grammatical errors in essays, reports, or any other written assignments. The AI creates unique, eye-catching templates that the student can use to- and improve the project and make it more memorable.

The **Gradescope** AI tool can be used by both students and teachers. Students are allowed to self-assess. Gradescope relies on a combination of machine learning (ML) and AI to facilitate grading, which saves time and energy. Teachers can use Gradescope for assessment, or online assignments, as well as to prepare teaching projects in one place. Some of the main features of Gradescope are AI-assisted test generation and student grading. Grading is fast, flexible and detailed personalized feedback can be given. Gradescope supports assignments of variable length (problem sets and projects), as well as diverse assignments such as worksheets, quizzes, papers, and exams.

**Fetchy** is an AI-powered generative platform designed specifically for educators, enabling the simplification and efficiency of the multitude of tasks teachers face, including creating engaging lessons, generating newsletters, crafting professional emails, and more. Harnessing the power of artificial intelligence, Fetchy enables educators to improve their teaching methods, optimize time management, and make confident and informed decisions. Fetchy allows generating lesson plans, viewing a student's progress from multiple angles.

**Nuance's Dragon Speech Recognition** is a speech recognition software that can be used by both students and teachers. The Dragon Speech Recognition product can transcribe up to 160 words per minute, helping students with upper limb locomotion problems. The tool also supports verbal commands to navigate through documents, which is essential for students with special requirements. Dragon offers many more features, such as the ability to dictate lesson plans, schedules, worksheets, reading lists and more at a rate three times faster than typing. It does this while achieving 99% accuracy.

**Ivy Chatbot** is a set of AI tools for chatbots that were designed especially for the administrative part of educational institutions. They help with various administrative processes such as filling out forms, enrollment, tuition costs, deadlines, and more. A unique feature of Ivy is its ability to plan recruitment campaigns through the collected data. Among the main features of Ivy we list: live chat and SMS sending; Integrations for Facebook, ERP, CRM and SIS; becomes smarter over time as a result of interacting with users.

**Cognii** develops AI-based products for K-12 and higher education institutions. One of Cogni's main AI tools is its virtual learning assistant, which relies on conversational technology to help students form open-ended responses and improve critical thinking skills. The virtual assistant also provides one-on-one tutoring and personalized real-time feedback for each student. Key features: help students form open-ended responses; offers individual instruction and adaptive customization for each student. The Cognii Virtual Learning Assistant engages students in chatbot-style learning conversations, prompting them to construct responses, providing instant formative assessment, providing personalized hints and tips, and guiding them toward conceptual mastery.

**Knowji** is an audio-visual vocabulary app designed for language learners, using various methods and concepts to help students learn faster. The AI education tool tracks the progress of each word and can predict when users are likely to forget certain concepts. It achieves these skills by using a space repetition algorithm that allows students to learn better over time. Knowji keeps track of learning progress for each word and brings back vocabulary drills

for the student. Knowji ensures that every word learned by the learner is retained and stored in his long-term memory.

**Plaito** provides recommendations and suggestions to students to help them progress as they write, debate, and collaborate in exciting new ways. The tool gives students the benefits of one-on-one tutoring—deep understanding, confidence, clarity, and empowerment.

The platform offers functional services: allows screenshot with assignments., uploading live AI training courses with Plaito; lessons are tailored to help students learn individually, at the right level and pace; speaks 4 languages and is ready to learn more; helps students learn faster and remember better to work on tasks based on learning growth; makes language learning easier with game-like features, fun challenges and reminders from AI Robot Plaito.

**Querium** provides an AI platform that helps students develop critical STEM skills while preparing them for college and careers. The platform is based on personalized lessons and step-by-step support by a virtual AI tutor. For teachers, the Queirum AI analyzes student responses and the time it takes to complete tutoring lessons, which helps instructors gain insight into student learning habits and areas to help.

Some of the main advantages of using Queirum AI: personalized, small lessons; step-by-step guidance assistance; increases student engagement.

**Century Tech -** London-based Century Tech offers an AI platform that uses cognitive neuroscience and data analytics to build personalized learning plans for students and reduce the workload of instructors. The AI platform also tracks student progress while highlighting learning gaps and providing personalized study recommendations and feedback for each user. As for teachers, Century helps them find new teaching resources specific to the desired topic, thereby reducing the time required for monotonous tasks such as planning and grading.

In conclusion, Century accelerates learning and improves student engagement and reduces teacher workload. This improving CAT, SAT, GCSE scores and in international programs; provides educational resources for English, math, and science for primary, secondary, and high education; is a trusted tool in schools and colleges around the world: it combines science learning, AI and neuroscience. Century accelerates learning for students (improves engagement and understanding of knowledge), reduces the workload of teachers in terms of grading and creating educational resources, and improves teaching by allowing timely personalized interventions.

**Carnegie Learning** is a provider of educational technology and curriculum solutions based on artificial intelligence and machine learning for high school and college students. These platforms offer unique solutions for the fields of mathematics, literacy, or foreign languages.

Here are some of the main features of Carnegie Learning platforms: Mimic human tutors; offers a personalized learning experience for each student; allows data storage for student management; Carnegie Learning MATHia is currently the best learning platform; MATHstream is the only adaptive and interactive video streaming program for grades 6-12 where math teachers can deliver personalized instruction in an engaging, game-based environment.

**Midjourney** is an independent research laboratory that explores new mediums of thought and expands the imaginative powers of the human species. It can be used via web, phone or desktop applications and can generate images with Midjourney Bot on any Discord server.

Midjourney is a unique AI tool for its ability to generate detailed art from simple written directions. These prompts can be both long or short, providing great flexibility in creation. This text-to-art functionality is at the heart of what makes Midjourney so innovative and engaging.

**DALL·E** (the name is a pun between Salvador Dali and Pixar's WALL-E) is an image generator based on machine learning and specifically the GPT-3 algorithm. It's OpenAI artificial intelligence, it's a generative tool, meaning users can generate art from scratch using natural language.

**Stable Diffusion** is a deep learning model that uses artificial intelligence to generate images from descriptions. It is an open-source resource, being a free alternative to the more popular DALL-E 2 and Midjourney.

**ChatGPT** is a chatbot, which was launched on November 30, 2022, by OpenAI. A chatbot is a software application designed to mimic a human-like conversation based on user prompts.

ChatGPT can chat, generate readable text on demand, and produce images and videos based on what it has "learned" from a vast database of digital books, online writing, and other media. Its performances include tasks like providing answers to questions; completing a given text or a phrase; writing fiction and non-fiction content from prompts; producing humanlike chatbot responses; generating computer code; translating text from one language to another; performing calculations; summarizing a given text; classifying text into different categories; analyzing text sentiment; generating text that summarizes data in tables and spreadsheets; responding to user input

in a conversational manner. The robot can answer a wide range of questions by mimicking the speaking style of humans. (Margaret Rouse, ChatGPT, https://www.techopedia.com/definition/34933/chatgpt)

**Bing Chat -** the new Bing is developed by Microsoft as an alternative to Chat GPT. The new Bing provides reliable, up-to-date results and complete answers to the questions asked by the user, providing the citations and sources used.

With the new Bing built into the Microsoft Edge sidebar, you can ask complex questions, find comprehensive answers, get summary information, and more.

**Claude** is a state-of-the-art AI assistant based on Anthropic's research on assisted instruction through the chat interface. Claude is capable of a wide variety of conversational and word processing tasks while maintaining a high degree of reliability and predictability. Claude is Anthropic's rival on ChatGPT. Anthropic is an AI startup co-founded by former OpenAI employees. Both Claude and ChatGPT rely on reinforcement learning (RL) to train a preference model on their outputs, and the preferred generations are used for subsequent fine-tuning. Claude is available in two models: a powerful model (Claude-v1) that can handle sophisticated dialogs, creative content generation and detailed instructions; a faster and less expensive model (Claude Instant) that can handle regular dialogue, text parsing and summarizing, and document questioning and answering.

Claude can help in various situations, such as summarizing, research, creative and collaborative writing, questions and answers, coding, etc.

**Bard** is Google's experimental, conversational AI chat service. It is meant to work similarly to ChatGPT, with the biggest difference being that it will pull its information from the web. Bard can develop the imagination, increase productivity, and help in accomplishing goals. Bard can code, answer math problems, and help with writing needs. Even though Bard was a completely new concept, the AI chat service that was launched was powered by Google's Language Models for Dialog Applications (LaMDA), which was unveiled in 2021.

Google's Bard is based on the controversial LaMDA bot because developer engineer Blake Lemoine called it "Sentient". Before ChatGPT existed, LaMDA was for several months the most controversial AI chatbot in the world, able to produce human-sounding text. Some of the things that LaMDA can do are to respond to a series of user prompts in a conversational manner; generate text in a variety of formats and writing styles; translate text into over 100 different languages; to answer questions. LaMDA is constantly learning and improving as it interacts with more users and is exposed to more data.

Bard is currently available in over 180 countries and includes Japanese and Korean in addition to English (according to Google). However, and unlike ChatGPT, Google Bard does not understand French and is not accessible from Europe. The reason would be the General Data Protection Regulation (GDPR).

## Conclusions

The transformation of the computer into a way of communication, work, education, learning and training guide through a computerized environment, driven by the science of automatic data processing, mediates the widespread use of multimedia and artificial intelligence tools. Collaboration skills are essential in teaching practice, for improving the didactic act and the evolution of educational techniques that can be used in the classroom or in the online environment.

AIED systems can have several advantages, such as the use of virtual laboratories, conducting experiments in the virtual environment, evaluation, administration of the educational process, planning of didactic activity, personalized learning. AI has the potential to improve the online learning experience by: personalization of learning: AI-based systems can analyze learner data and tailor training content to meet their individual needs; interactive learning: AI-based chatbots and virtual assistants can provide an interactive learning experience by answering learners' questions and providing instant feedback; data analysis: AI-based systems can collect and analyze learner data, allowing trainers to identify areas where learners struggle and adjust training accordingly.

Among the disadvantages we can list: the lack of personalization, the potential for errors and the fear of job loss by teachers, errors in individualized learning needs or assessment. Errors in AI recommendations or faulty feedback can affect learning outcomes. Finally, students no longer practice their memory and creativity.

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# Tools for creating Open Educational Resources in STEM education

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## Abstract

In recent years, society is connecting to the virtual environment, experiencing a true digital revolution in all fields, including education. More and more digital platforms flood the educational market and provide teachers with interactive content creation tools, assessment tests as well as teacher-student, teacher-parent or teacher-parent communication interfaces, so that open educational materials become accessible to all. Teachers can develop or customize intelligent content according to school curricula. In Romania, through the national CRED project, a free digital library with open educational resources for primary and secondary education was created, which makes video content available to teachers and students. The purpose of this work is to present some platforms that provide 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 some tools, such as Learning Designer for didactic design, or such as Genially, Canva, Wordwall, Livresq, Mozabook, Mozaweb that can be used in the didactic process, both in the real environment and in the virtual environment and (2) to create a digital library with such means, as well as with Open Educational Resources that can be used to Physics, in pre-university education, and that can be accessed by teachers, students or parents. The use of Open Educational Resources could bring some benefits, such as: an engaging learning environment; interactive laboratories, experimental data processing, interactive assessment, addresses different learning styles; makes learning at your own pace possible. Using digital resources makes it easier to create personalized learning experiences for students. However, their excessive use can affect the quality of learning, the quality of communication between educational actors, the power of concentration, creativity, and empathy.

**Keywords**: Open Educational Resources, STEM education, virtual environment, digital resources, teacher, students.

## Introduction

STEM education focuses on all areas of learning, teaching and assessment in Science, Technology, Engineering and Mathematics. It attracts and promotes educational research and development in the field of science education. The COVID-19 pandemic has presented many challenges in the education sector, where education with STEM content has become particularly difficult, especially with the shift to hybrid or distance learning. We know that scientific education requires laboratory activity, respectively experimental activity, which is difficult to achieve in the virtual environment. In this context, many education providers have taken steps towards digital transformation and are implementing a range of remote teaching, learning and assessment approaches.

The use of open educational resources (OER) is an important objective of current educational policies at the national, European, and international level (National Education Law no. 1/2011; Communication from the European Commission to the European Parliament Opening up Education: Innovative teaching and learning for all through new Technologies and Open Educational Resources, 2013; Paris OER Declaration, UNESCO, 2012).

In Romania, the "CRED - Relevant curriculum, open education for all" project was implemented in the period 2017-2023 by the Ministry of National Education, in partnership with the Institute of Education Sciences/National Center for Policies and Evaluation in Education, 8 Houses of the Teaching Corps and three Inspectorates County Schools, with the aim of preventing early school leaving, through systemic measures of innovative and sustainable application of the new National Curriculum. (Andrei&all, 2018). One of the goals was to create open educational resources for secondary school students.

The existence of centralized OER offers, which are easily accessible, supports teachers and students in the educational endeavor both in the classroom, at home, or in activities such as e-learning, blended learning, etc. The Multimedia (MM) tools have an important impact for the teaching - learning process of Physic, and the teachers could be successfully integrated as activities in schoolwork, homework and in distance learning, respectively.

In this context, we thought of creating a digital library with platforms that facilitate the creation of OERs or contain OERs themselves for STEM subjects.

## Methodology

The purpose of this work is to present some platforms that provide 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 some tools, such as Learning Designer for didactic design, or such as Genially, Canva, Wordwall, Livresq, Mozabook, Mozaweb that can be used in the didactic process, both in the real environment and in the virtual environment and

(2) to create a digital library with such means, as well as with Open Educational Resources that can be used to Physics, in pre-university education, and that can be accessed by teachers, students or parents.

## Tools for creating Open Educational Resources in STEM education

Tools for creating Open Educational Resources in STEM education is an online library that provides resources to help educators create online courses, materials and tools that can be used in their classrooms. The library includes articles, tutorials, templates, and tools to help educators create effective online courses, materials and tools that can be used in their classrooms.

### *Learning Designer*

The Learning Designer 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.
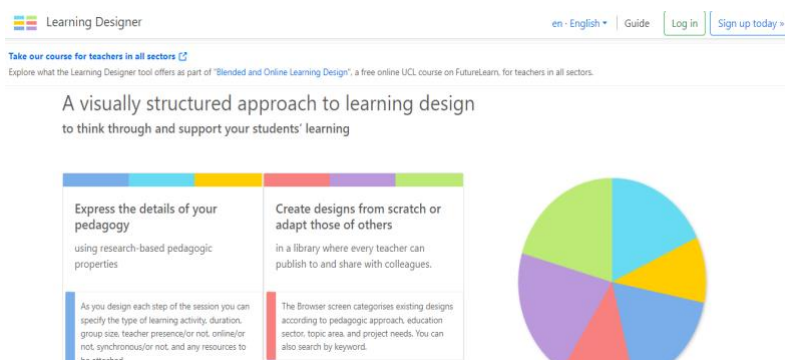


Figure 1

### *Genially*

Genially can be used to create interactive educational content, educational games, quizzes, interactive images, videos, presentations, infographics, concept maps, interactive assessments, amazing interactive lessons, amazing content. Teachers can access from a library, various interactive, animated templates, quick and easy to customize, designed by the professionals of the platform. (Figure 2)
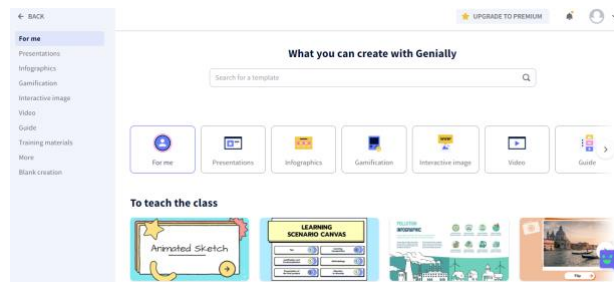
Figure 2

*Canva*

Teachers can create and personalize lesson plans, infographics, posters, videos, and more. 100% free for eligible schools.

Canva for Education integrates with core classroom tools, including Schoology, D2L, Moodle, Blackboard, Google Classroom, Canvas, and Microsoft Teams. Teachers create engaging assignments with Canva share and review student assignments from LMS. Canva has thousands of free, high-quality templates on any topic or subject imaginable to help students improve their studies. (Figure 4)
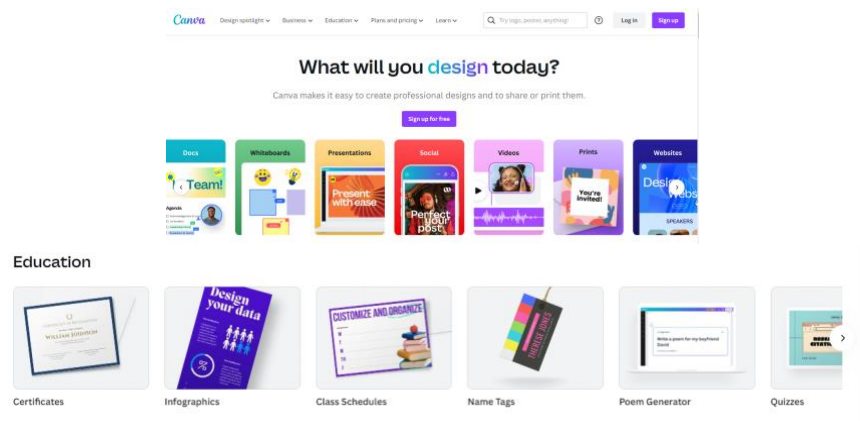


Figure 3

*Livresq*

Livresq is a Romanian software company that provides users with professional online tools to create, publish and track the progress of e-Learning courses and interactive lessons. LIVRESQ is a SaaS (Software as a Service) platform that allows all educational content creators to create e-Learning courses and interactive lessons that comply with international standards. The platform editor is used by companies, educational institutions, ministries of education and NGOs. Because it has an easy-to-use interface, it is a popular tool among teachers. This e-Learning editor is intended for the development of digital educational materials, and began to be developed in 2017, through non-refundable funding from European funds. LIVRESQ represents a continuation of the development process of previous Ascendia projects.

Livresq can be used by teachers to create eLearning Courses, Online & Offline Lessons, Digital Textbooks, or Interactive Materials. Livresq makes it possible to create interactive lessons that do not require in-depth IT knowledge. These lessons allow any teacher to bring to the attention of students interesting, interactive materials that are consistent with his personality and the group of students he is addressing and can be updated at any time.

*Mozaik Education*

Mozaik Education is used worldwide in schools and uses artificial intelligence systems. It has developed innovative digital education solutions for teachers and students, as well as facilitating school management. On the mozaWeb platform, you can find a suite of educational applications and tools, usable both on the tablet and on the phone, such as Mozabook; mozaMap; mozaLog; Euclid; Euler3D, Matek, Fizika, LabCamera, which provide the opportunity to learn through play. The products made available to schools, teachers, and students are against cost, at modest prices.
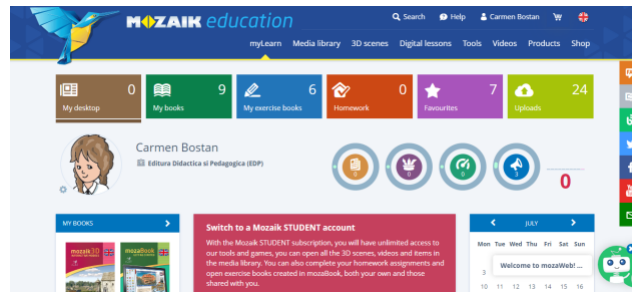
Figure 4

MozaBook is an application created by Mozaik education, with the help of which a textbook can be customized, or a lesson can be adapted to the needs of the class of students. The teacher can share the created content with his students, give them homework and see in real time if they have solved the homework correctly.

The MozaBook menu offers facilities to create new notebooks, import/export or add books, open books, or notebooks, share or print a material, draw with the pen, access the media library, images, videos, 3D animations or interactive lessons. The 3D animations are spectacular, the student can move the image in any direction or search for related content. The animation allows the creation of a personalized test.

MozaWeb is a platform developed by Mozaik Education, which can change the way teachers and students can collaborate both in the classroom and in the virtual environment.

The platform is a friendly, simple, effective, and relevant tool. Teachers can adapt the content of the lesson, customize it to their own class, use various functions such as blackboard, interactive tests, online presentations, 3D video, homework. In his account (Figure 4), the teacher has teaching materials created by him, interactive tests, digital lessons provided by the platform, kits for mechanics (with games in a realistic environment for observing movements and forces.), optical kit (students can observe and examine refractions with optical lenses, mirrors, and rays) and electro-kit (students can create simple circuits and measurements using devices with variable parameters.).

*Wordwall*

Wordwall allows you to create personalized assessments, just like a game. Here it can create quizzes, matches, crosswords, flip tiles, the wheel of fortune, puzzles, and many others. (Figure 5)
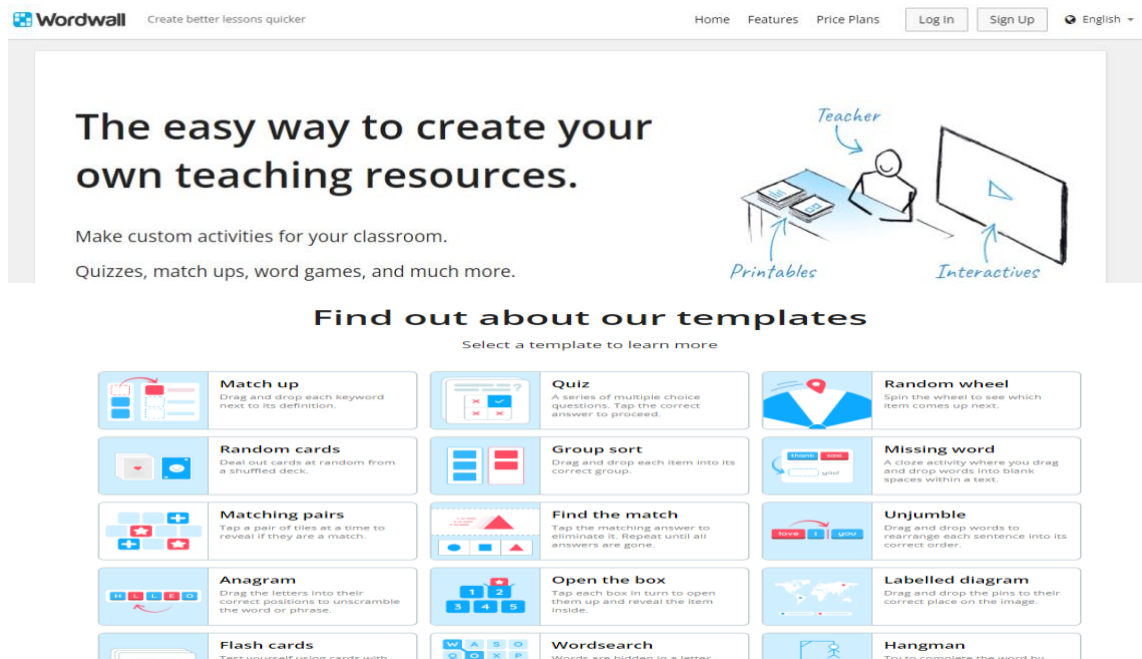


Figure 5

## Results. Digital library with Open Educational Resources that can be used to Physics

We used the Webnode platform to create a library of OER that can be used for Physics. The project page is https://tools-for-creating-open-educational-resources-in-stem-education.cms.webnode.page/portfolio/ .



Figure 6 Tools for creating OER in STEM education

This site is an OER library which offers access to quality resources. Teachers and students can access the tools they need to succeed in STEM fields. Our library of Open Educational Resources includes links to platforms that allow the creation/customization of educational content, respectively for the creation of interactive content, platforms dedicated to teachers for help in didactic design, tips for their use, videos, articles, problem sets and much more, all of which can be used to supplement classroom instruction. Apart from the previously presented platforms, useful in the creation of OER by the teacher, the site also presents platforms with open educational resources, specific to STEM, such as PhET (https://phet.colorado.edu/), Physics at school (https://www.vascak.cz/physicsanimations.php/), The Physics Classroom (https://www.physicsclassroom.com ), Physics Games (https://www.physicsgames.net/), Apps on Physics (https: /www.walter-fendt.de/html5/phen/), Annenberg Learner (https://www.learner.org/), Physics Simulations (https://www.myphysicslab.com/), Yenka (https://yenka.com/), e-Learning in education (https://e-learningise.weebly.com/), Physion. Interactive Physics Simulations (https://physion.net/), TryEngineering (https://tryengineering.org/), Labster (https://www.labster.com/), IOP (https://spark.iop. org/classroom-physics), Virtual Resources (https://sites.google.com/liceulnational.ro/resurse-digitale-ltn/%C8%99tiin%C8%9Be), OER CRED (https://digital.educred.ro/), JavaLab (https://javalab.org/en/), PraxilLabs (https://praxilabs.com/ ), oPhysics: Interactive Physics Simulations (https://ophysics.com/), Khan Academy (https://www.khanacademy.org/). The library has dynamic content, and it is constantly updated.

Regarding tools for creating Open Educational Resources in STEM education, we believe in empowering educators with the tools they need to create quality resources for their students. Our library of Open Educational Resources (OERs) offers educators access to resources covering a wide range of topics in physics and math, making it easy to find the information and materials they need to support learning.

## Conclusions

The use of Open Educational Resources could bring some benefits, such as: an engaging learning environment; interactive laboratories, experimental data processing, interactive assessment, addresses different learning styles; makes learning at your own pace possible. Using digital resources makes it easier to create personalized learning experiences for students.

However, their excessive use can affect the quality of learning, the quality of communication between educational actors, the power of concentration, creativity, and empathy.

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# Optics Applets for a Virtual Physics Lab

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## Abstract

Virtual labs are a very valuable resource not only in distance learning but also in traditional face-to-face education when time and/or resources are scarce. In this latter case they can be used either as a substitute for traditional laboratories or as and aid to them, allowing students to have longer lab time so that they can get ready in advance for the physical lab session or, after this session, to consolidate and expand the knowledge acquired. Virtual labs are difficult to implement if a high degree of realism is needed. This is the case for a general physics lab and, especially, for an optics lab. There are many optics applets that help students to understand, for instance, paraxial optics by using ray tracing. They are useful but cannot be used for a virtual lab. They have nothing to do with the real experience. Our aim is to develop applets that mimic a real lab as close as possible so that the same lab manuals used in the physical lab can be used with the applets. in this case, we present two different applets. The first one simulates the image of an object created on a screen by a converging lens. The height of the object can be changed, as well as the distance between the object and the screen, and the position of the lens. This applet can be used to determine the focal length of a lens using Bessel's method. We have used Wolfram Language because it is a very high-level language (that includes commands for image blurring) and allows to easily create intuitive and visually appealing interactive tools that can be run on a variety of devices such as computers, tablets, and smartphones. The applet is available in both Spanish and English. This applet can be used as a stand-alone experiment within a virtual laboratory (if you do not have access to a real laboratory, e.g., in distance learning) or as a tool to be used after a physical lab session to complement the knowledge acquired in the laboratory. in the latter case, teachers can change the power of the lens to provide students with different conditions than those experienced in the laboratory. The second one has been developed with the same tool and is devoted to study the diffraction pattern created on a screen when laser light passes through a grating. It allows choosing among 50 gratings with different number of lines per millimeter (unknown to the student) and changing the distance from the grating to the screen. It also includes a feature impossible to have in a real lab: The wavelength of the laser light can be selected in 1 nm steps throughout the visible spectrum. The student can see the image of the diffraction pattern on a screen that includes a scale for measuring distances and can calculate the number of lines per millimeter of the grating.

**Keywords**: Virtual lab, applet, optics, physics, Bessel's method, diffraction

## Introduction

Laboratory experiments (hands-on, simulated or remote) play a critical role in scientific education (Ma & Nickerson, 2006). Laboratory activities enhance student's interest in the subject they are learning. Virtual laboratories (V-labs) provide new opportunities for learning (Jones, 2018) since they present several advantages over traditional labs, namely, permanent access, flexibility to learn at the student's own pace as well as the possibility of retrying experiments without wasting resources and in a safe environment (Alkhaldi, Pranata, & Athauda, 2016). The potential of V-labs for undergraduate science and engineering students has been established in several studies (for a recent review see Reeves & Crippen, 2020).

Taking all this into account, our proposal intends to exploit the advantages of a V-lab for the specific case of an Optics laboratory.

## Methodology

In order to write these applets, we have used Mathematica (Wolfram, 2023a) as a programming language because of three reasons:

- It is very easy to incorporate sophisticated calculations using its powerful built-in functions.
- Creating real-time interactive applets is simple.
- There is a free Wolfram Player (Wolfram 2023b) app available for Windows, Linux, MacOS and iOS so that the applets can be run on many different devices.

## Results

We present in this section the applets written. Both applets are available in English and in Spanish. In some cases, the figures correspond to the English version while in others the Spamish applet is shown.

### Bessel's method applet

When a convergent thin lens is located between an object and a screen so that the real image of the object is formed on the screen, it is a well-known fact that within the paraxial ray approximation holds the so-called thin lens equation:

$$\frac{1}{s} + \frac{1}{s'} = \frac{1}{f'}$$

where:

$s$ is the distance from the object to the lens,

$s'$ is the distance from the screen to the lens, and

$f'$ is the focal length of the lens,

and the lateral magnification is given by

$$\beta' = \frac{y'}{y} = -\frac{s'}{s}$$

where:

$y'$ is the height of the image formed on the screen and

$y$ is the height of the object.

Taking advantage of these formulae, Friedrich Wilhelm Bessel created a clever method to determine the focal length of a lens. Let's consider (see Fig. 1) an object Y and a screen P separated by a distance $D$. If $D$ is large enough and we place a thin convergent lens in between there are only two positions (named A and B in the figure) for the lens so that the image of the object is clearly seen on the screen. These two positions are a distance $d$ apart.
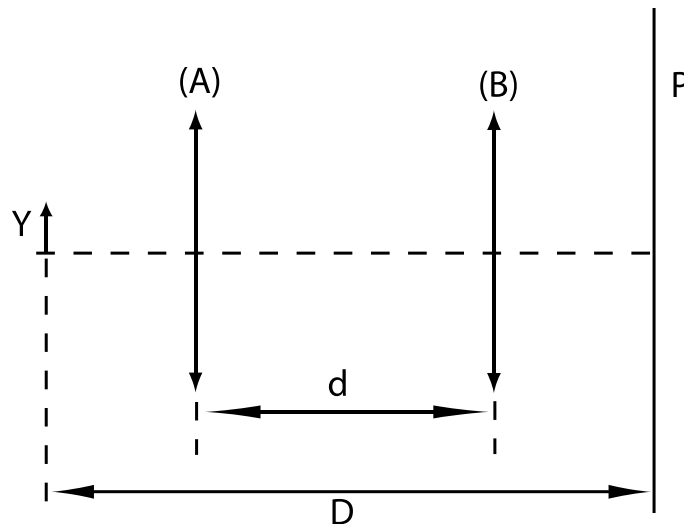


Figure 1. Bessel's method.

Bessel proved that the following simple relation holds:

$$f' = \frac{D^2 - d^2}{4D}$$

For this method to work, $D$ has to be large enough so that $d \geq 0$. This means $D \geq 4 f'$. Therefore, we have three different possibilities:

- If $D > 4 f'$, there are two different positions of the lens creating a clear image on the screen and the method is reliable.
- If $D = 4 f'$, there is only one position of the lens creating a clear image on the screen and the method is unreliable.
- If $D < 4 f'$, there is no position of the lens creating a clear image on the screen and the method cannot be applied.

The applet is shown in Fig.2. It contains two independent interactive animations: one for the optical bench setup and another for the image formed on the screen. The reason for not integrating both animations in a single one is avoiding the need of demanding computational resources that made the applet very slow on some devices.
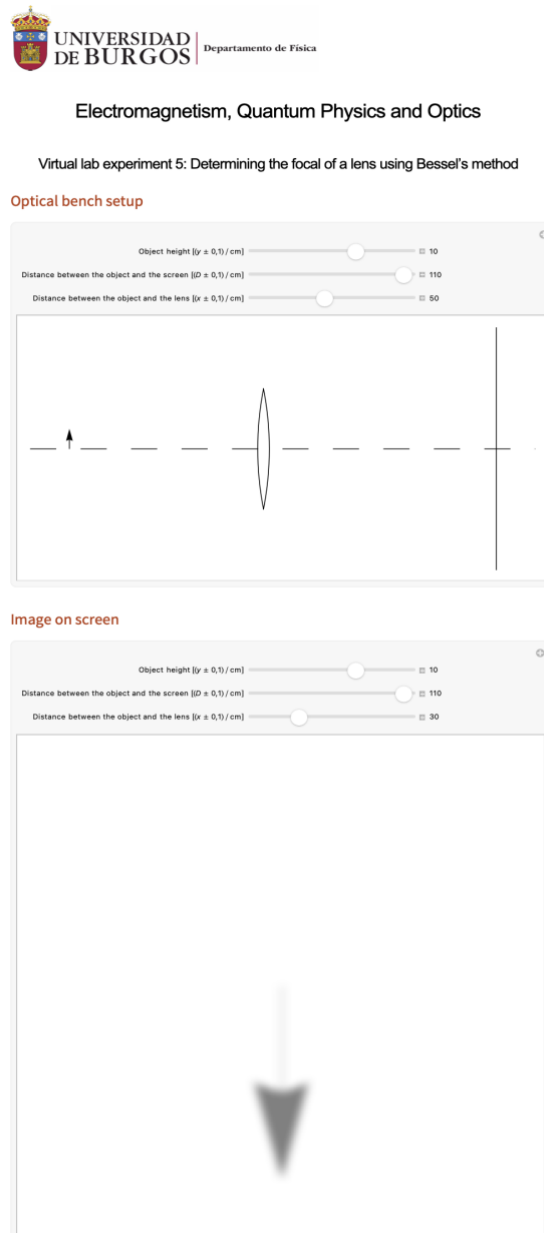


Figure 2. Bessel's applet view.

We present in Fig. 3 the case corresponding to $D > 4 f'$. There are two different positions for the lens to create a focused image on the screen. Both of these images are inverted with respect to the object and one of them is smaller

than the object while the other is bigger. The upper panel of the figure shows the first position of the lens for which a clear image is formed on the screen. The lower panel of the figure depicts the second position of the lens for which a clear image is formed on the screen. The middle panel corresponds to an intermediate position of the lens that leads to a blurred imaged on the screen.
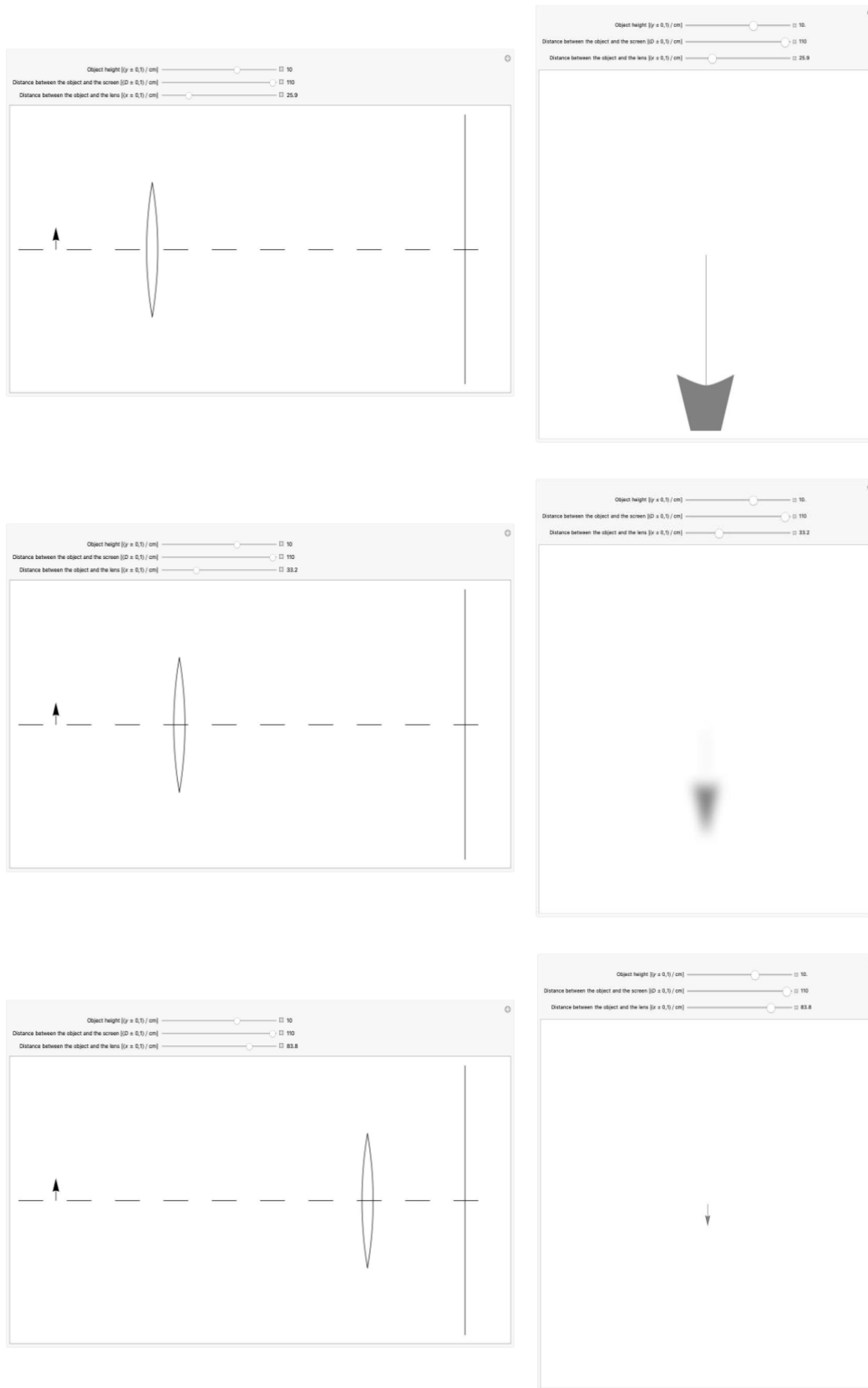


Figure 3. Bessel's method for $D > 4 f$'.

In this case it is straightforward to apply Bessel's formula to calculate the focal distance of the lens since *d* equals the difference between the two positions forming focused images.

**Diffraction applet**

We present in Figs. 5 and 6 two different possibilities for the diffraction applet. In the first case, we have selected grating no. 15 among the 50 available and chosen red light. In the second case, blue light passes through grating no. 5.

The student can determine the number of lines per millimeter of the gratings by measuring the positions of the intensity maxima using the scale provided at the top of the diffraction pattern.
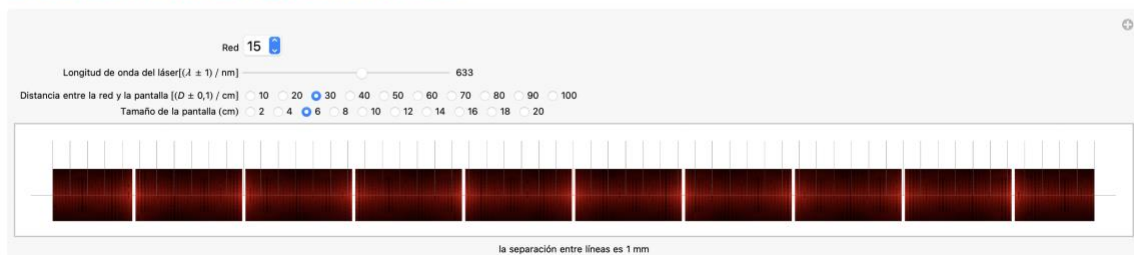


Figure 4. Diffraction applet for red light passing through grating no. 15.
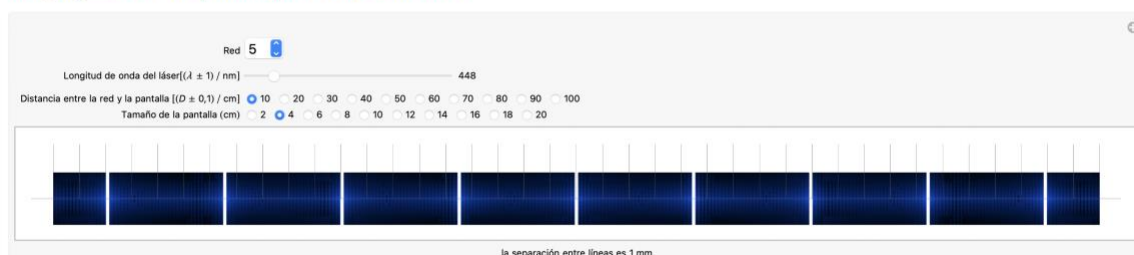


Figure 5. Diffraction applet for blue light passing through grating no. 5.

## Conclusions

We have written interactive applets simulating the formation of the image of an object created by a converging lens on a screen and the diffraction pattern created by a grating. In the first case, the student can change the height of the object as well as the object-screen distance and the position of the lens. In the second case, he or she can choose among 50 gratings with different number of lines per millimeter (unknown to the student) and change the distance from the grating to the screen, as well as the wavelength of the laser light in 1 nm steps throughout the visible spectrum. The student can see the image of the diffraction pattern on a screen that includes a scale for measuring distances and can calculate the number of lines per millimeter of the grating. The applets are so realistic that it is not necessary to write new lab guides; the same ones used for the laboratory are valid for the applets.

The applets can be used as stand-alone virtual lab experiments if no access to a real Optics laboratory is available (for instance in distance learning) or as a tool to use after a real hands-on lab experience to complement the knowledge acquired during the lab session (Dominguez et al., 2018). This repetition of the hands-on experience with the virtual tool allows the students to extend their lab time. This kind of blended-laboratory strengthens science learning (de Jong, Linn, & Zacharia, 2013) and has been proved to outperform physical-only or virtual-only Optics laboratories (Olympiou and Zacharia, 2012).

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# Alokh Vision: A Deep learning based Automatic Drone Detection Approach for Cross Border Surveillance

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## Abstract

Alokh Vision is an advanced drone detection system that offers seamless integration with Firebase Storage, allowing for secure storage of detected drone screenshots along with date and time information. The React Native app and ReactJS website provide a convenient interface for users to access and review the stored screenshots, aiding in real-time detection and response to potential security threats. Object Detection with Firebase Storage integration is a powerful solution for organizations looking to enhance their surveillance and security measures with cutting-edge machine learning capabilities

**Keywords**: YOLO, Machine Learning, Deep Learning, CNN, Security

## Introduction

According to a report by ANI, 311 occurrences of drone sightings along the Pakistani border were reported in 2022, a threefold rise from the previous year [1]. This emphasises the critical requirement for efficient countermeasures to identify and eliminate these threats. The demand for answers has led to the implementation of Computer Vision technology in India, which can detect and track drones using image processing techniques and algorithms, in order to improve border security.

Computer Vision technology can detect and track drones in real-time by analysing their visual properties such as shape, size, and patterns, providing crucial information to security agencies. Alokh Vision can locate drones and notify ground staff in real-time through email, providing the exact date, time, and screenshot of the drone's movement. This technology enables security agencies to respond quickly and effectively to any unauthorised drone activity along the border with Pakistan

## Methodology

Flow Process: Our entire process can be summarized into 5 sub-processes as shown in Fig 1. The following points will be the order explaining everything respectively:
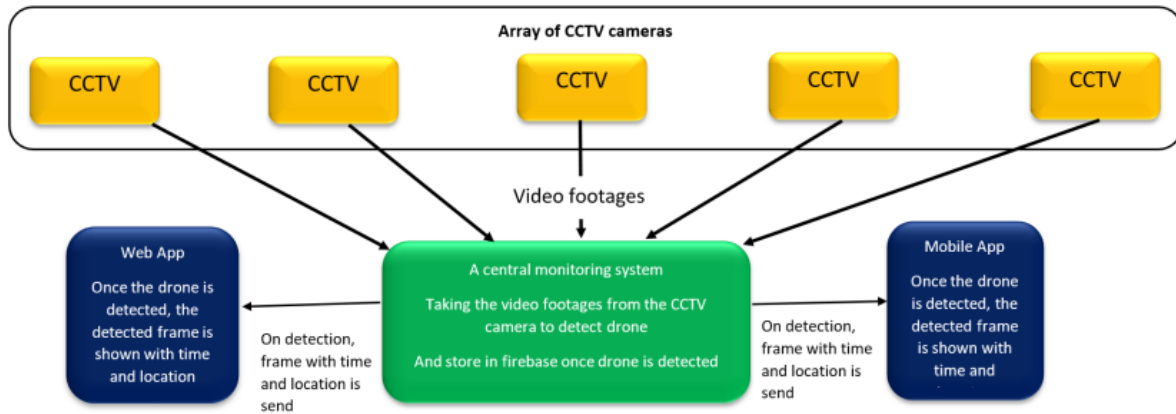
Fig !:Work flow diagram of Alokh Vision for Drone detections and surveillance

1.Alokh Vision is a security solution that seamlessly integrates with Firebase Storage, a cloud-based storage service. It is compatible with various camera types, including CCTV cameras, security cameras, and drones with built-in cameras.

2.When Alokh Vision detects a drone, it automatically captures a screenshot of the camera feed, including the date and time information. The screenshot is securely uploaded to Firebase Storage, which offers robust security measures, such as data encryption and authentication.

3.The stored screenshots can be easily accessed through a user-friendly React Native app and a web-based ReactJS website. The app and website provide a seamless interface for users to view the captured screenshots, along with the associated date and time information.

4.The React Native app and ReactJS website can be customized to suit the specific requirements of the user or organization. Users can search and filter the screenshots based on date and time information, making it convenient to access the relevant data.

5.The ability to quickly review and analyze the captured screenshots can aid in identifying potential security threats and taking appropriate action in real-time. Alokh Vision is a versatile solution for a variety of use cases, including airports, critical infrastructure, events, and public spaces.

## Results

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### Customizations and Analysis

Alokh Vision is trained on the dataset of drones with other flying objects such as helicopter, bird, aeroplane [6] to minimize the frequency of false alarm. Dataset also consist the IR CCTV footages. This not only help us to detect drones in daylight but also in night with the help of infrared CCTV cameras. Dataset are present in video format, for training the object detection model, these video footages are converted in separate frames and then these frames are annotated for custom training

### Configuration Changes:

1) Adjust the batch size to 64 in the YOLOv4 config file to enable efficient training by allowing greater parallelism during GPU computations. This reduces training time and memory usage during training.

2) Set the subdivision value to 16, which is the number of images processed in a batch during training. This value can be adjusted depending on the size of the dataset and available GPU memory.

3) For training a YOLOv4 model with three classes, set max_batches to at least 6000 or classes*2000, ensuring sufficient training iterations for each class to learn the necessary features to accurately detect objects in images. 4) Adjust the steps parameter to 80% and 90% of max_batches to adjust the learning rate at key points during the training process, allowing the model to learn quickly in the beginning and prevent overfitting later on.

5) Set the network size to a multiple of 32, such as 416x416 or 608x608, to ensure that the final feature map has the same aspect ratio as the input image.

6) Change the number of filters in the last convolutional layer before each YOLO layer to (classes + 5) x 3, which adjusts the network to detect objects in a specific number of classes. The number of filters corresponds to the number of channels or feature maps produced by that layer, and each channel is responsible for detecting a specific type of feature in the input image.

**Output Analysis:**

As shown in Fig 2 there is a steady loss in box and steady precision showing the effectiveness of the model. Even the model is more precise than the model trained [7] with same dataset in YOLOv2



Fig 2:Graph showing the box losses and precision on the given dataset

Table 1. Comparison between trained model and model trained in YOLOv2[7]

|  | Precision | Recall |
| --- | --- | --- |
| YOLOv2 | 0.76 | 0.72 |

| YOLOv4 | 0.77 | 0.80 |
|---|---|---|

**Implementation of Alert System:**

ReactJS and React Native were selected to develop the website and app for displaying monitoring alerts. ReactJS is a JavaScript library used for building dynamic user interfaces for web applications, while React Native is a framework used for building native mobile applications using JavaScript and React principles. They were chosen because they have a large and active community of developers, resulting in the availability of numerous libraries, components, and tools that enhance the development process. Additionally, ReactJS and React Native are highly efficient, performant, flexible, and scalable, making them suitable for a wide range of applications.

The monitoring alerts are displayed on the website and app, and the screenshots of the detected drones are sent to a Firebase server. Firebase is a mobile and web application development platform developed by Google. It provides various features such as real-time database, cloud storage, and hosting, making it easier for developers to build and scale their applications. The screenshots of the detected drones are stored in the cloud storage provided by Firebase, and the website and app fetch them from the storage to display them to the users.

Using Firebase for storing and retrieving the screenshots has several advantages. Firstly, it provides real-time updates, meaning any new screenshot that is added to the storage is immediately available to the website and app. Secondly, it provides fast and reliable performance, as the screenshots are stored in the cloud, reducing the load on the website and app servers. Thirdly, it provides secure storage, as Firebase offers various security features such as user authentication and access control. Lastly, it provides scalable storage, as it can handle large amounts of data, making it suitable for applications that generate large amounts of data.

## Conclusions

The increasing use of drones in various industries has raised concerns for security and safety. Unauthorized drone activity can cause harm and disruption to people, property, and critical infrastructure. Therefore, an efficient and effective drone detection system is urgently needed to prevent such incidents. We have developed Alokh Vision, a customized drone detection system that uses object detection algorithms to detect drones and send real-time alerts to security personnel. Our system is highly accurate and efficient in detecting drones, allowing security personnel to respond promptly to potential threats. To ensure the effectiveness of our system, we have installed high-quality CCTV cameras in strategic locations. Our customized approach allows us to filter out false positives, reducing the burden on security personnel. The effectiveness of our system depends on the quality of the input footage and the reliability of the alert system. With proper implementation and maintenance, our system can be scaled to cover larger areas and higher volumes of drone activity. In conclusion, Alokh Vision provides an efficient and effective solution to address the growing threat of unauthorized drone activities. By ensuring prompt detection and response, we can help enhance security and safety in various industries and sectors.

## Acknowledgements

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# Pandemi (Covid-19) Sürecinde Verilen Uzaktan Eğitimin Öğrencilerin ve Ailelerinin İnternet Kullanımlarına Etkisi Üzerine Bir Derleme Çalışması

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## Özet

Covid 19 pandemisi sürecinde verilen uzaktan eğitim internet kullanımını artırmış, öğrencilerde ve ailelerinde birtakım sıkıntılar doğurmuştur. Bu sebeple çalışmada pandemi döneminde uzaktan eğitimi ve internet kullanımını inceleyen çalışmaları derleyerek pandemi sürecinin öğrencilerde ve ailelerde yarattığı sorunları okuyucuya sunmak amaçlanmıştır. Bu sebeple derleme türünde bir araştırma modeli kullanılmıştır. Covid 19 pandemisinde uzaktan eğitimi ve internet kullanımını inceleyen, öğrenciler ve aileler üzerindeki etkisine bakan çalışmalar yurtdışındaki ve Türkiye'deki veri tabanları kullanılarak incelenmiştir. Araştırmalar EBSCO, ProQuest Central, ResearchGate, Web of Science, Google Akademik veri tabanları kullanılarak taranmış ve 2020 yılı ve sonrasında bu konuda yapılan 10 araştırma makalesinin sonuçları özetlenmiştir. Çalışmalar sonucunda pandemi sürecinde uzaktan eğitiminle ilgili sorunlar yaşandığı, internet kullanımının ve bağımlılığının arttığı, öğrencilerin ve ailelerin bu süreçten daha çok olumsuz etkilendiği görülmüştür. Derlenen çalışmalardan yola çıkarak okuyuculara öneriler sunulmuştur.

**Anahtar kelimeler**: Pandemi, uzaktan eğitim, internet, öğrenci, aile

# A Review Study on the Effect of Distance Education Provided During the Pandemic (Covid-19) on the Internet Usage of Students and Their Families

## Abstract

The distance education provided during the Covid 19 pandemic increased the use of the internet and caused some problems for students and their families. For this reason, the aim of this study was to compile studies examining distance education and internet use during the pandemic period and to present the problems created by the pandemic process in students and families to the reader. For this reason, a review type research model was used. The studies examining distance education and internet use during the Covid 19 pandemic and its impact on students and families were examined using databases in Turkey and abroad. The studies were scanned using EBSCO, ProQuest Central, ResearchGate, Web of Science, Google Scholar databases and the results of 10 research articles on this subject in 2020 and after were summarized. As a result of the studies, it was seen that there were problems with distance education during the pandemic process, internet use and addiction increased, and students and families were more negatively affected by this process. Based on the compiled studies, recommendations are presented to the readers

**Keywords**: Pandemic, distance learning, internet, student, family

## Giriş

İlk olarak Çin'de 2020 yılının başında ortaya çıkan koronavirüs hızla tüm dünyaya yayılarak küresel salgın haline gelmiştir (Sarı, 2020). Türkiye'yi ve tüm dünyayı etkileyen Covid-19 pandemisinden eğitim sistemi de etkilenmiş ve bu durum okullarla üniversitelerin kapanmasına sebebiyet vermiştir (Wikipedia, 2020). Okulların kapanmasıyla birlikte ülkeler eğitim sistemini ayakta tutabilmek adına çeşitli çözümler düşünmüş ve bu süreçte eğitimin kesintiye uğramadan devam edebilmesine öncelik vermişlerdir. Bu durumda da Türkiye dahil tüm dünya için en kolay ve uygulanabilir çözüm olan uzaktan /çevrimiçi eğitim tercih edilmeye başlanmıştır (Can, 2020). Türkiye'de ilk olarak okullar 16 Mart 2020 tarihinden 30 Nisan 2020'ye kadar tatil edilmiş, daha sonra tatil süresi 31 Mayıs 2020'ye ertelenmiş, son olarak da okulların eylülün başına kadar açılmayacağı kararı alınmıştır. Bu süreçte ilköğretim ve ortaöğretimdeki öğrencilerin üç televizyon kanalı ve EBA (Eğitim Bilişim Ağı) üzerinden uzaktan eğitimlerinin sürmesi kararlaştırılmıştır (MEB, 2020). Ayrıca bu süreçte öğrencilere sanal sınıflarda ders anlatılmış ve sanal ortamlardan ödevler paylaşılmıştır (Çakır ve Balcı Çelik, 2020).

Uzaktan eğitim, öğreten ile öğrenenin farklı mekanlarda olduğu, yer, zaman ve mekan bakımından esneklik sağlayan, öğrencilere eğitsel metaryalleri elektronik ortamda uygun olarak sunabilen ekonomik, çağdaş, etkin ve etkileşimli bir eğitim modeli olarak tanımlanmaktadır (Gökçe, 2008; Yamamoto ve Altun, 2020). Uzaktan eğitim yoluyla verilen dersler eş zamanlı (senkron) veya eş zamansız (asenkron) olarak gerçekleştirilmektedir. Eş zamanlı olarak verilen derslerde sanal sınıf ortamında öğrenci ile öğretmen canlı olarak iletişim kurarak anlaşılmayan konularla ilgili sorularını ve isteklerini belirtebilir ve karşılıklı tartışabilirler. Eş zamansız olarak verilen derslerde ise öğrenci istediği zaman ve istediği yerde sisteme yüklenen ses ve video kayıtlarını internet üzerinden takip edebilmekte fakat anlaşılmayan konularla ilgili öğrenci ve öğretmen arasında iletişim sağlanamamaktadır (Serçemeli ve Kurnaz, 2020).

İster eş zamanlı ister eş zamansız olsun uzaktan verilen eğitim için olmazsa olmazlardan biri teknolojinin ve internetin kullanılmasıdır. İnternet sayesinde birçok bilgiye ulaşmak daha kolay hale gelmiştir. Çocuklar ve ergenler aynı zamanda, kişisel verilerini ve kullanıcı bilgilerini paylaştıkları TikTok, Instagram, Snapchat ve WhatsApp gibi sosyal medya sitelerinin, uygulamaların ve sohbet odalarının hevesli kullanıcılarıdır. Dijital ortam, çocuklara ve ergenlere kendilerini ifade etmelerine, bilgi edinmelerine ve akranlarıyla sosyalleşmelerine izin verme gibi fırsatlar sunar. Ayrıca, yaşa uygun, yüksek kaliteli programlamanın izlenmesi bazı bilişsel faydaları teşvik edebilir. Bununla birlikte dijital araçların denetimsiz kullanımı çocukların ve ergenlerin sağlığı için riskler içermektedir. (Gottschalk, 2019). Pandemi sürecinde de yürütülen uzaktan eğitim faaliyetleri sebebiyle internetin kullanımı daha çok artmıştır (Çakır ve Balcı Çelik, 2020). Covid-19 krizi nedeniyle işlenen ve paylaşılan kişisel bilgilerin bolluğu eğitim ortamlarında çocukları ve gençleri artan gizlilik risklerine maruz bırakabilir. Örneğin, eğitim amaçlı olarak giderek daha fazla kullanılmakta olan video konferans hizmetlerini kullanan çevrimiçi platformlar, uygunsuz veri toplama ve gizlilik ihlallerine yol açabilir. E-öğrenme platformları ayrıca kişisel verilerin toplanması, kullanılması, yeniden kullanılması ve ifşa edilmesi nedeniyle çocukların/gençlerin mahremiyetini tehdit edebilir (Hye Jung Han, 2020). Bu platformlar genellikle ebeveynlere ve çocuklara 'dönüşümsel' olarak sunulurken, kâr amaçlı platformların ve iş modellerinin kamu eğitimiyle birleştirilmesi ciddi gizlilik endişelerini gündeme getirmektedir (Livingstone, Stoilova ve Nandagiri, 2019). Ayrıca, öğretmen-öğrenci etkileşimleri için kullanılan sosyal ağ platformları ve uygulamaları güçlü gizlilik ve veri koruma önlemlerine sahip olmayabilir (World Childhood Foundation ve diğerleri, 2020). Çocukların dijital ortamda geçirdiği süreler, aynı zamanda onları sağlık ve refah risklerine de maruz bırakabilir. Özellikle, aşırı sosyal medya kullanımının sonucunda, çocukların/gençlerin zihinsel ve fiziksel sağlığı zarar görebilir; uyku düzensizliği, vücut imajı ile endişeler ve beslenme düzensizliği ortaya çıkabilir (OECD, 2018).

Dünyada olduğu gibi ülkemizde de pandemi sürecinde internet kullanımı artmıştır (TUİK, 2020) Covid-19 pandemisinde öğrencilerin uzaktan eğitim almaları için gerekli olan internet bağlantısını sürekli kullanmaları internet kullanımını sınırlayamama gibi sorunları da beraberinde getirmiştir (Young, 1996; Young, 1998). Covid-19 pandemisi hem uzaktan eğitimin takibi konusunda hem de internet kullanımının planlanması konusunda aileye de bazı sorumluluklar yüklemiştir. Eğitimlerine uzaktan eğitim süreci ile devam eden ve evlerinde bu süreci geçirecek olan tüm öğrenciler için ailelerinin eğitimlerine katılımları dolaylı olarak sağlanmıştır (Kırmızıgül, 2020). Ebeveynler, erken yaşlarda çocukların öğrenmesi için kritik öneme sahiptir. Özellikle çocukların erken çocukluk eğitimi ve bakımına veya okuluna erişimi olmadığında ve çevrimiçi veya televizyonda öğrenmenin gelişim aşamaları için yeterli olmadığı durumlarda ailenin önemi daha da büyüktür. Ebeveynlerin çocuklarıyla birlikte yürüttüğü günlük aktiviteler, çocukların öğrenme ve gelişimiyle büyük ölçüde ilişkilidir. Okullara uzaktan destek sağlama konusunda ise çocuklarının öğrenmesini denetlemeleri için ailelere zaman, hazır bulunuşluk ve sosyal sermaye gerekmektedir. Çocukların öğrenmesini destekleme becerisine olan güven ve konuya aşina olma potansiyelinin eksikliği, özellikle büyük çocuklara yardım etmek için düşük eğitimli ebeveynler arasında bir engel olabilir. Sosyoekonomik düzeyi düşük olan ebeveynlerin çocuklarına öğretici faaliyetler yapma olasılıkları daha düşüktür; bu nedenle, farklı sosyal-ekonomik gruplardan çocuklar arasındaki boşluk Covid-19 salgını ile genişlemiş olabilir (Thevenon ve Adema, 2020).

Evde eğitim ortamının kalitesi, okul çağındaki çocukların öğrenmeye devam edebilmesi için de çok önemlidir. Ebeveynlerin çoğu öğretmen değildir ve birçoğu eğitim programlarının içeriği ve pedagojik araçlarını bilmemektedir. Bazı ebeveynler çocuklarının okul çalışmalarından nispeten uzak görünürler; PISA 2015 testlerine katılan 15 yaşındaki çocukların yaklaşık %10'u ebeveynlerin çocuklarının okul çalışmalarıyla pek ilgilenmediğini veya desteklediğini belirtmiştir (Thevenon ve Adema, 2020). Ayrıca uzaktan öğrenme için gerekli olan bilgisayar ve internet erişimi sosyo-ekonomik düzeyi düşük ailelerde yaşayan çocuklar için %78'dir. Türkiye'de en yoksul hanelerdeki ergenlerin sadece az bir kısmı (% 27) evde e-öğrenim yapabilmektedir (OECD, 2020). Ayrıca, birçok evde cihazların ebeveynler arasında ve kardeşler arasında paylaşılması gerekebilir. Ayrıca tek başına teknolojiye erişim öğrenmeyi garanti etmez. Teknolojinin nasıl kullanılacağını bilmek dijital beceriler gerektirir. Burada yine avantajlı ve dezavantajlı haneler arasında bir ayrım vardır: Kendilerine ve çocuklarının dijital becerilerine daha fazla güvenen ebeveynlerin, çocuklarının dijital aktivitelerini teşvik etme ve yönlendirme, daha güvenli bir ortam oluşturma ve daha iyi destekleme olasılığı daha yüksektir (Thevenon ve Adema, 2020). Dijital okuryazarlık

seviyesine sahip olmayan ve evde eğitim için yeterli zamanı olmayan ebeveynlerin ise çocuklarına uzaktan eğitim sürecinde daha az yardımcı olduğu belirtilmektedir (Anderson, 2020). Covid 19 pandemisi sürecinde verilen uzaktan eğitimin internet kullanımını artırdığı, öğrencilerde ve ailelerinde birtakım sıkıntılar doğurduğu görülmektedir. Bu sebeple çalışmada pandemi döneminde internet kullanımını inceleyen çalışmaları derleyerek pandemi sürecinin öğrencilerde ve ailelerde yarattığı sorunları okuyucuya sunmak amaçlanmıştır.

## Yöntem

Bu çalışmada pandemi sürecinde uzaktan eğitime bağlı olarak öğrencilerin deneyimlerini ve internet kullanımını inceleyen çalışmaların derlenmesi amaçlandığından derleme türünde bir araştırmadır. Covid 19 pandemisinde internet kullanımını inceleyen, öğrenciler ve aileleri üzerindeki etkisine bakan çalışmalar yurtdışındaki ve Türkiye'deki veri tabanları kullanılarak incelenmiştir. Araştırmalar EBSCO, ProQuest Central, ResearchGate, Web of Science, Google Akademik veri tabanları kullanılarak taranmış ve 2020 yılı ve sonrasında bu konuda yapılan 10 araştırma makalesinin sonuçları özetlenmiştir. Tezler, derleme ve meta-analiz çalışmaları kapsam dışında bırakılmıştır. Çalışmalardan yola çıkarak okuyuculara öneriler sunulmuştur.

## Pandemi, Uzaktan Eğitim ve İnternet Kullanımı Konusunda Türkiye'de Yapılan Çalışmalar

**Özdoğan ve Berkant (2020)** pandemi sürecinde Türkiye'de uygulanan uzaktan eğitim sürecine ilişkin okul öğretmenlerinin, idarecilerin, öğrencilerin ve velilerin görüşlerini inceleyen nitel bir çalışma yapmışlardır. Çalışma sonucunda uzaktan eğitimin avantajları olduğu kadar (derslerin istenilen zamanda izlenmesi, hastalık bulaşmasının önlenmesi, zaman ve mekândan bağımsız olması, eğitim sürecinin devam edebilmesi gibi) dezavantajlarının da olduğu ortaya çıkmıştır. İnternetin ve bilgisayarın olmaması veya olsa bile teknik sorunlardan dolayı derse bağlanılamaması, öğrencilerin ders dinlerken güdülenmede zorluk yaşaması, derslerle ilgili ölçme ve değerlendirme sıkıntısının olması, fırsat eşitsizliği gibi sorunlar eğitim paydaşları tarafından dile getirilmiştir. Özellikle kırsal kesimdeki öğrencilerin ve velilerin şehir merkezinde yaşayanlara göre daha çok fırsat eşitsizliği yaşadığı, teknolojik aletlere erişmenin zorluğu, internetle ilgili teknik sıkıntılar yaşadıkları görülmüştür.

**Atasoy, Özden ve Kara (2020),** Covid 19 pandemisinde üniversite öğrencilerinin aldıkları online eğitim ile memnuniyetlerini öğrenmek amacıyla betimsel ve kestirimsel istatistik yöntemleri kullanarak birtakım sonuçlara varmışlardır. Öğrencilerin online derslere yönelik memnuniyetleri orta düzeyde bulunmuştur. Cinsiyete göre incelendiğinde erkek öğrencilerin ve anne eğitim düzeyi lise ve üstü olan öğrencilerin online derslere yönelik ilgisi ve motivasyonu yüksek bulunmuştur. Kız öğrencilerin ise online öğrenmede zorluklar yaşadıkları ve yüz yüze eğitimi daha çok tercih ettikleri görülmüştür.

**Baltacı, Akbulut ve Zafer (2020),** Covid-19 pandemisinde üniversite öğrencilerinin internet kullanımlarını nitel araştırma yöntemiyle incelemişlerdir. Bu amaç doğrultusunda öğrencilere pandemi sürecinde internet kullanımlarını kontrol etme noktasında yaşadıkları zorluklar, internet kullanımlarının aile ilişkilerine ve sosyal ilişkilerine etkisi ile akademik başarılarına etkisi sorulmuştur. Çalışma sonucunda öğrencilerin çoğunun internet kullanımlarını kontrol etmekte zorlandıkları, daha fazla internette vakit geçirdikleri ve buna bağlı olarak olumsuz etkiler ve duygular yaşadıkları görülmüştür. Öğrencilerin internet kullanımlarının aile içi ilişkilere etkisi açısından ise bazı sorunlar ve tartışmalar yaşandığı, öğrencilerin aileleriyle daha az zaman geçirdikleri, aileden kaçmak için internetin kullanıldığı belirlenmiştir. İnternet kullanımının sosyal ilişkilere etkisi açısından öğrencilerin bir kısmı sosyal ilişkileri zayıflattığını, bir kısmı ise internet üzerinde iletişim kurduklarını dile getirmişlerdir. Akademik anlamda ise öğrencilerin çoğunluğunun olumsuz etkilendiği, uzaktan eğitime alışamadıkları ve sorumluluklarını yerine getiremedikleri görülmüştür.

**Türker ve Dündar (2020),** Covid-19 salgını sürecinde kullanılan uzaktan eğitimin lise öğretmenleri açısından değerlendirilmesini amaçlayarak nitel bir çalışma yürütmüşlerdir. Öğretmenler, uzaktan eğitimin okuldan ve dersten kopmayı önleme, ödevlerin ve çalışma etkinliklerinin paylaşılabilmesi, canlı ders imkânı sunması gibi bazı avantajları olduğunu belirtmişlerdir. Bununla birlikte uzaktan eğitimin internet üzerinden yapılması sebebiyle bazı donanım ve alt yapı sorunlarının bulunması, sınav yapma ve değerlendirme olanağının yetersizliği, öğrenci takibinin zor olması, uygulama dersleri açısından verimsiz olması, ders içerikleri ile ilgili yetersizlikler, ödev takibinin yapılma zorluğu, ailenin bilinçsiz ve tecrübesiz olmasından dolayı bazı öğrencilerin derse girmemesi gibi dezavantajları olduğunu da belirtmiştir.

**Keskin ve Özer Kaya (2020),** Covid-19 pandemisinde üniversite öğrencilerinin uzaktan eğitim sürecine yönelik geribildirimlerini çevrimiçi anket kullanarak incelemişlerdir. Çalışma sonucunda öğrencilerin televizyon ve internette (özellikle sosyal medyada) pandemi öncesine kıyasla iki kat daha fazla zaman geçirdikleri görülmüştür. Öğrencilerin büyük çoğunluğu uzaktan eğitimin yüz yüze eğitim kadar etkili olmadığını, üniversitedeki öğretim üyeleriyle iletişim kurmakta zorlandıklarını, uzaktan eğitimin alternatif bir öğrenme yöntemi olması sebebiyle

bilgileri öğrenme konusunda etkili olsa da öğrenilen bilgilerin kalıcılığı noktasında yetersiz kaldığını ve ders sırasında yaşanan teknik sıkıntılar sebebiyle öğrenciler tarafından tercih edilmediğini belirtmişlerdir.

## Pandemi, Uzaktan Eğitim ve İnternet Kullanımı Konusunda Yurtdışında Yapılan Çalışmalar

**Jahan, Hosen, Mamun, Kaggwa, Griffiths ve Mamun (2021**), Covid-19 salgınıyla ilgili evde kalma ve sokağa çıkma yasağı kararlarının bireylerin teknoloji kullanımıyla (örneğin internet kullanımı) daha fazla ilgilenmesine yol açtığını gözlemlemiş ve bu doğrultuda Bangladeşli öğrenciler arasında çevrimiçi kesitsel bir çalışma gerçekleştirmişlerdir. Ankette sosyo-demografik özellikler, davranışsal sağlık, çevrimiçi kullanım davranışları ve psikopatolojik değişkenlere ilişkin sorular yer almıştır. Katılımcıların dörtte birinin (%26) internet bağımlılığı düzeylerinin düşük olduğu, %58,6'sının orta derecede internet bağımlısı olduğu ve %13'ünün ciddi derecede internet bağımlısı olduğu görülmüştür. Akıllı telefon bağımlılığı, Facebook bağımlılığı, depresyon ve kaygının internet bağımlılığı için riskli faktörler olduğu bulunmuştur. Araştırmada pandemi sırasında bildirilen diğer psikolojik etkiler gibi bireylerin problemli internet kullanımı riskinin yüksek olduğu sonucuna varılmıştır.

**Dong, Yang, Lu ve Hao (2020),** internet kullanım özelliklerini değerlendirmeyi ve Covid-19 salgını sırasında internet bağımlılığı ile ilişkili potansiyel psikolojik faktörleri objektif olarak incelemeyi amaçlamışlardır. 6 ila 18 yaş arası Çinli çocuklar ve ergenlere bazı ölçek ve anketler uygulayarak kesitsel bir çalışma yapmışlardır. Katılımcıların çoğunluğunun riskli ve problemli internet kullandıkları görülmüştür. Covid-19 salgını sırasında internet kullanımının, eğlence amaçlı internet kullanım sıklığının ve süresinin çocuk ve ergenlerde arttığı gözlemlenmiştir. Aynı zamanda kadın cinsiyeti, yaş, depresyon ve stresin internet bağımlılığını anlamlı olarak yordayan değişkenler olduğu görülmüştür.

**Agustina ve Cheng (2020),** Endonezyalı orta öğretim öğrencilerinin Coronavirüs (Covid-19) zamanında çevrimiçi eğitime bakış açılarını incelemişlerdir. Çevrimiçi öğrenmenin etkililiğini değerlendirmek için 10 maddelik bir anket kullanılmıştır. Ankete katılan orta öğretim öğrencilerinin çoğunluğunun çevrimiçi/dijital öğrenme hakkında bilgi sahibi olduğu görülmüştür. İnternet olanaklarına erişim eksikliği, öğrenciler ve eğitmenler ile uygun etkileşim ve iletişim eksikliği ve etkisiz teknoloji, Endonezya'daki orta öğretim öğrencilerinin karşılaştığı önemli zorluklar arasında yerini almıştır. Geleneksel sınıflardan ve yüz yüze öğrenmeden çevrimiçi öğrenmeye ani geçiş, öğrenciler için tamamen farklı bir öğrenme deneyimi ile sonuçlanmıştır. Çoğu öğrencinin yüksek hızlı veya güvenilir internet hizmetlerine erişimi olmadığından çevrimiçi öğrenme onlar açısından dezavantaj oluşturmuştur.

**Azlan vd. (2020),** Covid-19 salgını sebebiyle uzaktan eğitim sürecine geçen Malezya'daki üniversite öğrencilerinin bu süreçle ilgili deneyimlerini değerlendirmişlerdir. Çalışma sonucunda öğrencilerin yüz yüze eğitimi daha çok tercih ettikleri görülmüştür. Uzaktan eğitimin önceden kaydedilmiş ders videolarını izlemek ve evden çalışma konusunda esneklik sağlaması gibi konularda olumlu yönleri olduğunu belirtmişlerdir. Bununla birlikte dikkat dağınıklığı, katılım eksikliği ve zihinsel stres nedeniyle odaklanmayı da zorlaştırdığını belirtmişlerdir. Zayıf internet bağlantısı ve sınırlı veri planları gibi teknik sorunlar da uzaktan eğitimin problemleri arasında görülmüştür.

**Adnan ve Adwar (2020),** Pakistan'da üniversite öğrencilerinin Coronavirüs zamanında zorunlu dijital ve uzaktan eğitim derslerine yönelik tutumlarını incelemeyi amaçlamışlardır. Pakistan'daki çevrimiçi eğitim hakkındaki bakış açılarını bulmak için lisans ve lisansüstü öğrencilerine anketler uygulanmıştır. Araştırmanın bulguları, çevrimiçi öğrenmenin, öğrencilerin büyük çoğunluğunun teknik ve parasal sorunlar nedeniyle internete erişemediği Pakistan gibi az gelişmiş ülkelerde istenen sonuçları veremediğini vurgulamıştır. Eğitmenle yüz yüze etkileşimin olmaması, yanıt verme süresi ve geleneksel sınıf içi sosyalleşmenin olmaması yükseköğretim öğrencileri tarafından vurgulanan diğer konular arasında bulunmuştur.

## Sonuç ve Öneriler

Derlenen çalışmalar doğrultusunda pandemi döneminde uzaktan eğitim ve internet kullanımı ile ilgili çalışmalara ağırlık verildiği ve hem Türkiye'de hem yurtdışında genellikle öğrenciler üzerindeki etkisinin araştırıldığı görülmektedir. Covid-19 pandemisi döneminde başlayan uzaktan eğitimin bazı olumlu yönleri olsa da (derslerin sürekliliğinin sağlanması, zaman ve mekândan bağımsız dersi dinleme olanağı, salgın hastalığın bulaşmasını önlemesi gibi) öğrenciler tarafından genellikle tercih edilmediği görülmüştür. Öğrenciler yüz yüze eğitimi daha faydalı ve verimli bulmuşlardır. Uzaktan eğitimin internet ve derse bağlanılan cihaz (telefon, tablet, bilgisayar vb.) ile ilgili teknik sıkıntılar yaratması, derse aktif katılım anlamında eksiklerin olması, özellikle az gelişmiş ülkelerde veya şehirlerde (kırsal kesimlerde) öğrenci ve veliler açısından fırsat eşitsizliği yaratması, öğrenci ve öğretmen/öğretim görevlisi arasında iletişim ve etkileşim kopukluğu doğurması, sınıftakilerle sosyal ilişkilerin gelişememesi gibi olumsuz yönleri olduğu belirtilmektedir. Pandemi döneminde hem eğitimin hem işlerin evden yapılmasına bağlı olarak internet kullanım sıklığının da arttığı araştırmalar tarafından ortaya koyulmuştur. İnternet

kullanımının artmasıyla birlikte öğrencilerde internet bağımlılığı riskinin oluştuğu, gereğinden fazla internet uygulamalarına zaman harcadıkları, aile üyeleriyle sorunlar yaşadıkları halde internet kullanmaya devam ettikleri de görülmüştür. Pandemi döneminin internet kullanımı açısından çocuklar ve gençlerde riskli bir dönem olduğu belirtilmiştir.

Pandemi döneminde uzaktan eğitimin öğrenciler açısından etkili bulunmaması ve fırsat eşitsizliği yaratması sebebiyle bu gibi salgın hastalık durumlarında daha farklı öğrenme yöntemlerinin kullanılması önerilebilir. Örneğin hibrit/karma eğitimde dersler çoğunlukla yüz yüze yapılır ama dersleri pekiştirici ve yardımcı içerikler, aktiviteler, ölçme-değerlendirme faaliyetleri için teknolojik imkânlardan faydalanılır. Rotasyon modelinde öğrenmelerin hem çevrimiçi hem yüz yüze yapılması hem de arada grup ödevleri veya çalışmaları yapılarak öğretmenle bir araya gelinmesi söz konusudur. Zenginleştirilmiş sanal model de tercih edilebilecek bir yöntem olabilir. Bu modelde derslerin çoğunluğu çevrimiçi olarak alınırken dersleri pekiştirmek amaçlı haftada birkaç kez yüz yüze bir araya gelinip konu tekrarları yapılmaktadır (Vedubox, 2021). Uzaktan eğitime alternatif olarak bu yöntemlerin kullanılması eğitimde kalıcılığı ve öğrenci memnuniyetini artırma konusunda daha faydalı olabilir. Aynı zamanda pandemi döneminde görülen yoğun internet kullanımının çocuk ve gençlerdeki olumsuz etkisi düşünüldüğünde bu konuda okul psikolojik danışmanları tarafından seminerler, grupla psikolojik danışma oturumları veya bireysel danışmanlık gibi hizmetler verilebilir. İnternet kullanımına bağlı olarak öğrenci ve aile arasındaki ilişkinin bozulması konusunda da ailelere yönelik bilgilendirici seminerler veya grup çalışmaları planlanabilir. Evde ve okulda öğrenciler internet dışında kendilerine yararlı olabilecek başka etkinliklere yönlendirilebilir. Aynı zamanda öğretmen ve öğrenciler tarafından internet kullanımının zararlı yönleri konusunda proje çalışmaları yapılabilir. Pandemi döneminde bilinçli internet kullanımının nasıl sağlanacağı konusunda çalışmalar yürütülebilir.

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# COVID-19 Süreci Sonrası Okul Müdürlerinin Teknoloji Liderliği Davranışları

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## Özet

2020 yılında COVID-19 salgını sebebiyle yüz yüze olan eğitim-öğretime ara verilmiştir. Bu dönemde K-12'ler okul müdürlerine büyük bir iş yükü düşmekteydi. Fakat okul müdürlerinin nasıl bir liderlik sergiledikleri sonrasında yapılan çalışmalarla ortaya koyulmuştur. Okul müdürlerinin bu süreci nasıl yürüttükleri, hangi davranışları sergiledikleri alanında bir çok çalışma yapılmıştır. Bunun yanı sıra okul müdürlerinin teknolojiye ve teknolojiye karşı tutumları da ele alınmıştır. Fakat okul müdürlerinin o süreçte edindikleri yetkinlikleri ve görevleri yüz yüze eğitime geçilmesiyle birlikte devam ettirip edilmediği bilinmemektedir. Bundan dolayı bu çalışmanın amacı COVID-19 süreci sonrası okul müdürlerinin teknolojik liderlik davranışlarını incelemektir. Bu amaç doğrultusunda bu araştırmada nitel araştırma yöntemlerinden tek durum çalışması deseninde tasarlanmıştır. Elverişli örneklem yöntemi tercih edilmiştir. Çalışma grubunu 2022-2023 eğitim-öğretim yılında İstanbul Kadıköy ilçesinde yer alan ilkokul, ortaokul ve liselerde görev yapan 12 okul müdürü oluşturmaktadır. Araştırma grubu 9 erkek 3 kadın okul müdüründen oluşmaktadır. Veri toplama aracı olarak görüşme yöntemi tercih edilmiştir. Elde edilen veriler içerik analizi yöntemiyle analiz edilmiştir. Elde edilen bulgular doğrultusunda okul müdürlerin COVID-19 bitimiyle birlikte teknoloji entegrasyonunu sonlandırmadığı, edindikleri farkındalıkları ve becerilerin sürekliliğini sağladıkları, ders içeriklerini teknoloji entegrasyonuna göre düzenlenmesi konusunda öncülük ettikleri, öğrenmede sürekliliğin sağlanması ve günceli takip edilmesi için kaynakların yönetildiği görülmüştür.

**Anahtar Kelimeler**: Teknoloji liderliği, liderlik, COVID-19 sonrası.

# Technology Leadership Behaviors of School Principals After the COVID-19 Process

## Abstract

In 2020, face-to-face education was suspended due to the COVID-19 outbreak. A huge workload fell on K-12 school principals during this period. However, the kind of leadership that school principals exhibit has been revealed by the studies carried out afterwards. Many studies have been conducted in the field of how school principals carry out this process and what behaviors they exhibit. In addition, school principals' attitudes towards technology and technology were also discussed. However, it is not known whether the competencies and duties acquired by the school principals in that process were continued with the transition to face-to-face education. Therefore, the aim of this study is to examine the technological leadership behaviors of school principals after the COVID-19 process. For this purpose, this research was designed in a single case study pattern, one of the qualitative research methods. The convenient sampling method was preferred. The study group consists of 12 school principals working in primary, secondary and high schools in Kadıköy district of Istanbul in the 2022-2023 academic year. The research group consists of 9 male and 3 female school principals. Interview method was preferred as data collection tool. The obtained data were analyzed by content analysis method. In line with the findings, it was seen that school principals did not terminate technology integration with the end of COVID-19, ensure the continuity of the awareness and skills they acquired, lead the way in arranging the course content according to technology integration, and resources are managed to ensure continuity in learning and keep up to date.

**Keywords**: Technology leadership, leadership, post COVID-19.

## Giriş

Teknolojinin gelişmesiyle birlikte okullarda eğitim teknolojilerininde önemi gittikçe artmıştır. Fakat K12'de görev yapan okul müdürlerinin eğitim teknolojilerine ve okullarda teknoloji kullanımın ilişkin zorluklar yaşadığı görülmektedir (Hero, 2020). Bu durum okul müdürlerinin teknoloji liderliğine ilişkin yetkinliklerine işaret etmektedir. Liderlik, belirli şartlar altında belirlenen hedefleri gerçekleştirmek için bir bireyin diğer çalışanlar üzerinde etkisinin olması ve yönlendirmesi anlamına gelmektedir (Koçel, 2010). Teknolojinin hızla gelişmesi

eğitim politikalarına etki etmiştir. Bu durum da liderlik kavramının bir alt boyutu olan teknoloji liderliğini ortaya çıkarmıştır. Teknoloji liderliği farklı eğitim altyapıları oluşturan, idare edebilen, günümüzün getirdiği yeniliklere dikkate alarak eğitimi tasarlayan ve motivasyonu ön planda tutabilen kişilerin sahip olduğu beceridir (Tanzer, 2004). Böylece teknoloji liderli olan okul müdürlerinin teknoloji ile teknolojinin eğitimle entegrasyonunun sağlanması, teknolojiyi kullanma ve yönetme gibi hususlarda öncülük etmesi beklenmektedir (Afshari vd., 2009). Teknoloji liderliği konusunda en çok ISTE (International Society for Technology in Education) çalışmalar yapmaktadır. ISTE, yöneticilere ilişkin teknoloji liderliği standartlarını ortaya koymuştur (Gökbulut ve Çoklar, 2017). Bunlara ek olarak Flanagan ve Jacobsen (2003) teknolojik liderliği standartlarının yanı sıra okul müdürünün, belirtilen dört hususa dikkat edilmesini gerektiğini vurgulamaktadır. Bunlar: (1) pedagojik konular, (2) eşitlik konusu, (3) öğretmenlerin yetersiz mesleki gelişimi ve (4) liderin yetersiz eğitimidir.

Okul müdürlerinin COVID-19 süreciyle bu standartlara sahip olup olmadıklarına bakılmaksızın teknoloji liderlik becerilerini ortaya koymak durumunda kalmışlardır. Çünkü bu süreçte teknoloji liderinin görev ve sorumluluklarına oldukça ihtiyaç duyulmuştur. Alanyazın incelendiğinde de teknolojik liderliğe dair çok fazla araştırma yapıldığı görülmektedir. Fakat COVID-19 sürecinde kazanılan davranışlarının süreç sonrası da devam edip edilmediği bilinmemektedir. Bundan dolayı bu çalışmanın amacı COVID-19 süreci sonrası okul müdürlerinin teknolojik liderlik davranışlarını incelemektir. Çalışmanın amacı doğrultusunda aşağıdaki sorulara cevap aranmıştır:

**1.** Teknoloji liderliği kavramı tanımlanmaktadır?

**2.** COVID-19 süreci sonrası okul müdürlerinin görev ve sorumluluklarındaki değişiklikler nelerdir?

**3.** COVID-19 süreci sonrası okul müdürlerinin teknoloji liderliği ilişkin hangi yetkinliklerinde değişimler olmuştur?

## Yöntem

Araştırma nitel araştırma yöntemleri arasında yer alan tek durum çalışması deseninde tasarlanmıştır. Elverişli örneklem yöntemi tercih edilmiştir. Çalışma grubunu 2022-2023 eğitim-öğretim yılında İstanbul Kadıköy ilçesinde yer alan ilkokul, ortaokul ve liselerde görev yapan 12 okul müdürü oluşturmaktadır. Araştırma grubu 9 erkek 3 kadın okul müdüründen oluşmaktadır. Çalışma grubuna ilişkin demografik bilgiler Tablo 1'de verilmiştir. Veri toplama aracı olarak görüşme yöntemi tercih edilmiştir. Araştırmanın verileri araştırmacı tarafından geliştirilen demografik bilgilerin ve üç sorudan oluşan yarı yapılandırılmış görüşme formu ile toplanmıştır. Elde edilen veriler içerik analizi yöntemiyle analiz edilmiştir.

Tablo 1. Çalışma Grubuna İlişkin Demografik Bilgiler

| Katılımcı | Cinsiyet | Okul Türü | Mesleki Kıdem | Okuldaki Görev Süresi |
|-----------|----------|-----------|---------------|------------------------|
| K1 | E | İlkokul | 11 | 3 |
| K2 | E | İlkokul | 17 | 5 |
| K3 | E | Lise | 13 | 7 |
| K4 | E | Ortaokul | 16 | 3 |
| K5 | K | Lise | 14 | 4 |
| K6 | K | Lise | 17 | 4 |
| K7 | E | Lise | 12 | 1 |
| K8 | E | İlkokul | 14 | 5 |
| K9 | E | İlkokul | 18 | 2 |
| K10 | E | İlkokul | 21 | 6 |
| K11 | K | Lise | 11 | 2 |
| K12 | E | Ortaokul | 13 | 4 |

## Bulgular

Bu bölümde araştırma amacına ve sorularına ilişkin bulgulara yer verilmektedir.

*1. Okul müdürlerinin teknoloji liderlik kavramına ilişkin görüşlerine ait bulgular*

Tablo 2. Teknoloji liderlik kavramına ilişkin görüşler

|  | Temalar | Kodlar |
|---|---|---|
| Teknoloji liderliği | Tanım | ➡ Politika belirleme |
|  |  | ➡ Teknolojik etkinlikleri yönetme |
|  |  | ➡ Teknoloji entegrasyonunu sağlayabilme |
|  |  | ➡ Öğretme ve öğrenme uygulamalarına yönelik çalışmalar |
|  |  | ➡ Teknoloji kullanabilme yetkinliği |

*2. COVID-19 süreci sonrası okul müdürlerinin görev ve sorumluluklarındaki değişikliklere ilişkin görüşlerine ait bulgular*

Tablo 2. COVID-19 süreci sonrası okul müdürlerinin görev ve sorumluluklarındaki değişikliklere ilişkin görüşler

|  | Temalar | Kodlar |
|---|---|---|
| Görev ve Sorumluklar | Ders süreç yönetimleri | ➡ Ders içeriklerinin tekrar gözden geçirilmesi |
|  |  | ➡ Derslere ilişkin öğretmen hazırlıklarının incelenmesi |
|  | Yönetim süreçleri | ➡ Çeşitli öğretim yöntem ve tekniklerin teknoloji ile entegrasyonunu süreçlerinin yürütülmesi |
|  |  | ➡ Kaynakların temin edilmesi ve kaynakların yönetimi |
|  |  | ➡ Öğrenmede sürekliliği sağlamak |

*3. COVID-19 süreci sonrası okul müdürlerinin değişen yetkinliklerine ilişkin görüşlerine ait bulgular*

Tablo 4. COVID-19 süreci sonrası okul müdürlerinin değişen yetkinliklerine ilişkin görüşler

|  | Temalar | Kodlar |
|---|---|---|
| Yetkinlikler | Değişiklik gösteren beceriler | ➡ Problem çözme odaklı olma |
|  |  | ➡ Dijital okuryazarlık becerisinde gelişme |
|  |  | ➡ Teknolojiyi etkin ve verimli kullanma |
|  |  | ➡ Öğretim liderliği ve teknoloji liderliğini entegre edebilme |
|  |  | ➡ Vizyoner olma |
|  |  | ➡ Gelişime ve değişime açık olma |

## Sonuç

Elde edilen bulgular doğrultusunda şu sonuçlara ulaşılmıştır:

- Okul müdürlerin COVID-19 bitimiyle birlikte teknoloji entegrasyonunu sonlandırmadığı,

- Edindikleri farkındalıkları ve becerilerin sürekliliğini sağladıkları,

- Ders içeriklerini teknoloji entegrasyonuna göre düzenlenmesi konusunda öncülük ettikleri,

- Öğrenmede sürekliliğin sağlanması ve günceli takip edilmesi için kaynakların yönetildiği

görülmüştür.

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# Açık ve Uzaktan Eğitimde Yenilikçi Değerlendirme Araçları

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## Özet

Eğitim kurumlarının ölçme ve değerlendirme süreçleri, belirlenen hedeflere ulaşmada kurum, öğrenen, öğreten ve programın etkililiğini belirlemektedir. Ölçme ve değerlendirme sonucu yapılan geri bildirimler ile öğrenenler öğrenme eksikliklerini belirleyebilmekte, kurumlar ise eğitim etkinliklerini daha verimli hale getirmek için çalışmalar yapabilmektedir. Günümüzdeki enformasyon ve iletişim teknolojilerindeki (BİT) gelişmeler açık ve uzaktan eğitim (AvUE)'in gelişimine ve farklı şekillerde uygulanmasına olanak sağlamaktadır. 21. yüzyılda her alanda yaşanan dijital gelişmeler AvUE sisteminde uygulanan ölçme ve değerlendirme yaklaşımını da etkilemiştir. Gerek gözetmenlik için gerekse yazılı, sözlü sınavlar için kullanılabilecek e-uygulamaların gün geçtikçe artması bu değişimin göstergesi olarak kabul edilebilir. Yaşanan gelişmelerin bir sonucu olarak ortaya çıkan öğrenen yeterliliklerini ölçebilen değerlendirme araçlarına duyulan ihtiyaç gün geçtikçe artmaktadır. AvUE'de tek bir değerlendirme yönteminin kullanılmasının önerilmediği göz önüne alınarak hangi araçların ne amaçla kullanılabileceğine ilişkin bir çerçeve oluşturulmasının kurumlara ve öğretenlere katkı sağlayacağı öngörülmektedir. Bu bağlamda pandemi, deprem gibi olağanüstü durumlarda zorunlu hale gelen AvUE'deki e-değerlendirme sürecinde kullanılabilecek yenilikçi dijital araçların tanıtımı bu çalışmanın konusunu oluşturmaktadır.

**Anahtar kelimeler**: Dijital Değerlendirme Araçları, Açık ve Uzaktan Eğitim, Ölçme ve Değerlendirme, E-Değerlendirme

# Innovative Assessment Tools in Open and Distance Education

## Abstract

The assessment processes of educational institutions determine the effectiveness of the institution, learner, teacher and programme in achieving the determined goals. With the feedbacks from assessment, learners can identify their learning deficiencies, and institutions can work to make their educational activities more efficient. Today's developments in information and communication technologies (ICT) have enabled the development and application of open and distance education in different ways. In the 21st century, digital developments in every field have also affected the assessment approach applied in open and distance education system. The increasing number of e- applications that can be used both for supervision and for written and oral exams can be considered as an indicator of this change. As a result of the developments, the need for assessment tools that can measure learner competences is increasing day by day. Considering that it is not recommended to use a single assessment method in open and distance education, it is foreseen that establishing a framework on which tools can be used for what purpose will contribute to institutions and teachers. In this context, the introduction of innovative digital tools that can be used in the e-assessment process in open and distance education , which has become mandatory in extraordinary situations such as pandemic and earthquakes, is the subject of this study.

**Keywords**: Digital Assessment Tools, Open and Distance Education, Assessment and Evaluation, E-Assessment

## Giriş

Eğitim, kökeni antik çağa kadar uzanan, bireylerin nasıl öğrendiği ve bilginin nasıl edinildiği üzerine sorgulama yapan bir bilim alanıdır ve içeriğinde farklı kuramları barındırmaktadır. Öğrenme ortamında bu kuramlardan hangisini ele alırsak sistematik bir anlayışta olduğu görülmektedir. Bu sistematikte öğretim sürecinin girdisi, işlemi, çıktısı ve kontrolü bulunmaktadır. Sistemin işleme kalitesinin belirlenmesi, herhangi bir problem olup olmadığının incelenmesi, problem varsa düzeltilmesi gerekmektedir (Yaşar,2014). Bu süreç eğitimin ölçme ve değerlendirme işlevi ile gerçekleşmektedir. Ölçme, bir niteliğin veya performansın gözlemlenerek gerçekleşme seviyesini belirleme ya da gözlemlenen performansın veya niteliğin bir sayı ya da sembolle ifade edilmesi olarak tanımlanmaktadır (Büyüköztürk,2011). Değerlendirme ise ölçme sonuçlarını bir ölçüte dayandırarak yargıya varma işi olarak tanımlanmaktadır (Demirel &Yağcı, 2012).

Öğreten ve öğrenenlerin zaman ve mekan bakımından birbirlerinden bağımsız olduğu ortamlar üzerine yapılandırılan uzaktan eğitim uygulamalarının, günümüz teknoloji ve internet olanaklarının gelişmesiyle ve yaşanan pandemi, deprem gibi olağanüstü durumlarda tercih sebebi olması ile birlikte önemli bir eğitim alanı haline geldiği görülmektedir. Bütün eğitim uygulamalarında olduğu gibi uzaktan eğitim uygulamalarının da etkililiğinin belirlenmesi önem arz etmektedir. Eğitim süreci, uygulamalar, varsa eksik kalınan noktalar ve kaynağının belirlenmesi, gerekli düzenlemelerin yapılabilmesi için ölçme ve değerlendirmenin yapılması gerekmektedir. Bu bağlamda ölçme ve değerlendirme kavramları ister yüz yüze, ister uzaktan eğitim-öğretim faaliyetlerinde yapılan etkinliklerin etkili olup olmadığını belirleyen kontrol mekanizmalarıdır.

Bu çalışmada gelişen teknoloji ve yaklaşımla birlikte hangi kontrol mekanizmalarına (e-değerlendirme araçlarına) hangi amaç için eğitim-öğretim faaliyetlerinde yer verilebileceği araştırılmıştır. Çalışmada sırasıyla uzaktan eğitim ve ölçme- değerlendirme kavramları, uzaktan eğitimde kullanılan ölçme ve değerlendirme araçları, uzaktan eğitimde yenilikçi e-değerlendirme araçları ve son olarak uzaktan eğitimde ölçme ve değerlendirmeye yönelik öneriler açıklanmaya çalışılmıştır.

## Uzaktan eğitim ve ölçme değerlendirme kavramları

Öğrenme faaliyetlerinin, öğreten ve öğrenenin ayrı mekanlarda olduğu ve farklı iletişim araçları kullanılarak gerçekleştirilen uzaktan eğitimde ölçme ve değerlendirme yüz yüze eğitim ortamlarıyla kıyaslandığında oldukça farklılık göstermektedir. Bu farklılıklarla beraber belli sınırlılıkların da ortaya çıkması olasıdır. Uzaktan eğitimde öğretilen dersin konusunun ve kazanımlarının öğrenilip öğrenilmediği ve bilgi seviyesinin belirlenmesinde ölçme ve değerlendirme araçlarının önemli bir rol oynadığını ve özellikle son dönemlerde bu konudaki tartışmaların arttığını söyleyebiliriz. Uzaktan eğitimin ilk yıllarında mektupla öğretimde yazışma yoluyla yapılan ölçme ve değerlendirme faaliyetleri gelişen teknoloji ve yaklaşımla birlikte görülen uzaktan eğitimdeki gelişmelere paralel olarak önemli gelişmeler göstermiştir. Bu bağlamda, içinde bulunduğumuz yüzyıl açık ve uzaktan eğitim sistemlerinde önemli yenilikleri beraberinde getirirken ölçme ve değerlendirme yaklaşımlarında da sürekli bir değişim gerektirmektedir. Sonuç olarak, yüzyıllara göre değişim gösteren öğrenen yeterlikleriyle birlikte değerlendirme faaliyetlerinin de hem bilgi hem de beceri/yeterlik gelişimi açısından sürekli değişim göstermektedir.

AvUE'de ölçme ve değerlendirmeye yönelik sınıflandırmalar yapılmaktadır. Öğrenme etkinlikleri sürerken yapılan biçimlendirme (yetiştirme) amaçlı değerlendirme (formative assessment) ve öğrenme etkinlikleri sonunda gerçekleştirilen düzey belirleme (değer biçme) amaçlı yapılan değerlendirme (summative assessment) şeklindedir. Biçimlendirme amaçlı değerlendirme, çalışma materyallerinde verilen değerlendirme dışı etkinlikleri ve geribildirimleri, öğrenenlerin gelişimlerini izlemelerine olanak sağlayan öz-değerlendirme testlerini, ödevlerden, akranlardan ya da öğreticilerden alınan geribildirimleri, öğretici ya da diğer öğrenenlerle olan etkileşimi ve öğrenenleri sınavlara hazırlayan testleri içermektedir. Düzey belirleme (summative) amaçlı değerlendirme ise gözetimli dönem sonu sınavlarını, başarı notuna etki eden ödevleri ya da performans sınavlarını içermektedir. Düzey belirleme amaçlı değerlendirmenin temel amacı, öğrenenlerin başarı durumlarını kayıt altına almak ve raporlaştırmaktır (Morgan & O'Reilly, 1999, s.15).

Simonson, vd. (2012, s.268) ise objektif ve sübjektif değerlendirme ile biçimlendirme ve düzey belirleme amaçlı değerlendirme şeklinde bir sınıflama yapmıştır. Objektif ve subjektif değerlendirme, öğrenenlerin başarısını ölçmede kullanılan araçların özellikleriyle ilgiliyken; biçimlendirme ve düzey belirleme amaçlı değerlendirme, ölçme sonuçlarının nasıl kullanılacağıyla ilgilidir. AvUE'de objektif testler, önemli sınırlılıkları olmasına karşın uygulama ve değerlendirmenin kolay olması, öğrenme/ders yönetim sistemlerinde kullanılabilmesi, bireyselleştirilebilmesi, kişiye uyarlanabilmesi, bilgisayarla not verilebilmesi ve anında geribildirim verilebilmesi açılarından avantaj sağlamaktadır. Çoktan seçmeli testler objektif testlere en iyi örnektir. Diğer yandan, araştırma makalesi, proje, çevrim-içi tartışmalar, e-portfolyo ve kavram haritası subjektif değerlendirmede kullanılan araçlardır (Simonson, vd. 2012, s.270).

## Uzaktan eğitimde kullanılan ölçme ve değerlendirme araçları

Teknoloji ağırlıklı yürütülen uzaktan eğitimde kullanılan öğrenme ortamları geleneksel öğrenme ortamından farklı şartlar barındırmaktadır. Buna bağlı olarak ölçme ve değerlendirme süreçleri de geleneksel eğitimdeki yöntemlerden farklılık göstermektedir. Açık ve uzaktan öğrenmeye dair endişeler arasında öğrenen çıktılarının ölçülmesinde, ayrıca uzaktan eğitim ders ve programlarının etkinliğinin değerlendirilmesinde kullanılacak yöntemlerin eksikliği yer almaktadır (Muilenburg & Berge, 2001). Bu endişelerin giderilebilmesi için geleneksel yöntemde kullanılan fiziki ölçme ve değerlendirme yöntemlerinin uzaktan eğitim ortamlarına uyarlanması ya da etkinliklerin doğru değerlendirilmesini sağlayacak yeni ölçme ve değerlendirme yöntemlerinin tasarlanması gerekmektedir.

Popham (2001), öğrenenleri değerlendirmede kaliteyi artırmak için; mümkün olduğunca az sayıda, fakat öğrenme çıktılarını ölçecek yeterlikte testin kullanılması, öğrenenlerden alınan geribildirimlerin öğretimin iyileştirilmesi için kullanılması, düzenli olarak eğitsel açıdan anlamlı ölçmelerin yapılması ve öğrenme çıktılarının niteliğini tam olarak belirleyebilmek için öğrenenleri değerlendirmede çeşitli ölçme araç ve tekniklerinin kullanılması şeklinde bir çerçeve çizmiştir.  Açık ve uzaktan öğrenmedeki öğrenen profilindeki çeşitlilik ve her bireyin farklı öğrenme biçimine sahip olduğu göz önüne alındığında farklı ölçme araç ve tekniklerini gerekli kılmakta ve değerlendirmenin yapılma amacına göre de farklı ölçme araç ve tekniklerinin kullanımı gerekmektedir (Karadağ, 2014).

Alanyazında öğrenen başarısının ölçülmesinde kullanılan araç ve tekniklere dair yapılan en yaygın sınıflama geleneksel, alternatif ve yenilikçi ölçme araçları şeklindedir. Geleneksel ölçme araçları daha çok öğrenme süreci sonunda düzey belirleme amaçlı, alternatif ölçme araçları ise öğrenme sürecinde performans ölçmek amaçlı kullanılmaktadır (Akyıldız ve Karadağ, 2018). Karadağ (2014), AvUE alanındaki ölçme değerlendirme üzerine yaptığı tez çalışmasında geleneksel ölçme araçlarını; çoktan seçmeli, doğru-yanlış, eşleştirme, boşluk doldurma, kısa cevaplı ve tamamlama testleri, sözlü sınav/görüşme, klasik yazılı sınavlar, yeterlilik sınavları, araştırma makalesi/tez, ödevler, anket/ön test-son test, staj şeklinde; alternatif ölçme araçlarını ise performans değerlendirme, portfolyo, gösteri/drama, günlük, dereceleme ölçekleri (rubrik), çevrimiçi tartışma/çevrimiçi sınav, durum çalışması, kavram haritaları, yansıtıcı mektup, proje, yapılandırılmış grid, tanılayıcı dallanmış ağaç, akran değerlendirme, kendi kendini değerlendirme ve grup değerlendirme şeklinde kategorize etmiştir.

İster yüz yüze ister uzaktan olsun öğrenme-öğretme sürecinde önemli bir rol üstlenen ölçme ve değerlendirme sonucu yapılan geri bildirimler özellikle öğrenen merkezli bireysel öğrenmenin hakim olduğu AvUE sisteminde kullanılabilecek farklı ölçme araç ve teknikleri ile öğrenenler öğrenme eksikliklerini belirleyebilecek, kurumlar ise eğitim etkinliklerini daha verimli hale getirmek için gerekli çalışmaları yapabilecektir.

## Uzaktan eğitimde yenilikçi e-değerlendirme araçları

Geleneksel değerlendirme yöntemleri günümüzün ihtiyaç duyduğu karmaşık problemleri çözme, yaratıcılık ve değerlendirme gibi öğrenenlerin dijital çağda ihtiyaç duyulan üst düzey zihinsel becerilerinin değerlendirilmesinde sınırlı kalmaktadır ve kullanışlı görülmemektedir (Bates,2014, s.549). Bu nedenle çağın ihtiyaçlarına göre ortaya çıkan öğrenen yeterliliklerini ölçebilen yenilikçi değerlendirme araçlarına ihtiyaç duyulmaktadır.

Eğitim alanında teknolojiye dayalı değerlendirme ya da bir diğer adıyla e-değerlendirme yaklaşık olarak 20 yıldır yapılabilmektedir ancak 2020 yılında yaşanan Covid-19 pandemisi ile birlikte eğitim sistemine dahil olan e-öğrenme süreci beraberinde kurumların e- değerlendirme için hangi aracı kullanmaları gerektiği sorusunu gündeme getirmiştir. AvUE de kendi kendine çalışma ve kendi kendine öğrenme ilkelerine dayalı değerlendirme uygulamalarının ders içeriklerine entegre edilmesi gerektiğinden yapay zeka teknolojisinden yararlanarak farklı e-değerlendirme araçları geliştirilmeye başlanmıştır.

İlk olarak yaygın olarak kullanılan öğrenme yönetim sistemlerinden bahsedecek olursak, bir öğrenme sürecini yönetmenin yanı sıra çok fazla ölçme ve değerlendirme türleri sunmaktadır. Örneğin; açık kaynak kodlu bir öğrenme yönetim sistemi olan Moodle'da bütün değerlendirme türlerine ek olarak resimli, sesli ya da videolu soru sorulabilmektedir ve sınav bittiğinde anında geri bildirim sağlanabilmektedir.

Bir diğer ölçme ve değerlendirme ortamı ise Google Formlar'dır. Doğru yanlış, anket, kısa cevaplı, çoktan seçmeli gibi değerlendirme türleri bulunmaktadır.

Üçüncü olarak ise; değerlendirme türlerinin büyük bir çoğunluğunu sunan platformlardan olan Quizmaker isimli Web 2.0 aracıdır. Ücretsizdir. Farklı puanlama türleri (yıldız, emoji gibi) sunmaktadır. Ölçme ve değerlendirme sonrasında elde edilen sonuçlar ortam tarafından grafik olarak sunulmaktadır. Sertifika verilebilmektedir. Oyunlaştırma ile liderlik tabloları oluşturulabilmektedir.

Uzaktan eğitimde bireylerin ürün oluşturup paylaşım yapabilecekleri uygulamaya örnek olarak Padlet verilebilir. Kullanımı kolay, işbirlikçi çalışmaya uygun, kişiselleştirilebilir bir ortamdır (Sese,2020). Yorumlar ve geri bildirim verilmesine ve tartışma ortamının oluşturulmasına imkan sağlamaktadır.

Bu araçların yanı sıra;

1- Çoktan seçmeli testler, eşleştirme, doğru yanlış soru tarzları için Kahoot, Socrative, Wordwall, Quizizz;

2- Soru cevap ve kelime bulutu için Mentimeter, Tricider;

3- Boşluk doldurma Wooclap,Liveworksheets,

4- Portfolyo için Edmodo ve Blogger, Google Sites, Tumblr

5- Kavram haritaları için Mindmeister ve Coggle

6- Akran değerlendirmesi için PeerStudio

Öğretenler tarafından kullanılabilecek yenilikçi e-değerlendirme araçlardır. AvUE'de değerlendirme yapmak için kullanılabilecek araçlar sadece bunlar ile sınırlı değildir. Farklı tür değerlendirmeler için H5P, Articulate Storyline, Kubbu, Quizlet, Spiral, Peergrade, Edpuzzle, iSpring Suite, Nearpod, Fluency Tutor, Assesment Generator, Clicker, iMocha, gibi çoğunluğu ücretsiz olan birçok araç bulunmaktadır.

## Uzaktan eğitimde ölçme ve değerlendirme için öneriler

Eğitimde ölçme değerlendirme denildiğinde öncelikle sınavlar (summative değerlendirme) akla gelmektedir. Bu bağlamda bu çalışmada hem bu yargıyı test etmek hem de yenilikçi bir aracı tanıtmak amacıyla 29 Haziran 2023 tarihinde ICETOL konferansında yapılan sunum esnasında "Mentimeter" aracından yararlanılarak katılımcıların ölçme değerlendirme farkındalığı ile ilgili bilgi düzeylerinin ne seviyede olduğunu görmek amacıyla katılımcılara "Ölçme değerlendirme denilince aklınıza ilk gelen ifade nedir?" sorusu yöneltilmiştir. Gelen sonuçlar anında kelime bulutunda katılımcılara gösterilmiştir.
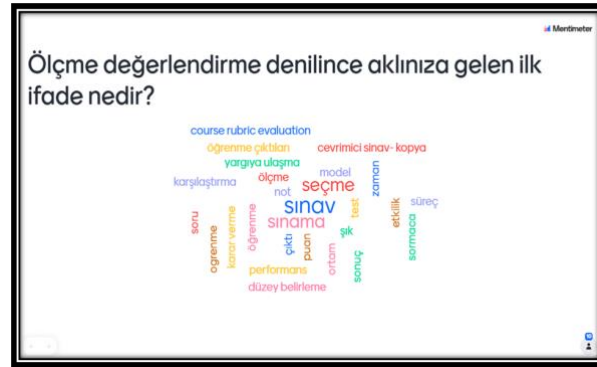


Şekil 1. Mentimeter ortamında kelime bulutu,

Resimde de görüldüğü gibi 10 kişinin katılımı ile gerçekleştirilen uygulamada sınav ifadesinin etrafında yoğunlaşıldığı görülmektedir. Oysa geleneksel ölçme araçlarının günümüz öğrenenleri için yetersiz kaldığı, 21. Yüzyıl becerilerini ölçebilen, istihdama yönelik yenilikçi ölçme araçlarına ihtiyaç olduğu sunumda vurgulanmıştır. Bu bağlamda ilk olarak öğretenlerin bakış açılarını değiştirmeleri gerektiği görülmektedir. Alışılagelmiş ölçme ve değerlendirme sürecinin eksikliklerini gideren, öğretim sürecini destekleyen, gelişen teknolojinin ölçme ve değerlendirme süreçlerine getirmiş olduğu yeniliklerin farkında olan öğretenlere ihtiyaç duyulmaktadır. Çünkü açık ve uzaktan eğitim sistemleri kapsamında gerçekleştirilen ölçme ve değerlendirme faaliyetlerinin dünya genelinde, 21.yüzyıl öğrenenlerinin üst düzey düşünme becerilerinin değerlendirilmesine imkân sunacak niteliğe kavuşturulması gerekmektedir. 2017 yılında Amerika Birleşik Devletleri'nin Eğitim Bakanlığı'na bağlı olan Eğitim Teknolojileri Ofisi tarafından yayınlanan raporda 'ölçme ve değerlendirme süreçleri öğrenme sonrasında değil öğrenmeyle bütünleşmiş, kısıtlı değil evrensel erişilebilir, sabit değil uyarlanabilir, gecikmiş değil gerçek zamanlı geri bildirim sağlamalıdır' ifadesi yer almaktadır (Office of Educational Technology,2017).

Teknolojinin sunduğu e-değerlendirme araçlarının öğrenme süreçlerine kazandırmış olduğu yararlar ölçme ve değerlendirme süreçlerine de yansımıştır (Ghouali, vd. 2020). Göz izleme, veri madenciliği gibi veri elde etme seçeneklerinin artması ile ölçme ve değerlendirme uygulamalarında yeni yaklaşımların benimsenmesinin öğretim

süreçlerini ve öğrenen başarısını destekleyeceği düşünülmektedir. Bu bakımdan gelişen teknoloji ile ölçme ve değerlendirme uygulamalarında kullanılan araçları sonuç odaklı değil süreç odaklı kullanarak öğrenenlere bireysel destek sağlanabilir.

Eğitim ortamlarının çeşitlenmesi, öğretim teknolojilerinin gelişmesi ile bu araçların sayılarının ve çeşitliliğinin de artması olasıdır. Ancak, öğrenme sürecinde kullanılan bu araçların ne amaçla üretildiği değil, öğretim süreçlerinde nasıl kullanılması gerektiği bilinmelidir.

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# STEM Araştırma Eğilimlerini Keşfetmek: Bibliyometrik Bir İçgörü

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## Özet

STEM terimi İngilizce'de bilim, teknoloji, mühendislik ve matematik (science, technology, engineering, andmathematics) anlamına gelen bir kısaltmadır ve dört akademik disiplini birleştiren bir eğitim yaklaşımını ifade eder. STEM, öğrencilere okulda öğrendiklerini günlük yaşantılarında kullanma deneyimi sunar. STEM eğitimi ile 21. yüzyıl becerileri denilen problem çözme becerisi, yenilikçilik, eleştirel ve analitik düşünme yetisi gibi becerilerin geliştirilmesi hedeflenmektedir. STEM ile ilgili çalışmalar incelendiğinde konuyla alakalı çalışmaların güncel bilgisini içeren bir bibliyometrik analize rastlanmamıştır. Bu tarama çalışmasında STEM kavramı genel hatlarıyla tanıtıldıktan sonra, WoS ve Scopus veri tabanlarında 1999–2023 tarihleri arasında sadece İngilizce yayınlanmış olan STEM temalı yayınlar bibliyometrik yöntemlerle incelenmiş, STEM eğitimi konusunun akademik dünyada nasıl ve ne kapsamda ele alındığı belirlenmiştir. Yayınlar "stem", "science", "technology", "engineering" ve "mathematics" anahtar kelimeleri kullanılarak ilgili veri tabanlarında aranmıştır. WoS veri tabanında abstract (özet), title (başlık), author keywords (yazar anahtar kelimeleri) ve keyword plus (ekstra anahtar kelime) alanlarında arama yapılmıştır. Scopus veri tabanında ise article title (makale başlığı), abstract (özet) ve keywords (anahtar kelimeler) alanlarında arama yapılmıştır. Anahtar kelimelerin kombinasyonları değerlendirilmiştir. Erişilen sonuçlar betimsel olarak irdelenmiş, araştırma kapsamında ele alındığı şekliyle STEM tanımına uymayan yayınlar çalışmanın dışında tutulmuştur. Bu yöntemle 13.695 bilimsel yayına ulaşılmıştır. STEM ile ilgili genel eğilimin belirlenmesi için akademik yayınların bibliyometrik analizi yapılmıştır. Ortak kelimeler tespit edilmiş, yayın sayıları ve atıf ilişkileri, grafiklerle ve tablolarla analiz edilerek yorumlanmıştır. Ayrıca, bilimsel çalışmaların yıllara, ülkelere göre dağılımları belirlenmiş ve atıf ilişkileri incelenmiştir. Çalışma sonucunda, STEM temalı yayınlarda en çok kullanılan anahtar kelimelerin eğitim, cinsiyet, robotik, problem çözme becerisi, bilgisayarca düşünme, 3d yazıcı ve proje tabanlı öğrenme olduğu belirlenmiştir. Genel anlamda STEM araştırmalarının yıllara ve ülkelere göre portresi çizilmiştir. Çalışma sonuçlarına dayanarak, pandeminin yayınlar üzerindeki olumsuz etkisi olduğu söylenebilir. Ayrıca Türk araştırmacıların ağırlıklı olarak Amerika Birleşik Devletleri ile iş birliği içinde çalıştığı, diğer ülkelerle çalışmaların teşvik edilmesi gerektiği ortaya çıkmaktadır. Bu çalışmada iki nitelikli veri tabanına odaklanılmıştır; ilave veri tabanlarında tarama yapmak diğer nitelik seviyelerindeki eğilimleri de sergileme ve farkı ortaya koyma imkânı sunabilir.

**Anahtar Kelimeler**: STEM, STEM eğitimi, bibliyometrik analiz, bilim, teknoloji, mühendislik, matematik

# Giriş

İçinde bulunduğumuz yüzyılda teknolojinin ve inovasyonun ilerlemesiyle ihtiyaç duyulan insan modeli, problemleri tanımlayabilen ve ilerleyen yeniliklere ayak uydurabilen, hızla değişen bilgi yığınında bilgiyi kolayca bulabilen, günlük yaşantısında okulda öğrendiği bilgileri kullanabilen bireyleri temsil eder. Bu tarz beceriler daha çok bilim, teknoloji, mühendislik ve matematik (STEM) becerilerini içermektedir. STEM science (bilim), technology (teknoloji), engineering (mühendislik) ve mathematics (matematik) disiplinlerinin İngilizcelerinin baş harflerinden oluşturulmuş bir kısaltmadır. STEM ilk olarak 1990'lı yılların başında Ulusal Bilim Vakfı (NSF) tarafından "SMET" adı altında öne sürülmüştür (Dugger, 2010). Bir NSF görevlisinin SMET'in İngilizce'deki "smut" kelimesine benzerliğinden dolayı itirazı üzerine STEM olarak değiştirilmiştir (Sanders, 2008).

Günden güne STEM eğitimi, eğitim, yenilikçilik ve rekabette uluslararası bir model haline gelmiştir. STEM eğitimi okul öncesi eğitimden lisansüstü eğitim kademelerine kadar her seviyede kullanılmaktadır. STEM eğitimi disiplinlerarası bir eğitim yaklaşımı içeren bilim, teknoloji mühendislik ve matematik branşlarının birbirine entegrasyonunu hedefleyen bir öğretim sistemidir (Akgündüz vd., 2018). STEM eğitimi ile öğrenciler iş birliği içinde, matematik ve bilimdeki bilgilerini mühendislik tasarım süreçleriyle ürüne dönüştürebilmektedir.

STEM eğitiminin içeriği 21. yüzyıl becerileri olarak adlandırılan yaratıcık, iş birliği, problem çözme, eleştirel düşünme, esnek ve uyumlu olma gibi yeteneklerin geliştirilmesinde katkı sağlar (Dare vd., 2021). İlgili literatür incelendiğinde bu kadar önemli bir eğitim yaklaşımıyla ilgili iki veri tabanını birleştirerek detaylı analiz sunan bir bibliyometrik analiz çalışmasına rastlanmamıştır. Genelde çalışmalar tek bir veri tabanına odaklanmakta ve yayınların sadece küçük ya da kısıtlı bir kesitini analiz etmektedir. Örneğin, Silva Díaz vd. (2022) tarafından Scopus ve WoS veri tabanlarını birleştiren bir çalışmada ortaöğretim ve ilköğretim öğrenci ve öğretmenleriyle

ilgili, STEM, STEAM ve bilim eğitimi alanlarında ve kullanılan teknoloji türüne göre yayınlar sınıflandırılarak bir analiz gerçekleştirilmiştir. En çok üretim yapan ülkeler Amerika Birleşik Devletleri, Tayvan, Türkiye'dir. En sık kullanılan anahtar kelimeler 2010- 2012 yılları arasında sanal gerçeklik, etkileşimli öğrenme iken, 2013-2014 yıllarında arttırılmış gerçeklik, interaktif öğrenim ortamları, robotik olmuştur. 2015-2016 yıllarında arttırılmış gerçeklik ve eğitim robotları anahtar kelimeleri öne çıktığı görülmüştür. 2017-2018 yılların arttırılmış gerçeklik tekrar en sık kullanılan anahtar kelime olmuştur. 2019-2020 yıllarında da arttırılmış gerçeklik, sanal gerçeklik, STEM ve robotik kelimeleri en fazla kullanılan anahtar kelimeler olduğu görülmüştür. 2017 yılından itibaren yayın sayıların önemli bir artış olduğu, STEM ve STEAM yaklaşımları üzerinde fen disiplinin daha baskın olduğu belirlenmiştir. Marín-Marín vd. (2021) tarafından yapılan bir çalışmada ise 2006–2020 yılları arasında WoS veri tabanındaki STEAM eğitimi (STEAM-EDU) alanında yapılan yayınlar bibliyometrik analiz yöntemiyle incelenmiştir. En fazla çalışmanın 2019 yılında yapıldığı ve 2020 yılında yayınlarda bir düşüş meydana geldiği rapor edilmiştir. Çalışmaların genelinin İngilizce dilinde, eğitim ve eğitim araştırmaları kapsamında yayımlandığı bildirilmiştir. En yüksek STEM eğitimi temalı yayın üreten kurumun University System of Georgia olduğu belirlenmiştir. STEM eğitimi alanında en fazla yayın üreten yazarlar J. Bazler ve M.Vansickle'dir. Yine bahsi geçen çalışmada en fazla yayın üreten derginin ASEE (Annual Conference Exhibition) olduğu ve en üretken ülkenin ise Amerika Birleşik Devletleri olduğu görülmüştür. Mevcut çalışmada STEAM eğitimi ya da ortaöğretim ve ilköğretim öğrencileri ile gerçekleştirilme gibi bir odaklanma olmaksızın STEM yayınları iki veri tabanında birden irdelenmiştir.

Bibliyometrik çalışmalar, belirli bir alanyazın hakkında sayısal bilgileri özetleyen çalışmalardır. STEM konusunda yapılan akademik çalışmaların güncel olarak sayısal bilgisini içeren bu çalışmanın bu alanda çalışmak isteyen araştırmacılara yol gösterici olması muhtemeldir. STEM eğitimi alanında ülkelerin üretkenliğini değerlendirmek, yayın çıktılarını analiz etmek açısından da fikir vereceği düşünülmektedir. Bu çalışmanın amacı WoS ve Scopus veri tabanlarında yayımlanmış olan STEM temalı bilimsel çalışmaları bibliyometrik analiz yoluyla değerlendirmektir. Araştırmanın amacı doğrultusunda şu sorulara cevap aranmıştır:

1. STEM temalı yayınlarda kullanılan anahtar kelimelerin dağılımı nasıldır?
2. STEM temalı yayın ve atıf sayılarının dağılımları nasıldır?
3. STEM temalı yayınların ülkelere göre dağılımı nasıldır?
4. STEM temalı yayınların yayın türüne göre dağılımı nasıldır?

## Yöntem

Bu çalışmada çalışmanın amacı doğrultusunda bibliyometrik analiz yöntemi kullanılmıştır. Bibliyometrik analiz, belirli bir alanyazındaki yayınların menşei, türleri ve sayısal çıktıları hakkında bilgi veren bir yöntemdir. Bu analiz türünü bilimin her alanında uygulamak mümkündür ve bibliyometrik analiz özellikle bilimsel bir alanda derinlemesine incelemeler yapılmadan önce bir ön adım olarak iş görebilir (Koç vd., 2022).

### Veri Toplama

Araştırmaya dahil edilmek istenen yayınlar "stem", "science", "technology", "engineering" ve "mathematics" anahtar kelimeleri kullanılarak iki veri tabanında aranmıştır. WoS veri tabanında abstract (özet), title (başlık), author keywords (yazar anahtar kelimeleri) ve keyword plus (ekstra anahtar kelime) alanlarında arama yapılmıştır. Scopus veri tabanında ise article title (makale başlığı), abstract (özet) ve keywords (anahtar kelimeler) alanlarında arama yapılmıştır. Anahtar kelimelerin kombinasyonları kullanılmıştır.

### Evren ve Örneklem

STEM alanında WoS veri tabanından 7.503 adet ve Scopus veri tabanından 15.241 adet olmak üzere, toplamda 22.744 bilimsel yayın bu çalışmanın evrenini oluşturmuştur. Bu yayınlar 1999–2023 tarihleri arasında ve İngilizce dilinde olan çalışmaları içermektedir. Birbirini tekrarlayan veriler çıkarıldığı zaman kalan 13.695 bilimsel çalışma araştırmanın örneklemini oluşturmuştur.

### Veri Analizi

1999–2023 yılları arasında yayımlanmış olan 13.695 adet bilimsel yayının hem Excel programında hem WoS ve Scopus veri tabanları üzerinden betimsel analizleri yapılmıştır. Bibliyometrik analiz yöntemi ile çalışmalar anahtar kelimeleri, yayın sayıları, atıf sayıları, ülkeleri ve yayın türlerine göre analiz edilmiştir. Elde edilen sonuçlar grafikler ve tablolar olarak görselleştirilerek sunulmuştur.

# Bulgular

1999–2023 yılları arasında WoS ve Scopus veri tabanlarında yayımlanmış olan sadece İngilizce dilindeki STEM temalı 13.695 adet bilimsel çalışma bibliyometrik analiz yöntemiyle incelenmiştir. Çalışmalar anahtar kelimelere, yıllara, ülkelere ve yayın türlerine göre analiz edilmiştir. Tablo 1 bu anlamda elde edilen yayınları özetlemektedir.

Tablo 1. Bibliyometrik analiz özeti

| Tanım | Sonuç |
|---|---|
| Zaman Aralığı | 1999–2023 |
| Kaynaklar (Dergi, Kitap, vb.) | 3.566 |
| Belgeler | 13.695 |
| Anahtar Kelimeler | 17.526 |
| Yazarlar | 29.036 |

## Anahtar Kelimelere Göre Dağılım

Çalışmanın araştırma sorularından ilki doğrultusunda, WoS ve Scopus veri tabanlarında bulunan 1999–2023 yılları arasında yayınlanmış STEM temalı yayınların anahtar kelimeleri arasındaki ilişkiler incelenmiştir. 13.695 bilimsel yayında kullanılmış 17.526 adet anahtar kelime bulunmaktadır. STEM temalı yayınlarda en çok kullanılan anahtar kelimeler STEM, STEM eğitimi, teknoloji ve bilim kelimeleridir. STEM eğitiminin içinde bulunan kelimeler dışında yaygın olarak tercih edilen ilk beş kelime Tablo 2'de gösterilmiştir.

Tablo 2. Anahtar kelimelerin yıllara göre dağılımları

| Yıl | Eğitim | Cinsiyet | Robotik | Bilgisayarca Düşünme | Proje Tabanlı Öğrenme |
|---|---|---|---|---|---|
| **1999** | 0 | 0 | 0 | 0 | 0 |
| **2000** | 0 | 0 | 0 | 0 | 0 |
| **2001** | 2 | 0 | 0 | 0 | 0 |
| **2002** | 4 | 0 | 0 | 0 | 0 |
| **2003** | 5 | 0 | 0 | 0 | 0 |
| **2004** | 6 | 0 | 0 | 0 | 1 |
| **2005** | 6 | 0 | 0 | 0 | 1 |
| **2006** | 7 | 1 | 0 | 0 | 1 |
| **2007** | 8 | 3 | 1 | 1 | 1 |
| **2008** | 13 | 4 | 2 | 1 | 1 |
| **2009** | 18 | 6 | 5 | 1 | 1 |
| **2010** | 26 | 13 | 11 | 2 | 1 |
| **2011** | 39 | 21 | 16 | 3 | 3 |
| **2012** | 50 | 30 | 17 | 5 | 3 |
| **2013** | 66 | 40 | 28 | 11 | 8 |
| **2014** | 88 | 59 | 37 | 13 | 14 |
| **2015** | 122 | 93 | 49 | 20 | 23 |
| **2016** | 166 | 118 | 66 | 31 | 35 |
| **2017** | 223 | 171 | 84 | 42 | 48 |
| **2018** | 301 | 225 | 109 | 60 | 60 |
| **2019** | 382 | 295 | 143 | 86 | 85 |
| **2020** | 431 | 343 | 158 | 113 | 104 |
| **2021** | 489 | 405 | 172 | 141 | 119 |
| **2022** | 527 | 471 | 186 | 157 | 130 |
| **2023** | 529 | 474 | 187 | 157 | 130 |
| **Toplam** | 3.508 | 2.772 | 1.271 | 844 | 769 |

Eğitim kelimesinin 2001 yılından 2023 yılına kadar STEM temalı çalışmalarda en fazla kullanılan kelime olduğu görülmüştür. STEM eğitimiyle öğretilen robotik kodlamayı ifade eden robotik kelimesinin 2007 yılından itibaren kullanılmaya başlandığı söylenebilir. Bilgisayarca düşünme becerisi ve proje tabanlı öğrenme gibi 21. yüzyıl yetkinliklerinin de STEM temalı çalışmalarda yazarların sıklıkla kullandığı anahtar kelimeler arasında olduğu görülmektedir.

## Yıllara Göre Dağılım

1999–2023 yılları arasındaki STEM temalı yayınların yıllara göre dağılımları Şekil 1'de gösterilmiştir.



| Yıl | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Yayın sayısı | 17 | 13 | 31 | 40 | 50 | 63 | 79 | 105 | 139 | 157 | 173 | 343 | 443 | 460 | 509 | 589 | 806 | 953 | 1181 | 1292 | 1733 | 1667 | 1577 | 1256 | 19 |
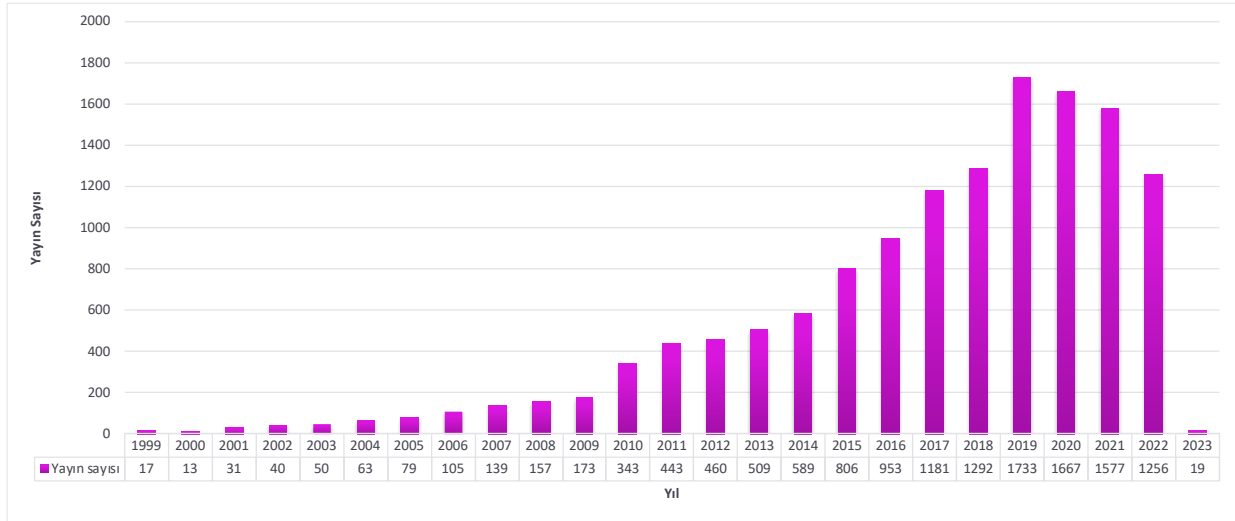
Şekil 1. Çalışmaların yıllara göre dağılımı

Yayın sayılarının 2019 yılına kadar sürekli artarken 2020 yılından itibaren düşmeye başlamış olduğu görülmektedir. Ayrıca, 2010 yılında popülerliğin ivme kazandığı fakat birkaç sene sonra bu ivmenin sönümlendiği de dikkat çekmektedir.

## Atıfların Yıllara Göre Dağılımı

Yayınların atıf sayılarının yıllara göre dağılımı Şekil 2'de gösterilmiştir. Şekil 2'ye göre atıf sayılarının genel olarak her yıl artan bir eğilim sergilediği görülmüştür. Yayın sayılarında görülen dalgalanmaların atıf sayılarında o kadar keskin olmadığı görülmektedir. Ancak 2021'den 2022'ye geçişte bir yavaşlama göze çarpmaktadır.



| Yıl | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Atıf sayısı | 0 | 11 | 26 | 66 | 125 | 193 | 257 | 353 | 449 | 600 | 744 | 982 | 1656 | 2017 | 2831 | 3939 | 5234 | 6866 | 9532 | 11884 | 17433 | 23112 | 30010 | 33011 |
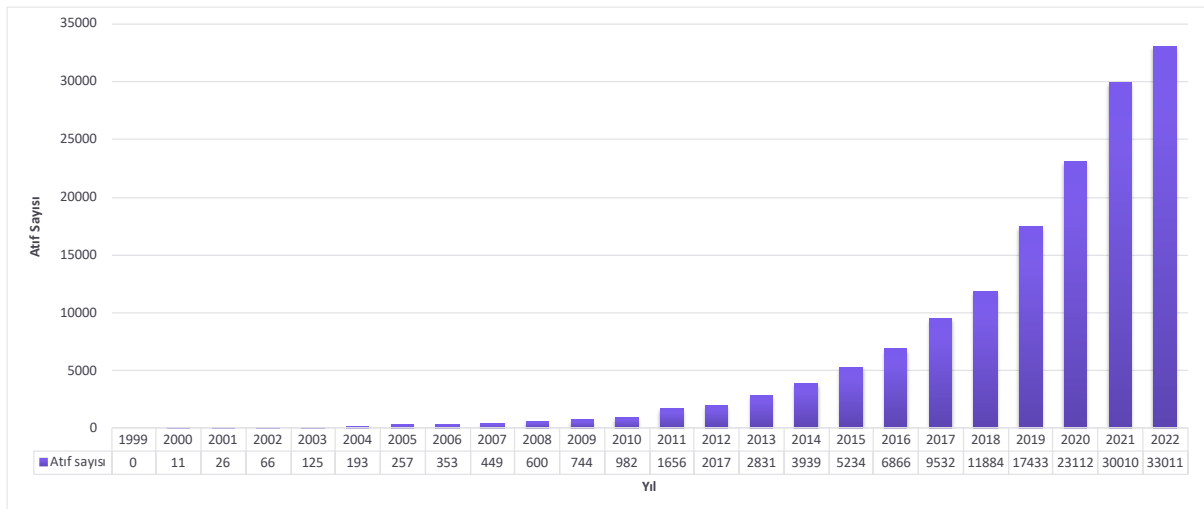
Şekil 2. Atıf sayılarının yıllara göre dağılımı

## Ülkeler Arası Yayın İlişkisi

STEM temalı çalışmaların ülkeler arası iş birliği ilişkisi Şekil 3'te gösterilmiştir.



Şekil 3. Ülkeler arası iş birliği ağı

WoS ve Scopus veri tabanlarında 1999–2023 yılları arasında yayımlanmış olan sadece İngilizce dilindeki STEM temalı yayınların ülkeler arası iş birlikleri incelendiğinde diğer ülkelerle en fazla iş birliği içinde olan ülkenin Amerika Birleşik Devletleri olduğu görülmüştür. Sonrasında ise İspanya, İngiltere, Almanya, Avusturalya ve Kanada'nın STEM temalı yayınlar konusunda diğer ülkelerle iş birliği içinde olduğu anlaşılmıştır. Türkiye'nin ise sadece Amerika Birleşik Devletleri ile yoğun ilişki içinde olduğu dikkat çekmektedir.

## Yayın Türüne Göre Dağılım

STEM temalı yayınların yayın türüne göre dağılımları Şekil 4'te verilmiştir. Şekil 4'e göre STEM temalı yayınlar en fazla makale türünde sonrasında ise bildiri türünde karşımıza çıkmaktadır. Editör materyali ve mektup gibi yayınlar ise son derece azdır.

Şekil 4. Çalışmaların yayın türüne göre dağılımı

## Sonuçlar

1999–2023 yılları arasında WoS ve Scopus veri tabanlarında sadece İngilizce dilinde yayımlanmış olan 13.695 adet STEM temalı bilimsel çalışma tespit edilmiş ve bunlar bibliyometrik analiz yöntemiyle irdelenmiştir. Çalışmalarda en çok kullanılan anahtar kelimelerin doğal olarak öncelikle STEM kavramını oluşturan anahtar kelimeler olduğu, yani STEM, STEM eğitimi, teknoloji, bilim, eğitim ve mühendislik olduğu görülmüştür. Robotik, bilgisayarca düşünme ve proje tabanlı öğrenme gibi konuların STEM temalı yayınlarda sıklıkla kullanılan anahtar kelimeler içinde bulunmaları, bu konuların STEM eğitimiyle öğretilen becerilerin başında gelmesinden kaynaklanıyor olabilir. Su & Yang'ın (2023) çalışmasına göre de en fazla kullanılan anahtar kelimelerin sırasıyla STEM, STEM eğitimi ve küçük çocuklar olduğu görülmüştür.

Çalışmaların yıllara göre dağılımına bakıldığında yıllar arasındaki farklar açısından en büyük farkın 2018–2019 yılları arasında olduğu görülmüştür. Yayın sayılarındaki en büyük sıçrama 2019 yılında yaşanmıştır. Yayın sayıları her yıl artarken 2020 yılından itibaren ise düşmeye başlamıştır. 2020 yılındaki düşüşün sebebinin Covid-19 pandemisi olduğu düşülmektedir. COVID-19 salgını, COVID-19 ile ilgili yayınların katlanarak artmasına neden olmuştur (Khalifa vd., 2021; Sepúlveda-Vildósola vd., 2020), ancak kadınların yayın sayısında düşüş bildirilmekle beraber (Vincent-Lamarre vd., 2020) diğer alanlardaki yayınların da bu eğilimi izlemediği açıktır. Ayrıca 2022 yılında daha da fazla bir düşüş meydana geldiği gözlemlenmiştir. Bu da pandeminin süregelen etkileriyle ilişkilendirilebilir. Bunun sebeplerinden birisi, çabaların ve kaynakların önemli bir kısmının pandemiyle mücadeleye kaydırılmış olması olabilir (Khalifa vd., 2021).

Atıf sayılarının yıllara göre dağılımına bakıldığında atıfların her yıl artan bir grafik sergilediği görülmektedir. Bu da STEM konusunun popülerliğini sürdürdüğünün bir işareti olarak görülebilir. Atıflar doğası gereği artan bir eğilim sergilemekte ve daha uzun süreçler içerisinde değişim sergileyebilmektedir. "Atıf sayıları zamanla artar, eski makaleler daha yeni makalelere göre ortalama olarak daha fazla atıf alır" ve "alıntılar, alana bağlı oranlarda birikir. Örneğin, yaşam bilimleri teknolojik ve sosyal bilimlere göre daha verimlidir ve ortalama olarak daha yüksek alıntı oranları sergiler" (Szomszor vd., 2021, s.2).

STEM temalı yayınlar arasında ülkeler arası iş birliği konusunda en önde olan ülkenin Amerika Birleşik Devletleri olduğu görülmüştür. STEM eğitimine ilk ihtiyaç duyan ve kavramı tanımlayan ülke Amerika Birleşik Devletleri'dir. Türkiye'nin de STEM temalı yayınlar konusunda en çok iş birliği içinde olduğu ülke Amerika Birleşik Devletleri'dir. Bu çalışmayla paralel bir şekilde, Zhan vd. (2022) tarafından yapılan çalışmaya göre de STEM alanında en üretken ülke Amerika Birleşik Devletleri'dir.

Çalışma sayılarının yayın türlerine göre dağılımı incelendiğinde, en fazla makale türünde yayınların bulunduğu, sonrasında ise bildirilerin ön planda olduğu görülmüştür. Makale ve bildirilerin diğer yayın türlerine göre çok daha büyük bir oranı kapsadığını görmekteyiz ki bu, yayın türlerinin genel eğilimiyle örtüşmektedir.

## Öneriler

Literatürde STEM temalı yayınlar ile ilgili sınırlı sayıda ve bu araştırma çalışmasından farklı bibliyometrik analiz çalışmaları bulunmaktadır. Örneğin, Zhan vd. (2022) çalışmalarında 2004–2021 yılları arasında STEM

eğitimindeki küresel araştırma sonuçları ile ilgili WoS veri tabanından elde ettikleri 1.718 akademik çalışmanın bibliyometrik analiz yöntemle dağılımlarını incelemiştir. İlgili çalışmadaki STEM konulu küresel yayınların ve atıfların dağılımlarına bakıldığında, en fazla yayının 2015 yılından itibaren STEM eğitiminin doğum yeri olan Amerika Birleşik Devletleri'nde üretildiği görülmüştür. Sonrasında ise sırayla Çin, Avusturalya ve Türkiye gelmektedir. Ülkeler arası uluslararası iş birliğinde Amerika Birleşik Devletleri'nin merkezde ve diğer ülkelerle en fazla iş birliği içinde olan ülke olduğu belirlenmiştir. Konu alanlarına göre en fazla STEM, öğretim düzeyine (öğrenci yaş aralığına) göre ise daha çok yüksek öğretim seviyesinde çalışıldığı belirtilmiştir. Talan (2021) çalışmasında STEM eğitiminde arttırılmış gerçeklik uygulamalarının kullanımına ilişkin bir bibliyometrik araştırma yapmıştır. WoS veri tabanından elde ettiği 741 bilimsel çalışmada en fazla 2020 yılında yayın üretildiğini tespit etmiştir. En fazla yayın üreten ülkenin İspanya, en fazla yayın çıkaran ve atıf alan derginin ise Computers & Education olduğunu belirtmiştir. Talan'ın çalışmasında kurumlar açısından yazarların en fazla birlikte çalıştığı kurum Ulusal Tayvan Bilim Üniversitesi'dir. Ülkeler arası iş birliklerinde ise sırasıyla İngiltere, İspanya, Avusturalya, Çin ve Amerika Birleşik Devletleri önde gelmektedir. Son olarak en çok kullanılan kavramların arttırılmış gerçeklik, sanal gerçeklik, mobil öğrenme, bilim eğitimi ve karma gerçeklik olduğunu belirlemiştir. Su & Yang (2023) tarafından gerçekleştirilen çalışmada erken STEM eğitimini içeren bilimsel yayınların bibliyometrik analizi gerçekleştirilmiştir. WoS veri tabanından elde ettikleri 129 makale üzerinde yaptıkları analizde yayınların en çok Amerika Birleşik Devletleri, Türkiye ve Avusturalya'da yürütüldüğü ortaya çıkmıştır. En fazla yayın 2022 yılında yayımlanmış ve en fazla atıf ise 2020 yılında yapılmıştır. En fazla yayın üreten kurum Tufts Üniversitesi, en fazla yayın üretilen alanların eğitim ve eğitim araştırmaları alanı olduğu görülmüştür. Anahtar kelime olarak tercih edilen kelimeler STEM, erken çocukluk, STEM eğitimi terimleri olduğu belirlenmiştir. Bu mevcut çalışmada ise nitelikli iki veri tabanına birden odaklanılmıştır. Yayınların dağılımları ve eğilimleri incelenmiştir.

Pandeminin yayınlar üzerindeki olumsuz etkisi analiz sonuçlarında görülebilmektedir. Ayrıca, pandemi gibi olağanüstü durumlarla başa çıkabilmek için STEM alanında daha fazla çalışma yapılmalıdır. STEM alanında yapılan araştırmaların azalan sayısını olumlu etkilemek için, akademisyenlerin teşvik edilmesi ve desteklenmesi önemlidir. Araştırmacılara daha fazla kaynak sağlanmalı, araştırma fonları ve burs imkânları sunulmalıdır.

Ülkeler arası iş birliği, STEM alanında daha verimli ve etkili çalışmalara olanak tanır. Türkiye'nin ağırlıklı olarak Amerika Birleşik Devletleri ile iş birliği içinde olduğu görülmektedir. Bu ise kısıtlı bir yayın potansiyeli sağlar. Türkiye ile diğer ülkeler arasında da ortak projeler, araştırma ağları ve bilgi paylaşımı teşvik edilmelidir.

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# Açık ve Uzaktan Öğrenmede Ciddi Oyunların Kullanımına İlişkin Bir Değerlendirme: Sistematik Alanyazın Taraması

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## Özet

Ciddi oyunların ortaya çıkışı ve gelişimi 'yıkıcı yeniliğe' dönüşebilecek ve eğitim kurumlarında kullanılabilecek bir öğrenme teknolojisidir. Ciddi oyunların gelişimi yüzyıllar öncesine dayanmasına rağmen son yıllarda dijitalleşen öğrenme ortamlarıyla birlikte popülerliğini artırdığı söylenebilir. Dijital ortamlarda eğitim amaçlı oyun konseptlerinin kullanımı giderek daha yaygın ve ilgi çekici hale gelmiştir. Oyunlar, kullanıcıları düzenli sistem kullanımına motive etmek ve katılımlarını artırmak için kullanılabileceği gibi, öğrenenlerin daha iyi öğrenme çıktıları elde etmelerini de destekleyebilir. Dijital öğrenme ortamlarında oyun kavramlarının geliştirilmesi ve kullanılması son zamanlarda daha önemli hale geldiğinden ve bunların geliştirilmesi hala tam olarak yerleşmediğinden, dijital öğrenmede ciddi oyunları içeren gelecekteki araştırma eğilimleri hakkında sorular ortaya çıkmaktadır. Çalışmanın araştırma boyutu kavramsal ve uygulamaya dönük tartışmaların ele alındığı sistematik bir alanyazın taraması olarak desenlenmiştir. 2021-2023 yılları arasında alanyazında ciddi oyunlar üzerine yapılan çalışmalar incelenmiştir. Web of Science veritabanında 'serious games' ve 'higher education' anahtar kelimeleriyle yapılan taramada 125 makaleye ulaşılmıştır. PRISMA modeli filtreleme kriterlerine uygun şekilde 24 makaleye erişilmiştir. Araştırma sonucunda ciddi oyunların potansiyelinin eğitimin farklı düzeylerinde kullanılabileceği gibi açık ve uzaktan öğrenme ortamlarına da yeni bir soluk getireceği düşünülmektedir.

**Anahtar Kelimeler:** Ciddi oyunlar, yükseköğretim, açık ve uzaktan öğrenme, dijital öğrenme ortamları

# An Evaluation on the Use of Serious Games in Open and Distance Learning: A Systematic Literature Review

## Abstract

The emergence and development of serious games is a learning technology that can become a 'disruptive innovation' and be used in educational institutions. Although the development of serious games dates back centuries, serious games have increased in popularity in recent years with the digitalization of learning environments. Using game concepts for educational purposes in digital environments has become increasingly common and exciting. Games can motivate users to use the system regularly and increase their engagement, but they can also support learners to achieve better learning outcomes. As the development and use of game concepts in digital learning environments have recently become more critical, and their development still needs to be fully established, questions arise about future research trends involving serious games in digital learning. The research dimension of the study is designed as a systematic literature review that addresses conceptual and practical debates. Studies on serious games in the literature between 2021 and 2023 were analyzed. A search of the Web of Science database with the keywords 'serious games' and 'higher education' yielded 125 articles. Following the PRISMA model filtering criteria, 24 articles were accessed. As a result of the research, the potential of serious games can be used at different levels of education and will bring fresh air to open and distance learning environments.

**Keywords**: Serious games, higher education, open and distance learning, digital learning environments

## Giriş

Oyun, gündelik hayatın vazgeçilmez bir parçasıdır (Huizinga, 1949). İnsanlar çok eski zamanlardan beri oyun oynamaktadır; örneğin tavla 5000 yılı aşkın bir süredir oynanmaktadır (Dörner vd., 2016b). Oyunlar, antik çağlardan günümüze kadar her türlü teknolojiye uyarlanabilen fantastik bir ortamdır (Costikyan, 2010). Birincil amacı saf eğlence olan diğer oyun türlerinden farklı olarak, ciddi oyunların temel amacı öğrenmedir (Abt, 1970). Esas itibariyle ciddi oyunlar, eğitim, beceri geliştirme ve eğitsel amaçlar için ya da tutumsal ve davranışsal

değişimi etkilemek için tasarlanmıştır (Ge ve Ifenthaler, 2017). Ciddi oyunlar potansiyel olarak çok çeşitli eğitim ve öğretim bağlamlarında ve kozmetik, teknoloji veya savunma gibi çeşitli sektörlerde kullanılabilir (Boyle vd., 2016; Allal-Chérif ve Bidan, 2017). Kullanımları öğrenmeye olan ilgi düzeyini artırabildiği ve hem yaratıcılığı hem de duygusal zekayı geliştirebildiği için öğrenme sürecini kolaylaştırdıkları ve enerji verdikleri kanıtlanmıştır. Oyun oynayarak öğrenme, öğrenenlerin diğer pasif, yenilikçi olmayan metodolojilere kıyasla daha üstün performans elde etmelerini sağlayan aktif, deneyimsel bir öğrenme biçimini teşvik eder (Corriveau, 2020). Ciddi oyunlar sadece bilgi aktarımı olarak algılanmamalıdır, becerilerin, performansın ve karar verme süreçlerinin iyileştirilmesi amacıyla da kullanılır (Kaczmarczyk vd., 2016).

Yeni teknolojilerin, özellikle de ciddi oyunların öğrenmeyi desteklemek için bir araç olarak kullanılması, öğrenenlerin eğitim süreçleri boyunca özerkliğe sahip olmalarını sağlamak için öğretme-öğrenme sürecinde değişiklikler gerçekleştirebilir. Duin ve Thoben (2014) oyunların yaratıcılığın, eleştirel duyunun ve sağlıklı rekabetin gelişimini desteklediğini savunmaktadır. Hocine (2019) ise, ciddi oyunların dikkat, özdenetim, kurallara saygı ve sunulan her oyun türüne göre algısal ve motor becerileri geliştirdiğini ifade etmiştir. Her iki görüş de incelendiğinde, ciddi oyunların öğrenenin bütünsel gelişimini teşvik etmek için güçlü bir kaynak olduğu sonucuna varılabilir.

Ciddi oyunlar eğlence ve pedagojik bileşenler arasında bir denge kurmalıdır (de Freitas, 2018; Franzwa vd., 2014). Bunların her birinin göreceli rolü üzerinde uzlaşılamamakta ve önemleri konusunda anlaşmazlıklar ortaya çıkmaktadır. Ancak bu karar, oyunla ulaşılmak istenen nihai sonucu ve öğrenenlerin etkinliğe az ya da çok bağlılığını etkiler (Arnab vd.,2012). Almeida ve Simoes (2019), oyuncuya önerilen zorluklarda bir dengeye ihtiyaç duyulduğunu ve bunların beceri ve bilgilerine uygun bir seviyeye yerleştirilmesi gerektiğini belirtmektedir. Bu, daha karmaşık zorlukların motivasyon kaybına yol açabileceği anlamına gelirken çok basit olması oyuncuların motivasyonunun düşmesine neden olabilir. Anlatı, ciddi bir oyunun tasarımında kilit bir unsurdur çünkü oyun ile bağlamı arasında bağlantı kurulmasına yardımcı olarak daha yüksek düzeyde bir bağlılık yaratılmasını sağlar (Naul ve Liu, 2020). Ayrıca, geri bildirim, ciddi oyunun etkili bir öğrenme aracı olması için gerekli bir unsurdur (Johnson vd., 2017; Nadolski ve Hummel, 2017). Geri bildirim aynı zamanda oyuncunun nerede ve neden yanlış yaptığını bilmesine de hizmet eder, böylece oyun deneyimi bir öğrenme sürecine dönüştürülebilir.

Açık ve uzaktan öğrenme ortamları öğrenenlere farklı ve çok çeşitli öğrenme içerikleri sunmaktadır. Ciddi oyunların kullanılmasıyla birlikte öğrenenler öğrenme aşamalarını geliştirebilir. Sistematik alanyazın taraması ile birlikte, ciddi oyunların pek çok faydasının açığa çıkacağı ve gelecekte yapılacak çalışmalara ışık tutacağı düşünülmektedir. Güncel çalışmaların ve eğilimlerin tespit edilmesi yapılacak çalışmalara yön verecektir. Çalışmanın amacı doğrultusunda aşağıdaki araştırma soruları oluşturulmuştur:

1. İncelenen çalışmaların demografik özellikleri nelerdir? (Çalışmaların yıllara, ülkelere ve dergilere göre dağılımı)
2. Ciddi oyunlar hangi alanlarda kullanılmaktadır?
3. Ciddi oyunlar hangi platformlarda, derslerde, tasarımlarda ve araçlarda kullanılmaktadır?

## Yöntem

Sistematik alanyazın taraması, önceden belirlenmiş araştırma sorularını protokollerde belgelenen yöntemleri kullanarak ve bulgularını güvenilir çalışmalara dayandırarak ön yargıyı en aza indirmeyi amaçlayan bir araştırma desenidir (Lasserson vd., 2019: 3).Sistematik alanyazın taramasının genel özellikleri, bir araştırma sorusunun önceden belirlenmesi; incelemenin kapsamı ve hangi çalışmaların araştırmaya dahil edilmeye uygun olduğu konusunda netlik, ilgili tüm çalışmaları bulmak ve dahil edilen çalışmalarda ön yargı konularının hesaba katılmasını sağlamak için her türlü çabayı göstermek; ve tespit edilen tüm araştırmalara dayalı olarak tarafsız ve nesnel bir şekilde sonuçlar çıkarmak için dahil edilen çalışmaları analiz etmektir (Lasserson vd., 2019: 4).

Bu araştırma PRISMA'nın değerlendirme yapısına dayanmaktadır. Bu raporlama standardı farklı alanlarda yaygın olarak kullanılmaktadır ve sistematik incelemelerin raporlanmasının bütünlüğünü artırmak için bu disiplinlerde yararlı bir raporlama kılavuzu olarak yaygın şekilde kabul edilmektedir.

### Araştırılan Veritabanları

Bu çalışmada taranan elektronik veri tabanları eğitim, bilgi teknolojileri ve sosyal bilimlerle ilgili olarak tanımlananları içermektedir. Web of Science Core Collection veritabanında: SCI-EXPANDED, SSCI, AHCI, CPCI-S, CPCI-SSH, BKCI-S, BKCI-SSH, ESCI.

### Arama Terimleri

Arama kriterlerine uygun şekilde çalışmaları belirlemek şu kelimeler kullanılmıştır: ('*Serious game*' AND *'higher education'*).

**İncelemeye Dahil Edilen Makalelerin Seçimi**

İncelemeye dahil edilecek uygun çalışmaları seçmek için bir dizi kriter belirlenmiştir. (a) İngilizce dilinde yapılan çalışmalar, (b) 2021-2023 yılları arasındaki çalışmalar, (c) özetin içinde veya başlıkta 'ciddi oyun' geçiren çalışmalar araştırmaya dahil edildi. Bu kriterlere uygun 125 makale belirlenmiş ve araştırmaya dahil edilmiştir (Şekil 1).
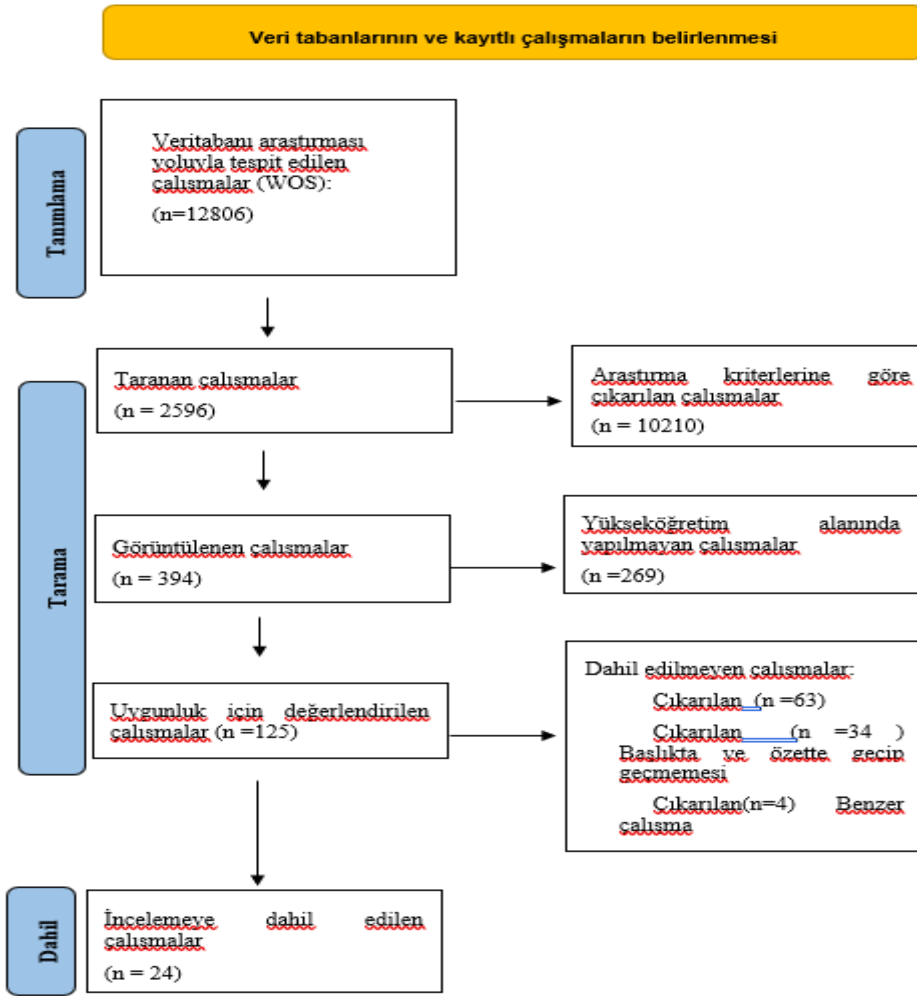


Şekil 1. PRISMA akış şeması (Page vd., 2020)

125 makalenin 63'ü araştırma kriterlerine ve uygulamalarına uygun olmadığı için çıkarılmıştır. 34 makale başlıkta ve özette geçmediği için çıkarılmıştır. 4 makale ise benzer içerikte olduğu için araştırmaya dahil edilmemiştir. Araştırmaya dahil edilen makale sayısı 24 olarak belirlenmiştir.

## Bulgular



Görsel 1. Çalışmaların ülkelere göre dağılımı

Görsel 1 incelendiğinde İspanya ve Malezya'da ciddi oyunlara ilişkin 3 makalenin yayınlandığı gözlemlenmiştir. Tunus ve Çin 2 makale ile araştırmaya dahil olmuştur.
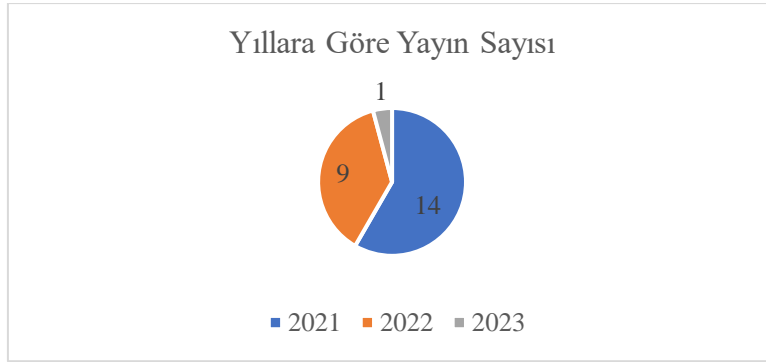


Görsel 2. Çalışmaların yıllara göre dağılımı

Çalışmaların yıllara göre dağılımı (Görsel 2) incelendiğinde en fazla yayının 2021 yılında yapıldığı görülmektedir. 2023 yılında araştırma kriterlerine uyan sadece bir çalışma vardır. Buna ek olarak 2023 yılı henüz tamamlanmadığı için eklenen çalışma sayısı azdır.
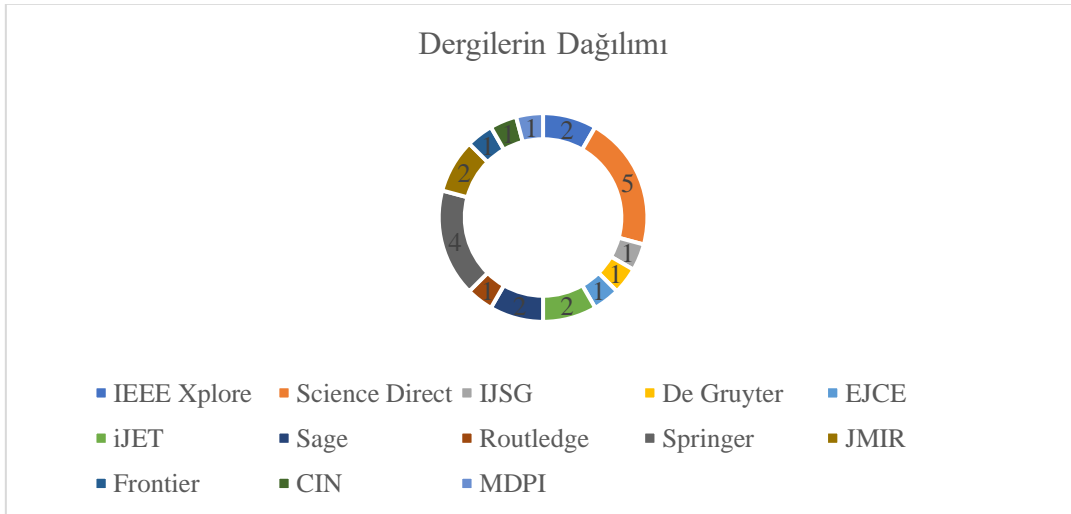


Görsel 3. Çalışmaların dergilere göre dağılımı

Dergilerin dağılımı incelendiğinde Science Direct ve Sage dergilerinde yayınlanan çalışmaların diğer dergilere göre fazla olduğu gözlemlenmiştir.
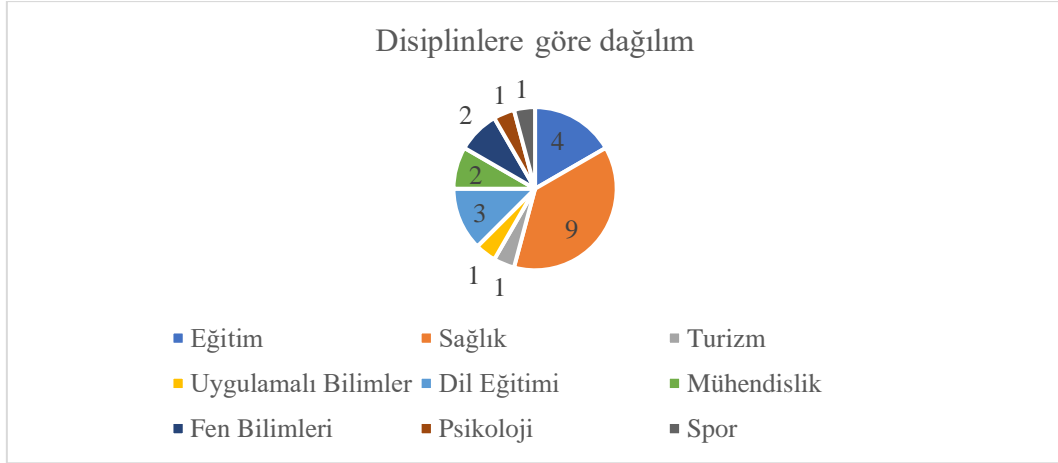
Görsel 4. Çalışmaların disiplinlere göre dağılımı

Araştırma kapsamında farklı disiplinlerin ciddi oyunları kullandığı görülmektedir (bkz. Görsel 4). Özellikle sağlık alanında en fazla çalışmanın ve uygulamanın yapıldığı görülmektedir. Eğitim, dil eğitimi, mühendislik ve fen bilimlerinde de çalışmaların fazla olduğu gözlemlenmektedir.

Tablo 1. Ciddi oyun kullanımında yararlanılan ortamlar, dersler, tasarımlar ve araçlar

| Kategori | Platform | Uygulama | Yazar |
|---|---|---|---|
| Dijital Oyun | Unity | uAdventure | Perez Colado vd. (2021) |
| | Be the Scheduler | Sanal ortama uyarlama | Mullen vd., (2021) |
| | Steam | Steam kullanıcıları (n=150) ve dersin öğrencisileri (n=17) | Moro vd., (2022) |
| | | Turizm yeterliliklerinin kazandırılması | |
| | Fligby | Eczacılık ve hemşirelik derslerinde kullanılmıştır. | Almeida vd., (2021) |
| | DOSE | | Kayyali vd., (2021) |
| | | İspanyolca öğretimine etkilerini araştırmak | |
| | ImmersMe | | Pitarch ve Gong (2021) |
| | | Mühendislik derslerinde sosyal becerilerin geliştirilmesi için kullanılmıştır. | |
| | EVE Online | | Pagel vd., (2021) |
| | | 16 mini oyun uygulanmıştır. | |

| | | | |
|---|---|---|---|
| | AlzCoGame | Öğrenenlerin iş planlaması, durum farkındalığı ve karar vermesini hedefleyen bir simülasyon. | Mezrar ve Bendella vd., (2022) |
| | CLONE | | Novoseltseva vd., (2022) |
| | | Spor yönetimi dersi öğrenenlerine uygulanmıştır. | |
| | Top Eleven | | Afthinos vd., (2022) |
| Ders/Proje Yönetimi | 2 üniversitede için pilot | 2 yıllık bir süreç | Perez Colado vd. (2021) |
| | Yüksek başarımlı bilgi işlem dersi | Işbirliğine dayalı çalışma ve rol yapma | Mullen vd., (2021) |
| | Turizm yeterliliklerinin belirlenmesi ve eşleştirmelerin yapılması | 18 yeterlilik belirlendi | Almeida vd., (2021) |
| | | Deney grubuna uygulanmıştır (5 ders) | |
| | ImmersMe | | Pitarch ve Gong (2021) |
| | | 2 yıllık bir süreç | |
| | Ciddi oyun tasarımına ilişkin prototip geliştirme | | Zairi vd., (2022) |
| | | Covid-19 döneminde senkron derslere tamamlayıcı olarak ciddi oyunlar kullanılmıştır. | |
| | Ciddi oyun tasarımı | | Arias-Calderon vd., (2022) |
| | Dil öğrenme oyunu | Dil eğitimine ve ciddi oyunlara uygun bir model hazırlanmıştır. | |
| | | | Ishaq vd., (2022) |
| | | Teorik kavramları gözden geçirmenin eğlenceli yolunu sağlamak. | |
| | RPG Maker V | | Rodriguez (2023) |

| | Top Eleven | Senaryo tabanlı öğrenme modeli uygulanmıştır. | Afthinos vd., (2022) |
|---|---|---|---|
| Tasarım | 3 aşamadan oluşan ders tasarımı | 1. aşama 20 saat, 5 hafta<br>2. aşama 20 saat, 5 hafta<br>3. aşama 28 saat, 6 hafta | Perez Colado vd. (2021) |
| | DOSE | Sağlık derslerinde uygulanabilirliği ve algıyı araştırıldı. | Kayyali vd., (2021) |
| | co.LAB | Ciddi oyun tasarım çerçevesi | Jaccard vd., (2021) |
| | Immersivo | Probleme dayalı öğrenme | Moradi ve Noor (2022) |
| | Eve Online | Çevrimiçi ders tasarımı | Pagel vd., (2021) |
| | Unity | 3 seviyeden oluşan ders tasarımı | Pagel vd., (2021) |
| | AlzCoGame | Günlük hayata ilişkin sanal bir ortam tasarlanmıştır. | Mezrar ve Bendella vd., (2022) |
| | Sanal ortam tasarımı | Akciğer embolisi dersi için tasarlanmıştır. 20 dakikalık oyun sağlık öğrencilerine uygulanmıştır. | Zairi vd., (2022) |
| | | Hemşirelik öğrenenleri için 3 saatlik çevrimiçi ders tasarlanmıştır. Ciddi | |

| | | oyun ise 2 saatlik bir oyun olarak hazırlanmıştır. | Hu vd., (2021) |
|---|---|---|---|
| | Covid-19 oyunu | Programlama öğrenenleri için geliştirilmiştir. | |
| | | | Abbasi vd., (2021) |
| | Nesne yönelimli ciddi oyun | Düşük kalite ve yüksek kalite olmak üzere iki tipte hazırlanmıştır. | |
| | | | Ishaq vd., (2022) |
| | Dil öğrenme oyunu | Mühendislik öğrencileri için ciddi oyun tasarlanmıştır. | |
| | | | Rodriguez (2023) |
| | RPG Maker V | | |
| Araçlar | xAPI | Oyuncu hareketlerinin ve oyun değişkenlerinin takibi | Perez Colado vd. (2021) |
| | Simva ve TxMon | Kullanıcı ilerlemesinin ve puanlarının izlenmesi, analitik göstergelere erişilmesi | Perez Colado vd. (2021) |
| | Steam | 12 aylık süreçte geri bildirimler toplandı. Ciddi oyun tasarımı ve iyileştirilmek için kullanılabilir. | Moro vd., (2022) |
| | Video oyun destekleyen cihazlar | Eczacılık öğrencilerine uygulanmıştır | Ng vd., (2021) |
| | VTS Editor | Ciddi oyunlara ilişkin ders tasarımı | Zairi vd., (2022) |
| | Moodle | Biyoloji dersi öğrencilerinin eksikliklerini tamamlaması için | Ouchaouka ve Talbi (2021) |

| | AlzCoGame | Alzheimer hastalarına ve hafif bilişsel bozukluk hastaları için uygulanmıştır. | Mezrar ve Bendella vd., (2022) |
|---|---|---|---|
| | WeChat ve Rain Classroom | Dil eğitiminde öğrenen katılımı ve öğrenme çıktılarının karşılaştırılması | Yu vd., (2022) |
| | Kahoot! | Hemşire ve ebelerin eğitimlerine destek olmak için kullanılmıştır. | Georgieva-Tsaneva ve Serbezova (2021) |

Ciddi oyun kullanımında çok fazla ortamın, aracın, tasarımın ve dersin uygulanabileceği Tablo 2'de görülebilir.

## Sonuç ve Öneriler

Açık ve uzaktan öğrenmenin farklı disiplinleri bünyesinde bulundurması sebebiyle farklı disiplinlerde yapılan çalışmaların yakından takip edilmesi gerekmektedir. Açık ve uzaktan öğrenenlerin izole olma ve derse katılımlarını artırmak için kullanılabilecek farklı disiplinlerdeki ciddi oyunlar bu çalışmada ayrıntısıyla incelenmiştir. Teori ve pratiği birleştiren tasarım ve dersler hazırlanabilir. Yapılan çalışmalarda görüldüğü üzere günümüzde ciddi oyunları eğitim amacıyla pek çok yerde kullanılabilir. Mobil telefonlar, web arayüzleri, sanal ortamlar, bilgisayar, konsol, akıllı televizyonlar bu uygulamaların kullanılabileceği ortamlardır. Bu ortamlara ek olarak yeni araçlar ve dersler hazırlanabilir. Öğretim tasarımcıları, oyun tasarımcıları, ölçme değerlendirme uzmanları bir araya gelerek açık ve uzaktan öğrenenler için ciddi oyun tasarımları geliştirebilirler.

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# Küreselleşme Çağında Yabancı Dil Öğretimi: Dil Öğretiminde Kullanılan Mobil Uygulamaların Sloganlarının İncelenmesi

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## Özet

20. yüzyılın sonlarına doğru gerçekleşen teknolojik gelişmelerle birlikte küresel akışkanlık olağanüstü düzeyde artmış, internet ve bilgisayarın kullanımıyla her şeyin küresel dolaşımı hızlanmış ve dünya "küresel bir köy" olarak tanımlanır olmuştur. Küreselleşme sürecinin en görsel yönleri medya, spor ve popüler kültür alanlarında görülse de yabancı dil öğretimi de pek çok şey gibi küreselleşme süreçlerinden etkilenmektedir. Küresel medyanın kültürleri deneyimleme biçimini değiştirdiği, zaman ve mekânın anlamını kaydırdığı söylenmektedir. İletişim teknolojileri de dahil tüm bu teknolojik gelişmeler yakınlık ve uzaklık algısını değiştirmiştir. Bununla birlikte yabancı bir dil öğrenmek için hedef dilin kullanıldığı ülkeye gitmek yeni iletişim araçlarıyla birlikte bir gereklilik olmaktan çıkmıştır. Zira günümüzde pek çok çevrim içi dil öğretim uygulaması dil öğrenimini zamansızlaştırmış ve mekansızlaştırmıştır. Yabancı bir dil öğrenmek isteyen birey dilediği zaman ve dilediği yerde mobil uygulamalar aracılığıyla hedef dili öğrenebilmekte, anadil konuşurlarıyla konuşma alıştırmaları yapabilmektedir. Bu çalışmanın genel amacı dil öğretiminde giderek daha fazla kullanılan mobil uygulamalar ve küreselleşme arasındaki ilişkiyi zaman ve mekânın dönüşümü, yersiz-yurtsuzlaşma ve küresel kültür kavramları etrafında tartışmaktır. Bu tartışma çerçevesinde dil öğretiminde kullanılan mobil uygulamaların sloganları ve bu sloganların vermek istediği mesajlar içerik analizi yöntemiyle incelenmiştir. Analiz sonucuna göre uygulamalar zaman ve mekândan bağımsızlaşma, yaşam boyu/ otonom öğrenme, anadili konuşurlarıyla pratik imkânı ve küresel dil topluluğuna entegrasyon vadetmektedir.

**Anahtar Kelimeler**: yabancı dil öğretimi, dil öğrenme uygulamaları, küreselleşme, yaşam boyu öğrenme.

## Abstract

With the technological developments towards the end of the 20th century, global fluidity has increased tremendously, the global circulation of everything has accelerated with the use of the internet and computer, and the world has been defined as a "global village". Although the most visual aspects of the globalization process are seen in the fields of media, sports and popular culture, foreign language teaching is also affected by globalization processes like many other things. It is said that global media has changed the way of experiencing cultures and shifted the meaning of time and space. All these technological developments, including communication technologies, have changed the perception of proximity and distance. However, going to the country where the target language is used to learn a foreign language is no longer a necessity with new communication tools. Because today, many online language teaching applications have made language learning timeless and placeless. Individuals who want to learn a foreign language can learn the target language whenever and wherever they want, through mobile applications, and can practice speaking with native speakers. The general aim of this study is to discuss the relationship between mobile applications, which are increasingly used in language teaching, and globalization around the concepts of transformation of time and space, displacement and global culture. Within the framework of this discussion, the slogans of mobile applications used in language teaching and the messages that these slogans want to give were analyzed by content analysis method. According to the analysis, the apps promise independence from time and space, lifelong/autonomous learning, practice with native speakers and integration into the global language community.

**Keywords**: foreign language teaching, language learning applications, globalization, life long learning.

## Giriş

Moda bir kavram olarak hemen her alanda karşımıza çıkan, çoğu zaman önemini ve anlamını yitiren küreselleşme kavramı günümüz toplumunu en çok etkileyen süreçlerden birine işaret etmektedir. Küreselleşme "modern yaşamı karakterize eden, hızla gelişen ve giderek yoğunlaşan karşılıklı bağlar ve bağımlılıklar ağıyla" ilgili bir kavramdır. (Tomlinson, 2017, s. 12). Küreselleşme ulusötesi şirketlerle bağlantılı olarak öncelikle ekonomik süreçlerle ilgili olsa da bununla sınırlı değildir; politika, sosyal yaşam ve kültürü de kapsayan geniş ölçekli bir olgudur. 20.

yüzyılın sonlarına doğru gerçekleşen teknolojik gelişmelerle birlikte küresel akışkanlık olağanüstü düzeyde artmış, internet ve bilgisayarın kullanımıyla her şeyin küresel dolaşımı hızlanmış (Ritzer, 2020) ve dünya "küresel bir köy" olarak tanımlanır olmuştur. Ritzer (2020, s. 36) akışkanlığı hızlandıran küresel ağların etkisinden bahsederek, internetin "çeşitli türden bilginin sayısız yöne akışına imkân tanıması açısından muazzam bir önem" taşıdığını ifade etmektedir. Küreselleşmeyle beraber iletişim biçimleri de farklılaşmıştır. Matbaanın icadıyla sözlü kültürden yazılı kültüre doğru toplumsal bir dönüşüm yaşanmış, internetin kullanımıyla ise enformasyon çağı başlamıştır. Küreselleşme süreciyle ilgili belki de en önemli özellik zaman ve mekânın birbirinden ayrılmasıdır. Tomlinson (2017, s. 218), medyanın ve iletişim teknolojilerinin küresel kültürel deneyimleri yaşamak için fiziksel engelleri nasıl ortadan kaldırdığını açıklamak için "yersiz-yurtsuzlaşmış kültürel deneyim" kavramını kullanmaktadır. Zira ona göre "birçok insanın çoğu zaman küreselleşmenin etkisini yolculuk sırasında değil, evde otururken hissetmekte olduğu söylenebilir". Bu etkiyi hissettiren ise medya ve iletişim teknolojilerinin kendisidir. Çoğu insan evinde televizyon izlerken, gazete ya da kitap okurken, internette gezinirken dünyada olup biten hakkında bilgi alabilmekte, farklı kültürel deneyimleri sanal olarak yaşayabilmektedir. Kitle iletişim araçlarıyla kurulan bu "dolayımlanmış iletişim" kişileri yersiz yurtsuzlaştırmakta, "kültürün coğrafi ve toplumsal kara parçalarıyla doğal ilişkisini" yok etmektedir (Garcia Canclini, 1995 akt. Tomlinson, 2017, s. 158). Meyrowitz (1985) medyanın evriminin zaman ve mekân deneyimi üzerindeki etkisini şöyle ifade etmektedir:

*"Medyanın evrilmesi insanların deneyiminde ve olaylarda fiziksel mevcudiyetin önemini azaltmıştır… Günümüzde bilgi, duvarların içinden geçebildiği ve uzak mesafeleri büyük bir hızla katedebildiği için fiziksel sınırları olan mekanlar daha az önemlidir. Bunun sonucunda, kişinin nerede olduğuyla, neyi bildiği ve deneyimlediği arasındaki ilişki azalmıştır. Elektronik medya, zaman ve mekânın toplumsal etkileşim için önemini değiştirmiştir" (akt. Tomlinson, 2017, s. 224).*

Sosyal yaşamın hemen her yönünü etkileyen ve dönüştüren bu sürecin uluslararası ilişkileri ve kültürlerarası iletişimi etkilememesi düşünülemez. Enformasyon çağı olarak adlandırılan günümüz toplumunda farklı milletlerden, farklı dilleri konuşan insanlarla etkileşim imkânı da önceki zamanlara göre çoğalmıştır. Bilgisayar ve internet teknolojilerindeki gelişmelerle sanal iletişim oldukça yaygınlaşmış, insanlar sosyal medya ve çeşitli uygulamalar aracılığıyla kilometrelerce uzakta olan farklı kültürlerden farklı dilleri konuşan arkadaşlarıyla görüşebilir olmuşlardır. Kültürü taşıyıcı özelliği bulunan yabancı dizi ve filmlerin, kitap ve dergilerin dolaşım hızı artmış ve dolaşım alanı genişlemiştir. Kullanıcı sayısı ve çeşitliliği giderek artan mobil uygulamalar sayesinde ise öğrenilen yabancı dili kullanmak için farklı bir ülkeye seyahat etmek tek seçenek olmaktan çıkmış, hedef dili öğrenmek için o dilin konuşulduğu bölgelere gitme gereği de ortadan kalkmıştır.

## Küreselleşen Dünyada Yabancı Dil Öğretimi

Güncel yabancı dil öğretim yaklaşımları çok dilliliğe ve kültürlerarası iletişim yeterliliği kavramlarına vurgu yapmaktadır. Bireylerin dili sosyo-kültürel bağlamında pek çok farklı kültürden bireyle iletişim kurabilecek düzeyde kullanması hedeflenmektedir. Avrupa Komisyonu'nun Avrupa ülkeleri arasındaki iletişimi geliştirmek, kültür ve dil çeşitliliğinin ülkeler arası iletişimin önünde engel olmasını önlemek amacıyla hazırlattığı Diller İçin Avrupa Ortak Başvuru Metni'nde (AOBM) "birey bağlamında çok dilliliğe" önem verilmiş, dil öğretiminin amacının değiştiği ifade edilmiştir:

*"Artık, bir, iki hatta üç dili birbirinden bağımsız biçimde, bir 'anadil konuşucusunu model alarak öğrenmek yerine, bütün dilsel yetenekleri kapsayan bir dilsel birikim geliştirmek amaç edinilmiştir. (...) dil öğrenmenin yaşam boyu devam eden bir etkinlik olduğunun bilincine vararak bireyin okul dışında da yeni dil deneyimleri karşısında güdüleme, beceri ve özgüvenini geliştirmek büyük önem taşımaktadır." (AOBM, 2009, s. 4).*

Eylem odaklı yaklaşımı benimseyen bu metne göre dil öğrenen birey dili otantik ortamlarda, tıpkı o dili anadili olarak kullanan bireyler gibi hem dilsel hem de dil dışı etkinlikleri yerine getirebilecek şekilde kullanabilmelidir. Dil öğreneni sosyal bir aktör olarak tanımlayan bu yaklaşımda hedef dile maruz kalmak, yani anadil konuşurlarıyla kültürel paylaşımda bulunmak, karşılıklı iletişim kurmak oldukça önemlidir. Her ne kadar bu metin Avrupa Birliği ülkeleri hedef alınarak hazırlanmış olsa da pek çok ülkenin dil öğretim politika ve yaklaşımını etkilemiştir. Ne var ki hedef dilin konuşulduğu ülkelere seyahat etmek, o dile maruz kalmak ve o dilin konuşurlarıyla karşılaşmak her zaman herkes için mümkün olmamaktadır. Küreselleşme sürecinin getirdiği uluslararası dolaşım avantajından bütün toplumlar eşit bir şekilde faydalanamamaktadır. Bununla birlikte gelişen iletişim teknolojileri bu sınırlamaları azaltmakta ya da ortadan kaldırabilmektedir. Dünyayı dolaşan internet ağı ve bilgisayar teknolojileri sayesinde bireyler fiziksel olarak seyahat edemeseler de sanal olarak seyahat edebilmektedir. Uzaktan eğitim teknolojileri, görüntülü görüşme, mobil öğrenme, yapay zekâ ve artırılmış gerçeklik uygulamaları gibi pek çok yeni nesil uygulama aracılığıyla öğretmenin öğrenciyle aynı mekânda bulunma zorunluluğu ortadan kalkmıştır. Aynı şekilde yabancı bir dil öğrenmek isteyen birey hedef dili konuşan kişilerle ya da öğretmenlerle tüm bu uygulamalar aracılığıyla farklı mekanlarda eş zamanlı olarak karşı karşıya gelebilmektedir. Yeni medyanın etkileşimli ve dinamik yapısı ve bu araçları kullananların çokluğu ve çeşitliliği sayesinde dil öğrenme ve kullanmadaki güç dağılımı artık basit bir anadili konuşucusu ve dil öğrenicisi ikilemine dayanmamaktadır.

Öğreniciler çok çeşitli çok dilli topluluklara katılabilmekte ve kendilerini farklı derecelerde meşru konuşmacılar olarak gösterebilmektedir.

## Mobil Destekli Dil Öğrenimi

Dil öğretiminde teknolojik araçların kullanılmaya başlanması ve öğretimin bu araçlarla desteklenmesi aslında çok yeni bir gelişme değildir. 1960'lı yıllardan itibaren teknolojik araçlar; önceleri tepegözler, projeksiyon cihazları, video kasetler, televizyon, radyo, daha sonra bilgisayar, internet, akıllı telefonlar, tabletler ve en nihayetinde artırılmış gerçeklik uygulamaları ve sohbet robotları kullanılagelmiştir. Bilgisayar destekli dil öğretimi (BDDÖ), teknoloji destekli dil öğretimi ve mobil destekli dil öğretimi (MALL) gibi çeşitli yaklaşım ve teknikler geliştirilmiştir. Web 2.0 uygulamaları ile dil öğretimi güncel yaklaşımların da öne sürdüğü gibi etkileşimli ve otantik bir boyut kazanmıştır. Bu araçların etkileşimli yapısı dil öğreneni sosyal bir bağlam içinde gerçek kullanıcılar için içerik üretmeye teşvik etmiş, gerçek bir ürün ortaya koymak ve gerçek kullanıcılar tarafından okunma/dinlenme imkânı sunmuştur. Bununla birlikte öğretmen öğrenci ürünlerini değerlendiren tek yetkili merci konumundan onlara rehberlik eden, yol gösteren yardımcı konumuna yerleşmiştir (Ollivier, 2009). Web 2.0 araçlarının hemen ardından akıllı telefonların yaygın kullanımıyla birlikte hemen hemen her şeyin uygulaması tasarlanmış, mobil öğrenme süreci başlamıştır. TUİK (Aralık, 2021) verilerine göre "internet kullanımı, 6-15 yaş grubundaki çocuklar için 2013 yılında %50,8 iken 2021 yılında %82,7 olmuştur". Ayrıca akıllı telefon kullanma oranının 11-15 yaş grubundaki çocuklarda %75,0'a yükseldiği görülmüştür. Akıllı telefon kullanımının artmasıyla birlikte mobil uygulamaların ortaya çıkış hızı da baş döndürücü şekilde artmıştır. Günümüzde bilgisayarın yerini akıllı telefonların, web sitelerinin yerini ise mobil uygulamaların aldığını söylemek mümkündür.

Özellikle son yıllarda mobil uygulamaların yabancı dil öğretim ve öğrenim süreçlerine etkisi üzerine pek çok çalışma yapıldığı görülmektedir. Bu çalışmaların çoğunluğu mobil uygulamaların ve akıllı telefonların yabancı dil sınıflarında derslere destek olarak kullanımının olumlu etkilerini ortaya koymaktadır (Davudova ve Kılıç Türel, 2022; Mavropoulou ve Arvanitis, 2021; Oreški, Mikulan & Legac, 2018; Saran, Seferoğlu ve Çağıltay, 2009). Saran, Seferoğlu ve Çağıltay'ın (2009) İngilizce öğrenenlerin sözcükleri telaffuzunu geliştirmek için cep telefonları aracılığıyla multimedya mesajları kullanımının etkilerini araştırdıkları çalışmanın sonuçlarına göre, cep telefonu kullanımı öğrencilerin motivasyonunu artırmış, düzenli çalışmayı teşvik etmiş ve öğrencilerin sözcükleri daha doğru telaffuz etmelerini desteklemiştir. Davudova ve Kılıç Türel'in (2022) geleneksel yöntemler ve "Duolingo" ve "Memrise" uygulamalarıyla yapılan İngilizce derslerindeki başarıyı karşılaştırdığı çalışmanın sonuçlarına göre ise mobil uygulamaların öğrencilerin İngilizce başarılarına önemli etkisi olmuştur. "Memrise" uygulaması konuşma, yazma ve okuma becerilerinin gelişmesinde geleneksel yöntemlere göre daha etkili olmuştur. Ayrıca öğrencilerin İngilizce öğrenme sürecinde mobil uygulamaları kullanmanın daha eğlenceli olduğunu düşündükleri de bu çalışmanın ortaya koyduğu sonuçlardandır. Başaran (2022) dil öğrenenlerin mobil öğrenme ile ilgili tutum ve algılarını incelediği çalışmasında, mobil öğrenmenin çeşitli değişkenlere (yaş, cinsiyet, sınıf düzeyi ve kullanılan mobil uygulama) bağlı olarak tutum ve yeterlilikte farklılıklara yol açtığını gösterirken, dil eğitimindeki bu farklılıkların dikkate alınarak derslerde mobil öğrenme uygulamalarına yer verilmesini önermektedir. Mavropoulou ve Arvanitis (2021) de mobil destekli dil öğrenme uygulamalarını tamamlayıcı eğitim araçları olarak kullanmanın önemini ve öğrenci performansını, motivasyonunu, yaratıcılığı ve öğrenci özerkliğini artırıcı etkisini ortaya koymuştur.

# Yöntem ve Bulgular

Sayısı günden güne hızla artan dil öğrenme uygulamaları otonom ve kendi kendine öğrenmeyi teşvik eden önemli bir eğilim oluşturmaktadır. Bu uygulamaların zaman ve mekândan bağımsız yapısı öğrenme ortamını sınırsız bir hale getirdiği gibi öğrenme zamanını da esnekleştirmektedir. Bu uygulamaların hepsinin kullanıcılarına vaat ettikleri bir ya da birden çok hedef, rekabet ortamında öne çıkmak için vurguladıkları bazı özellikler vardır. Bir "topluluk, kurum veya kuruluşun amaç ve araçlarını özlü bir biçimde tanımlayan deyiş veya söz" olarak tanımlanan (TDK, 2023) sloganlar içerisinde çeşitli ve derin anlamlar barındırabilmektedir. Bu nedenle bu çalışmada bu uygulamaların amaçları ve araçlarını sloganlarını inceleyerek ortaya koymak amaçlanmıştır. Öncelikle Google Play Store'da en çok kullanıcısı bulunan ve en popüler dil öğrenme uygulamaları tespit edilmiş ve bu uygulamaların sloganları gerek web siteleri gerek mobil uygulamalar incelenerek tespit edilmiştir. Tablo 1'de incelenen uygulama adı, kullanıcı sayısı ve öne çıkan slogan gösterilmektedir. Bazı uygulamaların hem Türkçe hem İngilizce sloganı mevcutken, bazıları sadece İngilizce slogan kullanmaktadır. Tabloda gösterilen İngilizce sloganlar yazar tarafında parantez içerisinde Türkçeye çevrilmiştir. Elde edilen bu veriler içerik analizi yöntemiyle kodlanmış ve temalara ulaşılmıştır.

Tablo 1. Dil Öğretiminde Kullanılan Mobil Uygulamalar ve Sloganları

| Uygulama adı | Kullanıcı sayıcı (Google Play) | Sloganı |
|---|---|---|
| **Duolingo** | 100 mn+ | "Bir dil öğrenmenin dünyadaki en iyi yolu" |
| | | "İstediğin yerde, istediğin zaman öğren" |
| **Babbel** | 50 mn+ | "Language for life (Hayat için dil)" |
| **Cambly** | 10 mn+ | "Ana dili İngilizce olan eğitmenlerle pratik yap" |
| | | "English Tutors Online (Çevrimiçi İngilizce Öğretmenleri)" |
| **Busuu** | 10 mn+ | "Gerçek hayat için öğren" |
| | | "Birlikte daha çok öğren" |
| | | "Kendine güvenerek öğren" |
| **Memrise** | 10 mn+ | "Bir dil öğren, dünya ile tanış" |
| **Rosetta Stone** | 10 mn+ | "Learn new languages intuitively without translations (Yeni dilleri çeviri olmadan sezgisel olarak öğrenin)" |
| **Mondly** | 10 mn+ | "Yeni bir dili eğlenerek öğrenin. 41'den fazla dil öğrenen 100 milyon insana katılın" |
| **Hello Talk** | 10 mn+ | "Talk to the world (dünyayla konuş)" |
| | | "Learn a language for free by chatting with native speakers around the world! (Dünyanın dört bir yanındaki anadili İngilizce olan kişilerle sohbet ederek bir dili ücretsiz öğrenin!)" |
| **Tandem** | 10 mn+ | "Master any language by actually chatting with real people (Gerçek insanlarla gerçekten sohbet ederek herhangi bir dilde ustalaşın)" |
| | | "The language learning app where millions of people teach each other (Milyonlarca insanın birbirine öğrettiği dil öğrenme uygulaması)" |
| **HiNative** | 5 mn+ | "Her zaman her yerde" |
| **Speaky** | 5 mn+ | "Start practising languages with people around the world! (Dünyanın her yerinden insanlarla dil pratiği yapmaya başlayın!)" |
| **İtalki** | 1 mn+ | "Learn language online (Çevrimiçi dil öğrenin)" |
| | | "Küresel dil öğrenci topluluğuna bağlan" |

Tablo 1'de verilen uygulamaların sloganları incelendiğinde, bu uygulamaların dört temel özelliğe vurgu yapan bir pazarlama stratejisi izlediği görülmektedir. Uygulamalar zaman ve mekândan bağımsızlaşma, yaşam boyu/ otonom öğrenme, anadili konuşurlarıyla pratik imkânı ve küresel dil topluluğuna entegrasyon vadetmektedir. Tablo 2'de sloganların içerik analizi sonucunda ortaya tematik dağılım gösterilmektedir.

Tablo 2. İçerik Analizi Sonucu Ortaya Çıkan Temalar

| Uygulamalar | Zaman ve mekândan bağımsızlaşma | Yaşam boyu/otonom öğrenme | Anadili konuşurlarıyla pratik | Küresel topluluğa entegrasyon |
|---|---|---|---|---|
| **Duolingo** | "İstediğin yerde, istediğin zaman öğren" | "Bir dil öğrenmenin dünyadaki en iyi yolu" | | |
| **HiNative** | "Her zaman her yerde" | | | |
| **İtalki** | "Learn language online" | | | "Küresel dil öğrenci topluluğuna bağlan" |
| **Babbel** | | "Language for life" | | |
| **Busuu** | | "Gerçek hayat için öğren" "Kendine güvenerek öğren" | | "Birlikte daha çok öğren" |
| **Cambly** | | | "Ana dili İngilizce olan eğitmenlerle pratik yap" | |
| **Rosetta Stone** | | "Learn new languages intuitively without | | |
| **Hello Talk** | | | "Learn a language for free by chatting with native speakers around the world! | "Talk to the world" |
| **Tandem** | | | "Master any language by actually chatting with real people" | The language learning app where millions of people teach each other" |
| **Memrise** | | | | "Bir dil öğren, dünya ile tanış" |
| **Mondly** | | | | "Yeni bir dili eğlenerek öğrenin. 41'den fazla dil öğrenen 100 milyon insana katılın" |
| **Speaky** | | | | **"**Start practicing languages with people around the world |

**Zaman ve mekândan bağımsızlaşma:** Mobil uygulamalar, sınıf ile dış dünya arasındaki geleneksel sınırı bulanıklaştırarak, dil öğretmenlerinin ve öğrencilerin sınıf dışında dil pratiği yapma fırsatlarından yararlanmalarına olanak sağlamaktadır. Mobil uygulamalar, öğrencilere bağımsız ve kişiselleştirilmiş bir şekilde yeni bir dil öğrenme fırsatı sunar. Duolingo ve HiNative gibi uygulamalar *"İstediğin zaman istediğin yerde öğren"* ya da *"her zaman her yerde"* öğren diyerek bu özelliğe vurgu yapmaktadır.

**Yaşam boyu/ otonom öğrenme:** Mobil dil öğrenme uygulamalarının bir diğer önemli özelliği de kendi kendine öğrenmeyi teşvik etmesidir. Her ne kadar bu uygulamaların bazılarında eğitmenler eşliğinde dersler olsa da öğrenme sürecini planlamak daha çok kullanıcı sorumluluğundadır. Ayrıca kullanıcılar arasında yaş farkının olmaması ve kullanım süresinin esnek olması yaşam boyu öğrenmeye olanak tanımaktadır. Gerçek hayat için ve kendine güvenerek öğrenmek, uygulamanın otantik olma yönüne vurgu yapmaktadır. Babbel *"Language for life (Hayat için dil)"*, Rosetta Stone *"Learn new languages intuitively without translations (Yeni dilleri çeviri olmadan sezgisel olarak öğrenin)"* sloganlarını kullanarak hem dil öğrenmenin hayat boyu kullanılacak bir beceri olmasına hem de öğrenen özerkliğine dikkat çekmektedir.

**Anadili konuşurlarıyla pratik imkânı:** Güncel dil öğretim yaklaşımlarına göre dili sosyal bağlamında sosyo-kültürel öğeleri de öğrenerek konuşmak hedeflendiği önceki bölümlerde ifade edilmişti. Anadili konuşurlarıyla otantik bir şekilde iletişim kurmanın dil öğretimini kolaylaştırıcı etkisi pek çok çalışma tarafından ortaya konmuştur (Ferroukhi, 2009; Medgyes, 2001; Médioni, 2010; Tagliante, 2006). İnternet ve yeni medya araçları uluslararası ve kültürlerarası iletişimi kolaylaştırmış, fiziksel yer değiştirmeye gerek kalmaksızın farklı ülkelerde yaşayan insanlarla konuşmayı ve görüşmeyi mümkün kılmıştır. Mobil dil öğrenme uygulamaları da bu avantajı kullanmakta, pek çok uygulama bu özelliği ön plana çıkarmaktadır: *"Learn a language for free by chatting with native speakers around the world! (Dünyanın dört bir yanındaki anadili İngilizce olan kişilerle sohbet ederek bir dili ücretsiz öğrenin!)"* (HelloTalk), *"Ana dili İngilizce olan eğitmenlerle pratik yap"* (Cambly), "Master any language by actually chatting with real people" (Gerçek insanlarla gerçekten sohbet ederek herhangi bir dilde ustalaşın)" (Tandem).

**Küresel dil topluluğuna entegrasyon:** İnternet ve mobil iletişimin küreselleşmesiyle birlikte kültürel kodların dünya çapında akışı hızlanmıştır. Pek çok bölge birbiriyle bağlantılı hale gelmiş, bunun sonucunda küresel bir kültür ve bu kültürü benimseyen bir topluluk oluşmuştur. Homojenleşme-heterojenleşme kavramları etrafında şekillenen bu tartışmanın bir tarafındakiler Batılı toplumların (özellikle ABD) kültürünün batılı olmayanlara dayatıldığını ve küresel homojen bir kültürün hedeflendiğini iddia ederken (Ritzer, 2022), diğer taraftakiler küreselleşmeyi çeşitlilik, karmaşıklık ve çift yönlü bir bağımlılık süreciyle ilişkilendirmektedir (Robertson, 1992; Tuner & Khondker, 2019; Wallerstein, 1998). Dillerin çeşitliliği, küresel dil, çok dillilik ve kültürlülük meseleleri de bu tartışmalar bağlamında ele alınmaktadır. Bu kapsamlı tartışmanın detaylarına girmeden şunu söyleyebiliriz: özellikle İngilizcenin geçer dil olmasıyla birlikte oluşan küresel bir dil topluluğu vardır. Bununla birlikte İngilizcenin küresel dil olarak kabul görmesinin ve uluslararası iletişimde geçer dil olmasının yanı sıra çokdillilik politikaları da özellikle Avrupa toplulukları tarafından desteklenmektedir. Mobil dil öğrenme uygulamalarının sloganlarını incelediğimizde bu uygulamaların da küresel vatandaşlığı, çok dilliliği, uluslararası etkileşimi ve birlikte öğrenmeyi vurguladığı söylenebilir: *"Bir dil öğren, dünya ile tanış"* (Memrise), *"Küresel dil öğrenci topluluğuna bağlan"* (İtalki), *"Start practising languages with people around the world!" (Dünyanın her yerinden insanlarla dil pratiği yapmaya başlayın!)"* (Speaky). İncelenen mobil uygulamaların pek çoğunda İngilizce sloganların yer alması İngilizcenin küresel dil olarak hakimiyetini gösterse de bu uygulamaların yine çoğunda farklı dil seçeneğinin ve çok farklı ülkelerden kullanıcısının olması çokdillilik yaklaşımını destekler görünmektedir.

## Sonuç, Tartışma ve Önerileri

Çok dilli olmanın en önemli becerilerden biri olarak kabul edildiği küresel bir dünyada yaşamaktayız. Günümüzde geçer dil olan İngilizce'nin yanı sıra uluslararası düzeyde kabul gören Fransızca, Çince, İspanyolca gibi farklı dilleri de iletişim kurabilecek düzeyde öğrenmek bir gereklilik olarak kabul edilmektedir. Bu çalışmada, bu amaçla kullanılan mobil uygulamaların dil öğretimindeki güncel yeri ve önemi tartışılmış, sayısı günden güne artan bu uygulamaların sloganları küreselleşme ve dil öğretimi bağlamında incelenmiştir. İçerik analizi sonucunda bu uygulamaların öğrenenlere küresel ağa bağlanarak, ana dili konuşurlarıyla pratik yaparak, zamandan ve mekândan bağımsız, otonom ve hayatın boyu bir öğrenme vaat ettikleri görülmüştür. Zira enformasyon çağında okul artık öğrenmenin gerçekleştiği tek ve merkezi yer olma konumunu kaybetmektedir. Yeni iletişim teknolojileri ve küreselleşme süreçleri öğrenmenin biçimlerini de değiştirmektedir. Özellikle genç neslin okul dışında, dijital medya aracılığyla meraklı ve ilgili oldukları alanlarda öğrenmeye oldukça hevesli olduklarını söylemek mümkündür. Gee (2017) öğretme ve öğrenmeyi okullardan oldukça farklı ve daha derin şekillerde organize eden bu alanları "yakınlık alanları/benzeşim alanları (affinity spaces)" olarak tanımlamaktadır. Ona göre bu alanlar 21. Yüzyıl becerilerinin öğretildiği ve öğrenildiği, ortak yakınlıkları olan insanların bir araya geldiği kilit alanlardır. İnformal öğrenme ve öğretmeyi destekleyen bu alanlar fiziksel olabileceği gibi, günümüzde çoğunlukla sanaldır.

Bu yakınlık alanlarında insanlar yaşlarına, kökenlerine, resmi kimlik bilgilerine veya uzmanlık düzeylerine bakılmaksızın birbirlerinin öğrenmesine, hareket etmesine ve üretmesine yardımcı olmaktadırlar. Gençlerin yabancı dili kullandıkları okul dışındaki temel yakınlık alanları olarak video oyunları, sosyal medya, internette gezinme, müzik, film ve diziler örnek gösterilebilir (Brevik & Holm, 2023). Yabancı dil öğrenmek ve farklı kültürlerden insanlarla sosyalleşmek için kullanılan mobil uygulamalar da otonom ve iş birliği içinde, çok çeşitli kişilerle birlikte öğrenmeye imkân veren doğasıyla bu alanlardan biri olarak kabul edilebilir. Bu şekilde öğrenen gençler çeşitli dilsel, kültürel, ulusal ve kimliğe dayalı sınırları aşmakta, küresel dünyada dil, kültür ve kimliğin nasıl oluştuğu ve ilişkilendiği üzerine yüksek bir biliş düzeyine erişebilmektedirler. Böylece küresel vatandaşlığa doğru bir adım da atmış olmaktadırlar (Gee & Hayes, 2011: 104). Darvin & Norton (2016:21) da internet teknolojilerinin sunduğu olanaklar sayesinde öğrenenlerin yerel ve küresel sınırları aşarak, birden fazla çevrimiçi ve çevrimdışı alanı işgal ederek öğrenme yatırımlarını zenginleştiren yeni imkân ve olanaklara erişebildiğini belirtmektedir.

Bununla birlikte bu öğrenme alanlarının formal eğitimle nasıl uyumlanacağı ve nereye konumlanacağı hala üzerinde tartışılan önemli bir sorudur. Gee'nin (2017) öne sürdüğü gibi, yakınlık alanlarında yaygın öğrenme giderek daha fazla yer aldığında, okulların örgün veya akademik öğrenme için yalıtılmış alanlar olarak görülmekten kaçınmak için neler yapabileceklerini düşünmeleri gerekir. Okulların ve öğretmenlerin nasıl farklı yakınlık alanları içinde yol gösterici, eşlik edici ve arabulucu rolü üstleneceklerini de sorgulamaları gerekmektedir (akt. Brevik & Holm, 2023). Teknoloji kullanımı her ne kadar pek çok olanak ve ilerlemeye imkân tanısa da eşitsizlikleri küresel ölçekte yeniden üretebilme potansiyeline de sahiptir. Dünyadaki bütün bölgeler ve öğrenenler bu konuda eşit ulaşım imkanına sahip değildir. Onlar için okul içi formal ve geleneksel eğitim hala tek ve en önemli seçenek olmaktadır. Bir diğer dikkate değer konu ise dil öğrenme amacıyla oluşturulan bu uygulamaların, ikinci dil pedagojisi alanının dışındaki kişiler tarafından geliştirilme ihtimali göz önüne alınarak, etkinliği ve verimliliği de sorgulanmalıdır. (Nushi and Jenabzadeh, 2016).

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# Metaverse Evreninde Öğrenme: Temel Tasarım İlkelerinin Oyunlaştırılması

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## Özet

Bireylerin sanal evrende avatarlarla etkileşime girebileceği bir dijital ortam olarak tanımlanan Metaverse, gerçek dünyaya benzer bir sanal ortamdır. Metaverse, konferans ve toplantı sistemleri, sinema, eğitim gibi çeşitli uygulamalarla bireylerin hayatında yer edinmektedir. Metaverse, içerisinde yer alan dijital oyunların eğitim amacıyla kullanılmasına imkân sunmaktadır. Eğitim sürecinden daha iyi sonuçlar alabilmek için eğiticimler metaverse gibi yeni dijital araçları ve stratejileri kullanmaktadır. Dijital oyunlar, eğitim gibi birçok alanda öğrencilerle kurulacak iletişim ve etkileşimde önemli bir araç olarak görülmektedir. Eğitimde oyunlaştırma, öğrenci motivasyonunu ve katılımını, nitelikli öğrenmeyi ve davranış değişikliğini sağlamak için oyun temelli mekanizmaların, oyun estetiğinin ve oyun düşüncesinin kullanılmasıdır. Oyunlaştırma, öğrencilerin konuya motive olmalarını kolaylaştırarak, bu süreci daha etkili ve çekici hale getirmektedir. Bu noktada oyunlaştırma, motivasyonu olmayan veya başarısız öğrencilerin eğitime aktif katılımını sağlamak için bir potansiyel olarak da kullanılabilir. Mimarlık eğitiminde yer alacak temel bilgilerin oyunlaştırılarak aktarılması, bilgilerin kalıcı olmasını ve öğrencilerin mesleki pratikleri kazanmasına yardımcı olacaktır. Bu doğrultuda çalışmanın amacı, metaverse evreninin uzaktan veya yüz yüze yapılan eğitim sürecinde oyunlaştırma aracılığıyla temel tasarım dersine entegre edilmesidir. Belirlenen amaç doğrultusunda Roblox uygulaması aracılığıyla deneme çalışması yapılmıştır. Bu deneme çalışması için eylem araştırması yöntemi esas alınmıştır. Eylem araştırması yönteminden yola çıkılarak veri toplama aracı olarak deney ve görüşme tekniği kullanılmıştır. Çalışmanın deney aşamasında çalışma grubu olarak 18 kişiden oluşan mimarlık öğrenci grubu; deney ortamı olarak ise çalışma amacına uygun Roblox uygulamasında yer alan Building Blocks isimli oyun belirlenmiştir. Mimarlık öğrencilerinden Building Blocks oyununda belirlenen oyun alanında, öğrencilere verilen oyun içerisindeki malzeme ve süre ile tasarım yapılması istenmiştir. 18 mimarlık öğrencisinin katıldığı deneme çalışması sonucunda tasarım ilkelerinin dijital ortamda oyunlaştırılması, öğrenme sürecinde ilkelerin daha kalıcı ve anlaşılır olmasını sağlamıştır. Sonuç olarak bu çalışma, derslerde öğretilen ilkelerin metaverse evreninde öğrenciler tarafından eş zamanlı olarak deneyimlenmesine, uzaktan eğitim sürecinde de temel tasarım derslerinin daha eğlenceli, kalıcı ve etkin bir şekilde yürütülmesine yardımcı olacaktır.

**Anahtar Kelimeler**: Metaverse, Temel Tasarım İlkeleri, Oyunlaştırma, Çevrimiçi Öğrenme

## Abstract

Metaverse, defined as a digital environment where individuals can interact with avatars, is a virtual environment similar to the real world. Metaverse is becoming a part of individuals' lives through various applications such as conference and meeting systems, cinema, and education. Metaverse provides the opportunity to use digital games for educational purposes. To achieve better results in the education process, educators are using new digital tools and strategies like Metaverse. Digital games are seen as an important tool for communication and interaction with students in various fields such as education. Gamification in education involves the use of game-based mechanisms, aesthetics, and thinking to promote student motivation and engagement, as well as to achieve quality learning and behavior change. Gamification makes the process more effective and appealing by facilitating students' motivation and active participation. At this point, gamification can also be used as a potential tool to enable students who lack motivation or are unsuccessful in education to participate actively. The transfer of basic information that will be included in architectural education through gamification will help the information to be permanent and assist students in acquiring professional practices. In this direction, the aim of the study is to integrate gamification into the basic design course through Metaverse in remote or face-to-face education processes. A trial study was conducted through the Roblox application in line with the identified goal. The action research method was primarily used for the trial study. Data collection was carried out through experiment and interview techniques based on the action research method. In the experimental stage of the study, a group of 18 architecture students were selected as the study group, and the Building Blocks game, which is appropriate for the

study's purpose in the Roblox application, was determined as the experimental environment. In the Building Blocks game, the students were asked to design with the given materials and time in the determined game area. As a result of the trial study, the gamification of design principles in the digital environment made the principles more permanent and understandable in the learning process. In conclusion, this study will help to enable students to experience the principles taught in classes simultaneously in the Metaverse environment, and to conduct basic design courses more fun, permanent, and effectively in remote education processes.

**Keywords:** Metaverse, Basic Design Principles, Gamification, Online Learning

# Introduction

Bireyin sanal evren içerisinde avatarlarla etkileşime girebileceği bir dijital ortam olarak tanımlanan Metaverse, gerçek dünyaya benzer bir sanal ortamdır. Kullanıcılarına tüm zamanlarını geçirebilecekleri, alışveriş yapabilecekleri, eğlenebilecekleri, toplantılar yapabilecekleri, yeni kişilerle tanışabilecekleri sonsuz bir mekân sunar (Kahraman, 2022). Metaverse, bireylerin hayatında çeşitli konferans ve toplantı sistemleri, oyun, sinema ve tanıtımlar, eğitim platformu gibi çeşitli sistemlerle var olmaktadır. Bireyler, metaverse ortamındaki oyun deneyimini çevrimiçi olarak CityScape, Sandbox gibi uygulamalarla deneyimlemektir (Güler ve Savaş, 2022). Sandbox gibi oyunlarda, oyuncuların oyundaki oyun ögelerinin kişiselleştirmesine izin verilmektedir. Sandbox oyunları arasında en bilinenler arasında Minecraft ve Roblox yer almaktadır. Minecraft'la kıyaslandığında Roblox'un ücretsiz olması, Roblox Studio'yu kullanarak tasarım, inşa etme, programlama gibi konular için öğrenme ortamını oluşturması, her yaş grubundaki öğrenciye kodlama, oyun tasarımı, girişimcilik becerilerini kazandıran bir platform olmasından dolayı daha çok tercih edilmektedir (Wardhana, 2021). Roblox'un aynı zamanda eğitim alanında ele alınması, motivasyon, birlikte öğrenme, problem çözme, STEM (Bilim, Teknoloji, Mühendislik ve Matematik), sosyal etkileşim gibi imkanları sağlamasından dolayı (Long, 2019) Roblox, 21. yy öğrencilerinin etkin olması gereken konulara ve dijitalleşen dünya içerisinde bu kuşağa eğitim veren eğiticilerin teknolojik süreçlere dahil olmasına yardımcı olmaktadır. Roblox'un giderek artan popüleritesinden dolayı öğretmenler için eğitim anlamında bir fırsat sağladığını ve Avrupa, Kanada, Asya gibi ülkelerin yer aldığı 50.000 öğrenciyle yapılan testlerde Roblox'un eğitim alanından başarılı olduğunu söylemek mümkündür (Long, 2019). Eğitimde oyunlaştırma, öğrenci motivasyonunu ve katılımını, nitelikli öğrenmeyi ve davranış değişikliğini sağlamak için oyun temelli mekanizmaların, oyun estetiğinin ve oyun düşüncesinin kullanılmasıdır. Oyunlaştırma, öğrencilerin konuya motive olmalarını kolaylaştırarak, bu süreci daha etkili ve çekici hale getirmektedir. Bu noktada oyunlaştırma, motivasyonu olmayan veya başarısız öğrencilerin eğitime aktif katılımını sağlamak için bir potansiyel olarak kullanılabilir (Thomas ve Baral, 2022; Fidan ve Şengel, 2022). Eğitimde oyunlaştırmanın yapılabilmesi için çeşitli oyunlaştırma modelleri yer almaktadır. GED Modeli, D6 Modeli bu oyunlaştırma modellerine örnektir. Bu çalışmalar arasında en çok kabul gören modeller arasında, Werbach ve Hunter (2012)'ın yapmış olduğu altı adımlık 'D6' isimli oyunlaştırma modeli yer almaktadır (Şenocak ve Bozkurt, 2020). Bu model çalışma için oyunun temel metodolojisini oluşturmaktadır. Çalışmanın amacı temel tasarım ilkelerinin tasarım öğrencilerine etkili ve kalıcı şekilde aktarılmasını ve tasarım dersinin metaverse ortamında eşzamanlı olarak deneyimlenmesini sağlamaktır. Bu doğrultuda çalışmanın örneklem profiline hitap etmesinden dolayı Roblox uygulaması içerisinde yer alan Building Blocks oyunu ile öğrencilerin belirlenen kriterlerde tasarım yapmaları istenmiştir.

## Literatür Taraması

Literatürde eğitim yaklaşımlarını; bilişsel yük teorisi ve öğretim tasarımı (Sweller,1994), iş birliğine dayalı öğrenme, özellikle bilgisayar destekli iş birliğine dayalı öğrenme (Kirschner vd., 2018) ya da anlamlı öğrenmeyi teşvik eden multimedya öğrenme ortamlarının nasıl tasarlanacağını anlama (Mayer, 2014) çerçevesinden pek çok araştırma yapılmaktadır. Bu konulardan biri olan ve son yıllarda sıkça kullanılan "Çevrimiçi öğrenme" terimi, öğrencilerin eğitmenden uzakta oldukları ve öğrenme materyallerine erişmek için bir tür teknoloji kullandıkları herhangi bir öğrenme biçimini ifade etmektedir (Usher, Barak ve Haick, 2021). Literatürde geniş yer alan eğitim yöntemlerine, yaşanan dijitalleşme ile yaygınlaşan çevrimiçi eğitim yöntemleri de eklenmektedir. Bu aşamada ise yöntem seçimi ve yöntemin etkin kullanımı, eğitimin kalitesi ve öğrencinin deneyimi açısından önem taşımaktadır. Çevrimiçi öğrenme yöntemleri olarak çeşitli çalışmalarda eğitimin oyunlaştırıldığı görülmektedir (Çatak, 2009). Eğitimde oyunlaştırma; nitelikli eğitim ve öğrencinin aktif katılımını sağlamak amacıyla oyun düşüncesi ile, oyun estetiğini ve oyun mekanizmalarını kullanmayı konu edinmektedir (Vargas-Macías vd., 2020 ve Kapp, 2007). Bu noktada dikkat edilmesi gereken en önemli unsur eğitim sürecinin bir oyun olarak düşünülmesidir.

Temel Tasarım dersi, fiziksel tasarım stüdyosu etrafında dönen canlı bir kolektif çalışma geleneğini gerektirmektedir. Kurumlar, öğrencilerin öğrenme deneyimlerini geliştirmek için fiziksel stüdyo alanlarında öğrenciler arasında maksimum akademik ve sosyal etkileşim için çaba göstermelidir. Çevrimiçi tasarım stüdyoları, senkronize olmak üzere grup çalışmaları yapmaya olanak sağlar ve aynı zamanda çeşitli arayüzlerle bunu çoğaltma

potansiyeline sahiptir (Baloğlu ve Sezgin, 2021; Alnusairat vd, 2021). Tasarım eğitimine yeni başlayan bir öğrenciden tasarım problemini anlama, kavrama, yorumlama, soyut düşünceyi geliştirme ve düşünceyi somutlaştırma eylemlerini öğrenmesi, derslerde öğrencinin tasarımcı kimliğinin oluşmaya başlaması için plastik değerleri kavraması, estetik değer üretmesi, algılarını geliştirmesi, nesneler arası ilişki kurması ve belirli tasarım ilkeleri doğrultusunda bu ilişkiyi düzenlemesi amaçlanmaktadır (Özdemir, 2016; Çubukçu ve Dündar, 2007; Uysal, 2015). Temel tasarım derslerinin içeriğini "çizgi, doku, form, şekil, mekân" öğeleri ve "ritim, hareket, denge, vurgu, zıtlık, birlik, bütünlük, çeşitlilik" ilkeleri kullanılarak yapılan iki ve üç boyutlu çalışmalar oluşturmaktadır (YÖK-Resim İş Öğretmenliği Lisans Programı Yönergesi). Temel tasarımın eğitim süreci, görsel-yorumsal alandaki uygulamalı çalışmalarla kuramsal bilgileri harmanlayarak, çizerek, inşa ederek, nesneler arası ilişki kurarak yönetilmektedir (Bingöl, 2016). Öğrencilerin tasarım sürecindeki farkındalıklarını arttırma ve kendilerini rahat ifade etmelerini sağlama konusunda enformel eğitim aracı olarak bilgisayar oyunları öne çıkmaktadır (Coşkun ve Çağdaş, 2022). Bireylerin kişiselleştirilmiş ve etkileşimli deneyimler yaşaması açısından oyunlardan faydalanmak tasarım eğitimi ve tasarım stüdyolarının kurgusu açısından da önemlidir (Applications, 2020). Literatürde temel tasarım ilkelerinin oyunlaştırıldığı çalışmalara bakıldığında; Çatak'ın (2009) 'Temel Tasarım Oyun Parkı' adı verilen modeli temel tasarım içeriğini kapsayacak şekilde üç boyutlu çevrimiçi bir dijital oyun evreni olarak önerilmiş ama odaklanmak adına sadece bir bölümü prototip olarak geliştirilmiştir. Coşkun ve Çağdaş (2022) bilgisayar oyunlarının tasarım eğitiminde etkin bir ortam olarak kullanılması yaklaşımından yola çıkılarak, temel tasarım dersi kapsamında öğrencilerin aktif oyunculara dönüştüğü ve yaptıkları kompozisyonları oyun evreni içerisinde deneyimleyebilecekleri bir oyun modülü oluşturmayı amaçlamıştır. Bu alandaki çalışmalar incelendiğinde literatürde oyunlaştırma modelini yöntem olarak kullanan ve metaverse evreninde eş zamanlı bir oyun oynama deneyimini ele alan çalışmanın alanyazında sınırlı olduğu görülmektedir. Bu nedenle Werbach ve Hunter'ın (2012), D6 modeli (Tablo 1), çalışmanın amacı olan 'eğitimde oyunlaştırma' kavramının başarılı bir şekilde yürütülmesi için oldukça önemlidir. Bu modelin temel tasarım ilkelerinin oyunlaştırma sürecinde bir yöntem olarak kullanılması, çalışmanın özgün değerini oluşturmaktadır.

## Yöntem

Metaverse evreninin eğitim alanındaki olumlu yönde etkisi çalışmanın ana motivasyonlarından biridir. Bu çalışma, "Temel tasarım dersi çevrimiçi eğitim sürecinde oyunlaştırılarak, metaverse ortamında öğrencilerin temel tasarım ilkelerini öğrenmeleri klasik yönteme göre daha etkin/kalıcı olacaktır." hipoteziyle ele alınmıştır. Bu hipotez doğrultusunda çalışmada nitel araştırma yöntemlerinden biri olan eylem araştırması seçilmiştir. Güçlü (2009)'ye göre eylem araştırması yönteminin eğitim alanında kullanılması oldukça önemlidir. Bu yöntem, bireylerin gündelik yaşam pratiklerini kolaylaştırmanın ve sağlıklı sosyal ilişkiler kurmanın yanı sıra eğitim niteliğinin yükseltilmesi, eğitimin yer aldığı koşulların iyileştirilmesi gibi konuları ele almaktadır (Güçlü, 2009). Eylem araştırmasının uygulandığı araştırmalarda sadece katılımcıların değil, aynı zamanda araştırmacıların da yer aldığı, etik bir çerçeve içerisinde katılımcı ve araştırmacının iş birliğiyle süreç yürütülmektedir (Lingard vd., 2008). Eylem araştırması; araştırma probleminin/amacının belirlenmesi, verilerin elde edilmesi, toplanan verilerin analiz edilmesi ve eylem planının geliştirilmesi olarak dört adımdan oluşmaktadır (Fraenkel vd, 2012 ve Tablo 1).

Tablo 1. Eylem Araştırması Yöntemine Göre Çalışmanın Aşamaları

| EYLEM ARAŞTIRMASI AŞAMALARI | ÇALIŞMANIN AŞAMALARI |
|---|---|
| Araştırma Amacı | Çalışmanın amacı, temel tasarım ilkelerinin mimarlık öğrencilerine eğlenceli, etkili ve kalıcı bir şekilde aktarılmasını ve tasarım dersinin metaverse ortamında eşzamanlı olarak deneyimlenmesini sağlamaktır. |
| Veri Toplama Tekniği | **1. Veri Toplama Tekniği:** Temel tasarım dersinin içeriği, oyunlaştırma kavramı, metaverse ve eğitim, roblox anahtar kelimelerinin literatürdeki tanımlarının araştırılmasıdır. <br> **2. Veri Toplama Tekniği:** Metaverse evreni olan Roblox uygulamasındaki Building Blocks oyununun mimarlık öğrencileri tarafından oynanması sonrasında görüşme yapılmasıdır. |
| Veri Analizi | Oyun sonrasında mimarlık öğrencileriyle yapılan görüşme sonucu oyunun işleyişi ve verimliliği hakkında verilen cevapların, öğrencinin bulunduğu sınıf ve oyun oynama deneyimi bazında değerlendirilmesidir. |
| Eylem Planının Oluşturulması | Elde edilen sonuçların değerlendirilmesi ile temel tasarım dersinin metaverse ortamında oyunlaştırılarak eğitimde kullanılmasını sağlanacaktır. |

Eylem araştırması yönteminden yola çıkılarak veri toplama aracı olarak deney ve görüşme tekniği kullanılmıştır. Çalışmanın deney aşamasında çalışma grubu olarak 18 mimarlık öğrencisi; deney ortamı olarak metaverse evreni

olan Roblox uygulaması seçilmiştir. Bu tercihin sebebi, Roblox'un kullanım ve erişim kolaylığı gibi özellikleri taşımasıdır. Roblox evreninde, çalışma amacına uygun olarak Building Blocks isimli oyun araç olarak kullanılmıştır. Bu oyunda, öğrencilerden belirli malzeme, süre içerisinde belirlenen temel tasarım ilkeleriyle tasarım yapmaları istenmiştir. Görüşme hem oyun esnasında hem de oyun sonrasında yapılarak, ilkelerin oyunlaştırılarak aktarılması hakkında öğrenci görüşleri alınmıştır. Elde edilen sonuçlar 'Bulgular ve Sonuç' başlığı altında tartışılmıştır. Bu çalışma kapsamında; Oyunun amacı: Metaverse evreninin uzaktan veya yüz yüze yapılan eğitim sürecinde oyunlaştırma aracılığıyla temel tasarım dersine entegre edilmesi; Oyunun kapsamı: Belirlenen oyun alanında, belirlenen malzemelerin seçimiyle verilen süre bitene kadar tasarım yapılması; Oyunun araç ve yöntemi: Metaverse ortamında oyunlaştırma kapsamında D6 modeli temel alınarak oluşturulan oyun basamaklarıyla Roblox uygulamasında yer alan Building Blocks oyununda belirlenen alan içerisinde tasarım yapılmasıdır (Tablo 2).

Tablo 2. D6 Modeli ve Oyundaki Karşılığı

| D6 MODELİ BASAMAKLARI | BASAMAKLARIN AMACI | BASAMAKLARIN OYUNDAKİ KARŞILIĞI |
|---|---|---|
| DEFINE business objectives | İş hedeflerini belirleyin | Temel Tasarım İlkelerinin Oyunlaştırılması |
| DELINEATE target behavior | Hedef davranışları betimleyin | Tasarım İlkeleri, Zaman ve Malzeme |
| DESCRIBE your players | Oyuncularınızı tanımlayın | Mimarlık Lisans Öğrencileri |
| DEVISE activity cycles | Etkinlik döngülerini planlayın | Belirlenen ilkeler doğrultusunda tasarım |
| DON'T forget the fun! | Eğlenceyi unutmayın | Sınırlı zaman ve malzeme |
| DEPLOY the appropriate tool | Uygun araçları kullanın | Roblox erişimi olan cihazlar |

Temel tasarım ilkelerinin oyunlaştırma yöntemiyle pekiştirilmesini temel alan oyun, 2 seviyeden oluşmaktadır. Her bir seviyede katılımcının tasarım yapacağı alanların ölçüleri, kullanabilecekleri maksimum süre, kullanılacak malzemelerin çeşidi; tasarımlarında yer alması beklenen temel tasarım ilkeleri belirlenmiştir. Malzemelerin çeşidi ve sayısı, oyun süresi ve tasarımlarda yer alması beklenen temel tasarım ilkelerinin sayısı oyun seviyelerine göre değişmektedir (Tablo 3).

Tablo 3. Oyun Seviyeleri ve Kurgusu

| Seviye | Seviyenin Amacı | Oyun Alanı | Malzeme | Süre |
|---|---|---|---|---|
| Birinci Seviye | Öğrenciden **Oran-Orantı** ve **Ritim** anlatan bir tasarım yapması istenmektedir. | 5x5'lik bir kare alan | -küp (1x1x1 birim) -tek renk -80 adet | 7 dk |
| İkinci Seviye | Öğrenciden **Hiyerarşi** ve **Zıtlık** anlatan bir tasarım yapması istenmektedir. | 7x7'lik bir kare alan | -küp-1 (1x1x1 birim) -küp-2 (1x1x0,5 birim) -100'er adet küp-1 ve küp-2 | 10 dk |

## Results and Conclusions

Oyuna katılan mimarlık öğrencilerden 7 kişi 1. sınıf, 2 kişi 2. sınıf, 4 kişi 3. sınıf, 5 kişi 4. sınıfta eğitim görmektedir. 10 öğrencinin, diğer 8 öğrenciye oranla daha fazla dijital oyun deneyiminin olduğu görüşme sonucunda tespit edilmiştir. Oyun sonucunda elde edilen bazı ürünler, oyunun oynandığı süre, ikinci seviyenin oynanıp oynanmadığı (oynanmadı ise nedenleri) değerlendirilmiştir (Tablo 4). Oyunu oynayan öğrenciler, bu tür bir oyunlaştırmanın temel tasarım ilkelerinin aktarılmasına önemli bir adım olacağını belirtmişlerdir. Öğrencilerin geri bildirimleri, 2. seviyede verilen malzeme ve renk seçiminin yetersiz olması; Oyuna başlamadan önce tanıtım videosu gibi bir içeriğin olması gerektiği; Tasarlama sürecinde dış etkenlerinin olması gerektiği (bazı öğrencilerde başka bir avatarın müdahalesi ile tasarımların silinmesi öğrencilerde oyunu tekrar oynama isteği oluşturmuştur.) şeklinde sıralanabilir. 1. sınıf öğrencilerinin dönem içerisinde temel tasarım eğitimini yeni almış olmaları, oyunu oynamayı daha keyifli bir hale getirirken; 4. sınıf öğrencilerinde bu etki daha az görülmüştür. Oyunu oynayan öğrencilerin, oyundan temel tasarım ilkeleri anlamında öğretici olmasının bir etkisi ise öğrencilerin daha önce oyun deneyimlerinin olup olmaması ile ilişkilidir. Daha önce oyun deneyimi olmayan öğrenciler, tasarımı oluşturma ve oyuna hâkim olmada birtakım eksiklikler yaşamıştır.

Tablo 4. Oyun Sonucunda Ortaya Çıkan Tasarım Ürünleri Örnekleri

| Öğrenci (Sınıf) | Oyun Deneyimi | Seviye-1 -Oran-Orantı ve Ritim -Tek Malzeme ve Renk | | Görsel | Seviye-2 -Zıtlık ve Hiyerarşi -İki Malzeme ve İki Renk | Görsel |
|---|---|---|---|---|---|---|
| 4. Sınıf Öğrencisi | Yok | Bitirdiği Süre | 2 dk | | 10 dk | |
| | | Tasarımdaki Küp Sayısı | 28 Küp | | 11 Yarım Küp ve 24 Tam Küp | |
| 2. Sınıf Öğrencisi | Yok | Bitirdiği Süre | 7 dk | | Süre yetersiz geldiği için yetiştirememiştir. | |
| | | Tasarımdaki Küp Sayısı | 16 Küp | | | |
| 4. Sınıf Öğrencisi | Var | Bitirdiği Süre | 5 dk | | Diğer katılımcıların müdahalesinden dolayı tamamlayamamıştır. | -- |
| | | Tasarımdaki Küp Sayısı | 33 Küp | | | |
| 1. Sınıf Öğrencisi | Var | Bitirdiği Süre | 7 dk | | 7 dk | |
| | | Tasarımdaki Küp Sayısı | 65 Küp | | 45 Yarım Küp ve 45 Tam Küp | |
| 1. Sınıf Öğrencisi | Var | Bitirdiği Süre | 6 dk | | 7 dk | |
| | | Tasarımdaki Küp Sayısı | 30 küp | | 20 Tam Küp ve 10 Yarım Küp | |

Tablo 4'te de görüldüğü üzere, oyunu oynayan öğrencilerden bazıları oyunda diğer katılımcıların müdahalesinden dolayı seviyeyi tamamlamamışlardır. Bu durum öğrencide oyunu yeniden oynamaya isteğini oluşturmuştur. Bu istek beraberinde oyun sürecinde ilkelerin yeniden tekrar edilmesine, öğrencide temel tasarım ilkelerinin daha iyi bir şekilde öğrenmesine yardımcı olmuştur. Metaverse ortamında temel tasarım ilkelerinin oyunlaştırılmasını amaçlayan bu oyun; diğer katılımcılarında eş zamanlı olarak oyunda yer almasını, bir arada öğrenmesi, öğrenciler arası rekabetin oluşması, oyunun sürekliliğini sağlaması açısından olumlu bir durumu teşkil ettiği söylenebilir. Sonuç olarak bu çalışma, derslerde öğretilen ilkelerin metaverse evreninde öğrenciler tarafından eş zamanlı olarak deneyimlenmesine, uzaktan eğitim sürecinde de temel tasarım derslerinin daha eğlenceli, kalıcı ve etkin bir şekilde yürütülmesine yardımcı olacaktır.

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# Uzaktan Eğitim Sürecine İlişkin Öğretmen Adaylarının Bakış Açıları

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## Özet

Bu araştırmanın amacı öğretmen adaylarının uzaktan eğitim sürecine yönelik bakış açılarını incelemek ve uzaktan eğitime yönelik beklentilerini ortaya çıkarmaktadır. Araştırmanın çalışma grubunu 2022-2023 eğitim-öğretim yılının bahar yarıyılında Açık ve Uzaktan Eğitim dersini alan 18 öğretmen adayı oluşturmaktadır. Veriler uzman görüşleri alınarak oluşturulan 17 sorudan oluşan bilgi toplama formu aracılığıyla toplanmıştır. Araştırma nitel araştırma desenlerinden biri olan durum çalışması kapsamında yürütülmüştür. Bilgi toplama formundan elde edilen verilerin analizinde içerik analiz yöntemi kullanılmıştır. Araştırma sonucunda her öğrenciye uzaktan eğitime erişebileceği teknik araç gereç sağlanması gerektiği ve etkin katılımın geleneksel sınıf ortamına benzer şekilde sağlanarak dersin yapılandırılması gerektiği tespit edilmiştir. Öğretmen adayları uzaktan eğitim sürecinin olumlu yönlerini ilgili dersleri tekrar tekrar izleme fırsatı sunması ve istedikleri mekanda derslere ulaşabilmeleri olarak belirtirken, olumsuz yönlerini internet bağlantı sorunları, internet paketlerinin bitmesi, platform kaynaklı sorunlar, verimsiz ders ortamı ve uzaktan eğitimde dikkat toplayamamak olarak belirtmişlerdir. Uzaktan eğitimde etkileşim sürecine ilişkin öğretmen adayları daha çok eğitmen ve öğrenci arasında etkileşim kurduklarını, öğrenci-öğrenci etkileşiminin eksik kaldığını bildirmiştir. Öğrenme sürecinde etkileşimi artırmak için öğrencilerin sunum gibi etkinlikler yaparak derse aktif olarak katılmaları ve ders sırasında kamera ve mikrofonların açık olması gerektiğini önermişlerdir. Ayrıca uzaktan eğitimde motivasyonlarının düşük olduğu ve derslerin yüz yüze eğitimdeki gibi ciddiye alınmadığı öğretmen adayları tarafından vurgulanmadır. Motivasyonunu artırmak için tartışmalar yapılması, çoklu ortam destekli materyaller kullanılması, grup ödevleri ve işbirlikli çalışmalara yer verilmesi gerektiği de belirtilmiştir.

**Anahtar Kelimeler:** Uzaktan eğitim, Öğretmen adayları, Motivasyon, Etkileşim

# Pre-Service Teachers' Perspectives on Distance Education Process

## Abstract

The aim of this study is to examine pre-service teachers' perspectives on the distance education process and to reveal their expectations for distance education. The study group of the research consists of 18 pre-service teachers who took the Open and Distance Education course in the spring semester of the 2022-2023 academic year. The data were collected through an information collection form consisting of 17 questions developed by taking expert opinions. This study is carried out within the scope of the case study which is one of the qualitative research patterns. The content analysis method was used to analyze the data obtained from the information collection form. As a result of the research work; it was determined that each student should be provided with technical equipment to access distance education and that the course should be structured by providing effective participation similar to the traditional classroom environment. While the pre-service teachers stated that the positive aspects of the distance education process were the opportunity to watch the related courses over and over again and the ability to access the courses at any place they wanted, the negative aspects were internet connection problems, running out of internet packages, platform-related problems, inefficient course environment and inability to concentrate in distance education. Regarding the interaction process in distance education, pre-service teachers reported that they mostly interacted between the instructor and the student, and that student-student interaction was lacking. To increase interaction in the learning process, they suggested that students should actively participate in the lesson by doing activities such as presentations and that cameras and microphones should be turned on during the lesson. In addition, it is emphasized by pre-service teachers that their motivation is low in distance education and that the lessons are not taken seriously as in face-to-face education. It was also stated that to increase motivation,

discussions should be held, multimedia-supported materials should be used, and group assignments and collaborative work should be included.

**Keywords:** Distance education, Pre-service teachers, Motivation, Interaction

# Giriş

Uzaktan eğitim; kırsal bölgede ve coğrafi açıdan uzak yerleşim yerlerinde yaşayan, yeterli sayıda kaynak ve öğretmenden yoksun olan insanlar, fiziksel bir engeli ya da hastalığı nedeniyle eve bağımlı olan insanların, örgün eğitime devam edememiş kişilerin ve kendilerini geliştirmek isteyen yetişkinlerin eğitim gereksinimleri gibi eğitime engel olan durumları ortadan kaldırmak amacı ile ortaya çıkmış bir eğitim modelidir (Newby, Stepich, Lehman & Russell, 2006). Bu eğitim modeli eğitici ve öğrenenin farklı mekan ve zamanlarda, bilgi ve iletişim teknolojileri kullanarak öğrenme ve öğretme faaliyetlerini gerçekleştirmelerine imkan tanımaktadır (Aşkar, 2003, Horzum, 2003; Moore & Kearsley, 2011; İşman, 2011). Pandemi, savaş ve doğal afetler gibi durumlar kesintisiz ve kaliteli yüzyüze eğitimin devam edebilmesine engel teşkil edebilir (Aslan & İnceoğlu, 2023; Reimers & Schleicher, 2020). Kriz durumları olarak nitelendirilen olağan üstü durumlarda yüz yüze eğitime ara verilmesi zorunda kalınmış ve ülkeler eğitimin sürekliliğinin sağlayabilmek için uzaktan eğitimi bir çözüm yolu olarak eğitim sürecine dahil etmişlerdir (Telli & Altun, 2020). Örneğin pandemi sürecinde birçok ülke salgının yayılımını önleyebilmek ve öğrenme kaybını en aza indirmek amacıyla uzaktan eğitime geçmiştir. Pandemi sürecinde hem yükseköğretimde, hem örgün öğretimde milyonlarca öğrenci uzaktan eğitimi deneyimlemiştir. Bu noktada geleneksel eğitime göre farklı bir öğrenme ortamı sunan uzaktan eğitim faaliyetlerinin verimli yürütülebilmesi önem arz etmektedir. Bunun için uzaktan eğitim kavramı bütün bileşenleri ile ele alınarak, eğitim faaliyetleri esnasında karşılaşılan sorunların çözümü üzerine iyileştirme çalışmaları yapılması gerekmektedir (Akkoyunlu & Bardakçı, 2020).

Uzaktan eğitimin geliştirilmesi ve iyileştirilmesi için uzaktan eğitimle öğrenim görmekte olan bireylerin bu ortamlara yönelik görüşlerinin belirlenmesi, ortamların daha etkili tasarlanması ve karşılaşılan aksaklıklar için gerekli ve istenen düzeltmelerin yapılmasında oldukça önemlidir (Yıldırım vd. 2014). Uzaktan eğitimde teknik sorunlar olabileceği, teknolojik bir altyapısının olması gerektiği, sistemi kullanacak bireylerin programları kullanabilir olması ve maddi yetersizlikler nedeni ile eğitime erişememesi gibi durumlar, uzaktan eğitimin gerçekleştirilmesinde karşılaşılan engellerdir (Altıparmak, Kurt & Kapıdere, 2011). Diğer taraftan öğrenci, eğitici, arayüz, içerik gibi uzaktan eğitimin temel bileşenleri arasındaki uyum ve etkileşim uzaktan eğitim sisteminin başarılı bir şekilde yürütülebilmesinde büyük önem taşımaktadır. Yapılan araştırmalarda uzaktan eğitimde öğrenci-öğretmen etkileşiminin zayıf kaldığı bu durumunda dikkat dağınıklığı ve motivasyon eksikliği gibi problemlere sebep olduğu ve sonuç olarak geleneksel eğitime göre uzaktan derslerin etkisinin düşük olduğu görülmektedir (Elçin & Şahiner, 2014). Öğrencinin motivasyon, tutum, güdülenme, ilgi gibi duyuşsal özellikleri de dersin verimliliğini etkilemektedir (Garrison, Anderson & Archer, 2000). Uzaktan eğitimde öğrenci görüşlerinin alınması, uzaktan eğitim sürecindeki eksikliklerin belirlenmesi ve bu eksikliklerin iyileştirilmesi adına önemlidir. Bu doğrultuda araştırmada; öğretmen adaylarının uzaktan eğitime yönelik fikirlerini ortaya koymak amaçlanmaktadır.

# Yöntem

Öğretmen adaylarının uzaktan eğitime yönelik fikirlerini ortaya koymayı amaçlayan bu araştırma, nitel araştırma desenlerinden özel durum çalışması çerçevesinde yürütülmüştür. Özel durum çalışmalarında araştırmacı, bağlamı açıkça belli olmayan durumları bağlamından kasıtlı olarak ayırır ve sınırlı bir biçimde gözlem için mevcut olmayan olayları bütününe odaklanarak derinlemesine analiz etmektedir (Yin, 1981; Schreiber & Asner-Self, 2011). Ayrıca özel durum çalışmalarının en önemli noktası çalışma grubu insanlar ve deneyimlerdir. Bu yüzden durum çalışmaları öncelikle çalışma grubunu veya görüşülen kişileri uygun şekilde yanıt vermeye ikna edecek bir biçimde tasarlanmalıdır (Njie & Asimiran, 2014).

## Araştırma Grubu

Araştırma 2022-2023 eğitim-öğretim yılının bahar yarıyılında Açık ve Uzaktan Eğitim dersini alan 18 öğretmen adayıyla yürütülmüştür. Kolay ulaşılabilir örnekleme yöntemi nitel araştırma yöntemlerinden biri olarak çoğu zaman araştırmacının diğer örnekleme yöntemlerini kullanma olanağının bulunmadığı zamanlarda kullanılan en iyi örneklem seçimi olarak değerlendirilir (Yıldırım & Şimşek, 2016). Bu doğrultuda araştırmanın çalışma grubu kolay ulaşılabilir örnekleme yöntemi kullanılarak seçilmiştir.

## Veri Toplama Aracı ve Süreç

Öğretmen adaylarının uzaktan eğitime yönelik fikirlerimi ortaya çıkarmak amacıyla veri toplama aracı olarak bilgi toplama formu oluşturulmuştur. Alanyazın ve belirlenen araştırma problemi göz önünde bulundurularak

oluşturulan bu formun geçerliliğini sağlamak amacıyla uzaktan eğitim alanında çalışan üç akademisyenden görüş alınmıştır. Uzmanlar bilgi toplama formunda yer alan soruları kapsam geçerliliği yönünden değerlendirmiş ve gelen dönütler doğrultusunda sorularda amacına uygunluk ve netlik bakımından gerekli düzenlemeler yapılmıştır. İlgili hususlar neticesinde öğretmen adaylarına yönelik bilgi toplama son şekli verilmiştir. Bilgi toplama formu adayların demografik özelliklerini ortaya çıkarmak amaçlı 5 soru (yaş, bölüm, sınıf vb.) ve uzaktan eğitime yönelik görüşlerini ortaya çıkarmak amaçlı 12 soru (uzaktan eğitim ortamı düzenlenirken dikkate alınması gerekenler, uzaktan eğitim sürecinde ders işlemenin olumlu-olumsuz yanları, uzaktan eğitim sürecindeki etkileşim vb.) olmak üzere toplam 17 sorudan oluşmaktadır. Veri toplama aracı "Google formlar" a işlenmiş ve bir bağlantı oluşturularak öğretmen adayları ile paylaşılmıştır.

### Verilerin Analizi

Bilgi toplama formundan elde edilen verilerin analizinde frekans ve içerik analiz teknikleri kullanılmıştır. Elde edilen veriler iki araştırmacı tarafından ayrıntılı olarak incelenmiş ve her iki farklı araştırmacı tarafından katılımcılar tarafından verilen yanıtlara uygun kodlar geliştirilmiştir. Ardından iki araştırmacının görüş birliği ve görüş ayrılıkları hesaplanarak (Miles ve Huberman; 1994), araştırmanın güvenirliği öğretmen adaylarının görüşleri ile oluşan kod ve kategorilerin güvenirliği Miles ve Huberman (1994)'ın uyum yüzdesi formülü ile (Uyum yüzdesi= [Görüş birliği/görüş ayrılığı+Görüş birliği]*100) hesaplanmış, uyum yüzdesi. 95 bulunmuştur. Bu değer nitel analizinin güvenilir olduğunun göstergesidir. Oluşturulan kategoriler vasıtasıyla temalara ulaşılmış ve bu işlem temalar sabitlenene kadar devam etmiştir. Ayrıca katılımcıların söylemlerinden bazı örneklere yer verilerek bulgular desteklenmeye çalışılmıştır.

### Etik

Etik ilkeler dâhilinde veri toplama aracının uygulama süreci bizzat araştırmacılar tarafından titizlikle yürütülmüş ve veriler gizlilik, insana saygı duyulması ilkelerine uyularak toplanmıştır. Araştırma süresince öğretmen adaylarına araştırmanın amacı ve araştırmanın sınırlılıklarına yönelik bilgi verilmiştir. Ayrıca uygulama süresince şahsi bilgilerinin hiç kimseyle paylaşılmayacağı teminatı verilmiş, kendi rızası da ayrıca alınarak araştırma sürecine dahil edilmiştir. Araştırmaya gönüllü olarak katılmayı kabul eden öğretmen adayları gizlilik ilkesi gereğince Ö1, Ö2…Ö18 olarak kodlanmıştır.

## Bulgular

Öğretmen adaylarının uzaktan eğitime yönelik fikirlerini ortaya koymayı amaçladığımız bu araştırmadan elde edilen bulgular bu bölümde sırası ile verilmiştir.

Tablo 1. Uzaktan eğitimde öğrenme sürecinde dikkate alınması gereken unsurlar

| Temalar | Kodlar | Katılımcılar | f(x) | % |
|---|---|---|---|---|
| Ders öncesi | Teknik araç gereç | Ö1, Ö5, Ö8, Ö13, Ö14, Ö15, Ö16, Ö18 | 8 | 44,44 |
| | Teknik altyapı | Ö1, Ö5, Ö6, Ö14, Ö15, Ö16, Ö18 | 7 | 38,89 |
| | Geleneksel sınıf ortamı | Ö4, Ö6, Ö10, Ö13 | 4 | 22,22 |
| | Konuların sıralanışı (yaşama yakınlık, somuttan soyuta | Ö3 | 2 | 11,11 |
| Ders içi | Etkin katılım | Ö2, Ö4, Ö7, Ö9, Ö10, Ö12, Ö16 | 7 | 38,89 |
| | Öğrenci merkezli | Ö7, Ö16 | 2 | 11,11 |
| | Tartışma | Ö4 | 1 | 5,56 |
| | Geri bildirim | Ö4 | 1 | 5,56 |
| | Devam önemsenmeli | Ö10 | 1 | 5,56 |

Öğretmen adaylarının bir kısmı ders öncesinde teknik araç gereç (f=8) yönünden yeterli imkanın sağlanması gerektiğine değinmektedir. Bu doğrultuda öğretmen adaylarından Ö14 "Her öğrencinin uzaktan eğitim sürecinde kullanacağı bilgisayarı, tableti vb. olmalı, eğitime erişim sürecinde her bireye eşit şartlar sunulmalıdır." şeklinde görüşünü ifade etmiştir. Bunun yanı sıra yine öğretmen adaylarının önemli bir kısmı (f=7) süreçte uygun altyapının sağlanmasına değinmektedir. Bu noktada adaylardan Ö6 "Alt yapı oldukça önemli internet bağlantı sürecinde yaşanan sorunlar halledilmelidir." ifadesine yer vermektedir. Ayrıca öğretmen adayları uzaktan eğitim ortamının, geleneksel sınıf ortamına (f=8) benzer şekilde yapılandırılması gerektiğini belirtmiştir. Buna yönelik Ö4 "Öğrenciler dersler nasıl olsa online diye dersleri ciddiye almıyor, geleneksel ortamdaki gibi öğrenemiyoruz bence bu ortamlarda geleneksel ortama benzer şekilde yapılandırılmalıdır." şeklinde görüşünü bildirmiştir. Tablo 1

incelendiğinde öğretmen adayları ders sürecinde etkin katılımının (f=8) da önemine değinmektedir. Bu bağlamda Ö12 "Öğrenme sürecine etkin bir şekilde katılırsak dersler daha verimli gerçekleşiyor ancak bu her ders için sağlanamıyor." şeklinde etkin katılımın öğrenme sürecindeki önemine vurgu yapmaktadır.

Tablo 2. Uzaktan eğitim sürecinde ders işlemenin olumlu yanları

| Kodlar | Katılımcılar | f(x) | % |
|---|---|---|---|
| Tekrar tekrar izleme | Ö1, Ö2, Ö3, Ö5, Ö11, Ö12, Ö13, Ö15, Ö17, Ö18 | 10 | 55,56 |
| İstenilen mekandan erişim | Ö1, Ö2, Ö4, Ö6, Ö7, Ö10, Ö11, Ö16, Ö17 | 9 | 50,00 |
| Zamandan tasarruf | Ö3, Ö7, Ö9, Ö10, Ö11, Ö12, Ö14, Ö16, Ö17 | 9 | 50,00 |
| Yüzyüze eğitime alternatif | Ö1, Ö8, Ö10, Ö17 | 4 | 22,22 |
| Çok sayıda öğrenen ile iletişim | Ö9, Ö12, Ö16 | 3 | 16,67 |
| Çekingen öğrencilere konuşma imkanı | Ö12, Ö13 | 2 | 11,11 |

Uzaktan eğitim sürecinin olumlu yönlerine ilişkin öğretmen adaylarından birçoğu (f=10) ilgili derslerin tekrar tekrar izleme fırsatı sunmasına değinmişlerdir. Buna yönelik Ö1 "Derslerin kayıt olması bize tekrar sürecinde kolaylık sağlıyor, kayıtları tekrar tekrar izleme fırsatı sunuyor." şeklinde görüşünü bildirmiştir. Bunun yanı sıra öğretmen adaylarının % 50'si uzaktan eğitim sürecinde istedikleri mekanda derslere ulaşabildiklerini (f=9) ve uzaktan eğitim sayesinde zamandan tasarruf ettiklerini belirtmişlerdir. Bu bağlamda Ö11 "İstediğim yerden derslere erişim sağlıyorum ve kendi evimde konforlu bir şekilde eğitim alırken okula hazırlanma, ulaşım gibi durumlardan da zaman kazanıyorum." ifadesine yer vermektedir.

Tablo 3.Uzaktan eğitim sürecinde ders işlemenin olumsuz yanları

| Kodlar | Katılımcılar | f(x) | % |
|---|---|---|---|
| İnternetin bağlantı sorunu | Ö1, Ö2, Ö3, Ö4, Ö5, Ö6, Ö8, Ö9, Ö15, Ö16, Ö17 | 11 | 61,11 |
| Platform kaynaklı sorunlar | Ö3, Ö4, Ö7, Ö8, Ö9, Ö10, Ö11, Ö14 | 8 | 44,44 |
| İnternetin bitmesi | Ö1, Ö2, Ö6, Ö12, Ö13, Ö18 | 6 | 33,33 |
| Verimsiz ders | Ö2, Ö4, Ö7, Ö8, Ö15 | 5 | 27,78 |
| Dikkat eksikliği | Ö4, Ö10, Ö16, Ö17,Ö18 | 5 | 27,78 |
| Motivasyon eksikliği | Ö15, Ö16, Ö17 | 3 | 16,67 |
| Öğretmen-öğrenci donanım sorunu | Ö4, Ö15 | 2 | 11,11 |
| Yüzyüzedeki gibi öğrenememe | Ö4, Ö15 | 2 | 11,11 |
| Kamera ve ses açmama | Ö7, Ö15 | 2 | 11,11 |
| Derse katılım | Ö4, Ö7 | 2 | 11,11 |
| Derse esnek katılımın rehaveti | Ö11, Ö16 | 2 | 11,11 |
| Sosyal etkileşim | Ö12 | 1 | 5,56 |
| İletişim sıkıntısı | Ö14 | 1 | 5,56 |
| Ders çalışma isteğinde azalma | Ö4 | 1 | 5,56 |

Uzaktan eğitim sürecinde ders işlerken internet bağlantı sorunları (f=10), uzaktan eğitim platformundan kaynaklı sorunlar (f=8), internetin bitmesi gibi (f=6) sorunlar yaşadıkları adaylar tarafından dile getirilmektedir. Bu bağlamda "Uzaktan eğitim başladığından sürekli internette kopmalar yaşadım, ilerleyen haftalarda düzenlenmesi için başvuru da bulundum, kopma sorununu çözdüm. Sonrasında kullandığımız platformda sıkıntılar yaşadık sisteme giremedik, girdik dersin bir kısmında sistem bizi dersten attı." şeklinde Ö8 görüşünü belirtmiştir. İnternetin bitmesine yönelik olarak da Ö13 "İnternet paketim sınırlı ve bitince paket yenileninceye kadar derslere giremiyorum, kayıtları izlemiyorum." ifadesine yer vermiştir.

Tablo 4.Uzaktan eğitim sürecinde kurulan etkileşim

| Temalar | Kodlar | Katılımcılar | f(x) | % |
|---|---|---|---|---|
| Eğitmen-Öğrenci | Yüzyüze ile benzer | Ö1, Ö7, Ö8, Ö10, Ö11, Ö14, Ö18 | 7 | 38,89 |
| | Öğretim elemanı ile iletişim eksik | Ö4, Ö15, Ö16 | 3 | 16,67 |
| | Öğretim elemanı ile etkileşim iyi | Ö6, Ö13 | 2 | 11,11 |
| Öğrenci-Öğrenci | Arkadaşlarıyla sosyal etkileşim eksik | Ö3, Ö4, Ö6, Ö13, Ö16, Ö17 | 6 | 33,33 |
| Öğrenci- Ortam | Olumsuz etki | Ö2, Ö9, Ö12, Ö16 | 4 | 22,22 |
| | Öğrencilerle etkileşim iyi | Ö4, Ö6 | 2 | 11,11 |
| Eğitmen-Öğrenci/ Öğrenci-Öğrenci | Hem öğretmen hem arkadaşla etkileşim iyi | Ö5 | 1 | 5,56 |

Uzaktan eğitimde etkileşim sürecine ilişkin öğretmen adayları daha çok eğitmen ve öğrenci arasında etkileşim kurduklarını (f=10), bu etkileşimin yüz yüze öğrenme ortamına benzer şekilde yapılandırıldığını belirtmişlerdir. Bu bağlamda öğretmen adaylarından Ö7 "Yüz yüze ortam ile benzer şekilde öğretmenle iletişim kuruyoruz, değişen bir şey yok." şeklinde görüş bildirmiştir. Öğrenci ve öğrenci iletişimine yönelik ise öğretmen adayları (f=6) daha çok sosyal iletişim yönünden eksiklikler yaşadığına değinmektedir. Buna yönelik Ö17 "Sınıf ortamında arkadaşlarımızla daha çok etkileşim halindeydik, bu ortamlar sosyal iletişimimizi zayıflattı." ifadesine yer vermektedir.

Tablo 5.Uzaktan eğitim sürecinde etkileşim için yapılması istenenler

| Temalar | Kodlar | Katılımcılar | f(x) | % |
|---|---|---|---|---|
| Ders içi | Derse katılım ve motivasyon | Ö3, Ö6, Ö7, Ö9, Ö10, Ö16, Ö18 | 7 | 38,89 |
| | Kamera ve mikrofon açma | Ö1, Ö2, Ö11, Ö12, Ö13, Ö15 | 6 | 33,33 |
| | Öğrencilerin sunum yapması | Ö4, Ö5, Ö14 | 3 | 16,67 |
| Ders dışı | Whatsapp grupları oluşturma | Ö8, Ö11 | 2 | 11,11 |
| | Tartışma platformları oluşturma | Ö16, Ö17 | 2 | 11,11 |

Uzaktan eğitim sürecinde etkileşimi arttırmak amacıyla öğretmen adayları ders içinde daha çok derse katılım ve motivasyonun (f=7), kamera ve mikrofon açmanın (f=6) önemine değinirken ders dışında ise etkileşimi arttırmak amacıyla whatsapp gruplarının ve tartışma platformlarının (f=2) kurulabileceğini belirtmektedir. Bu görüşlere yönelik Ö7 "Derse katılım ve motivasyon arttırıcı unsurlar derse konulmalı böylece süreçte etkileşim artacak ve öğrenen süreçte aktif rol almak isteyecektir." ifadesiyle derse katılım ve motivasyonun önemine değinmektedir. Ö11 ise "Kamera ve mikrofon genelde açmıyoruz, sadece yazışma bölümünü kullanıyoruz, eğer süreçte kamera ve mikrofon açarsak etkileşimde artacaktır." şeklinde görüş bildirmiştir.

Tablo 6.Uzaktan eğitim sürecinin motivasyona etkisi

| Temalar | Kodlar | Katılımcılar | f(x) | % |
|---|---|---|---|---|
| Olumlu | Motivasyonu arttırma | Ö1, Ö10 | 2 | 11,11 |
| | Dersi verimli hale getirme | Ö1, Ö10 | 2 | 11,11 |
| Kısmen | Dersten derse/eğitmenden eğitmene değişiklik yaratma | Ö8, Ö12, Ö16 | 3 | 16,67 |
| Olumsuz | Yüz yüze ortam gibi ciddi ortam sağlamaması | Ö4, Ö5, Ö11, Ö13, Ö17, Ö18 | 6 | 33,33 |
| | Motivasyonumu düşürmesi | Ö2, Ö4, Ö5, Ö6 | 4 | 22,22 |
| | Etkin katılım sağlayamaması | Ö7, Ö15 | 2 | 11,11 |
| | Motivasyonda değişiklik olmaması | Ö3, Ö14 | 2 | 11,11 |
| | Dikkat dağıtıcı unsurlar içermesi | Ö9 | 1 | 5,56 |
| | Teknik aksaklıklar olması | Ö7 | 1 | 5,56 |
| | Kayıtlardan izlenebilmesi | Ö15 | 1 | 5,56 |

Öğretmen adaylarının bir kısmı uzaktan eğitim ortamlarının motivasyonlarını olumsuz etkilediklerini belirtmiştir. Buna yönelik öğretmen adaylarından Ö5 "Uzaktan eğitim ortamı öğrenciler tarafından ciddiye alınmıyor, yüz yüze ortam daha ciddi. Bu durumda benim motivasyonumu düşürüyor." ifadesiyle görüşünü bildirmiştir. Ayrıca uzaktan eğitim sürecinde motivasyonun dersten derse/ eğitmenden eğitmene değişiklik (f=3) gösterdiği de belirtilmiştir. Ö16 ise "Uygulamalı dersler için uzaktan eğitimin pek faydalı olmadığını düşünüyorum ancak teorik derslerde motivasyonumuz daha yüksek. Bazı hocalarda ders içinde tartışmalar yaparak, videolar gibi farklı materyalleri ders işleyişinde kullanarak motivasyonumuzu arttırıyor." görüşüne yer vermektedir.

Tablo 7.Uzaktan eğitim sürecinde motivasyonu arttırmak için yapılması gerekenler

| Temalar | Kodlar | Katılımcılar | f(x) | % |
|---------|--------|--------------|------|---|
| Ders içi | Tartışmalar yapılmalı | Ö3, Ö4, Ö13, Ö16 | 4 | 22,22 |
| | Aktif katılımı arttırma | Ö7,Ö8, Ö16 | 3 | 16,67 |
| | Öğretmenlerle olumlu sınıf iklimi | Ö7,Ö10, Ö14 | 3 | 16,67 |
| | Farklı çoklu ortam destekli materyaller eklenmeli | Ö3, Ö4, Ö12 | 3 | 16,67 |
| | Kamera ve ses açılımını zorunlu tutma | Ö1, Ö13 | 2 | 11,11 |
| | Yüz yüze ortama benzer yapılandırılmalı | Ö6,Ö18 | 2 | 11,11 |
| Ders dışı | Grup ödevleri ve işbirlikli çalışmalar | Ö3,Ö4,Ö13,Ö16 | 4 | 22,22 |
| | Altyapı ve teknik araç gereç iyileştirilmeli | Ö5, Ö9, Ö11 | 3 | 16,67 |
| | Rehberlik hizmeti sunma | Ö2,Ö17 | 2 | 11,11 |
| | Ders sürelerini düşürme | Ö15 | 1 | 5,56 |
| | Devam zorunluluğunu kaldırma | Ö4 | 1 | 5,56 |

Uzaktan eğitim sürecinde motivasyonu arttırmak için ders içinde tartışmaların yapılması gerektiğine (f=4) ve grup ödevlerinin yanı sıra işbirlikli çalışmaların (f=3) ders dışında kullanılmasına adaylar değinmektedir. Buna bağlı olarak Ö3 "Ders içinde yapılan tartışmalar motivasyonumuzu artırma sürecinde yardımcı olabilir" şeklindeki görüşüne yer verirken Ö13 "Grup ödevleri ve işbirlikli çalışmalar sayesinde arkadaşlarımızla hem ders dışında birlikte çalışma imkanı yakalarız hem de birbirimizin motivasyonunu yükseltiriz." ifadesine yer vermektedir.

Tablo 8.Uzaktan eğitimin öğrenme sürecine bağlılığına etkisi

| Temalar | Kodlar | Katılımcılar | f(x) | % |
|---------|--------|--------------|------|---|
| Olumlu | Uzaktan eğitime inancım arttı | Ö3, Ö10, Ö13, Ö16, Ö17, Ö18 | 6 | 33,33 |
| | Öğrenme sürecine etkin katılımım arttı | Ö3, Ö16 | 2 | 11,11 |
| Olumsuz | Derse devamım azaldı | Ö4, Ö5, Ö6, Ö8, Ö12, Ö15 | 6 | 33,33 |
| | Öğrenme sürecine etkin katılımım azaldı | Ö5, Ö9, Ö11, Ö14, Ö15 | 5 | 27,78 |
| | Öğrenme sürecinde herhangi bir değişim yok | Ö1, Ö2, Ö7 | 3 | 16,67 |

Uzaktan eğitimin bağlılığa olan etkisi incelendiğinde öğretmen adaylarından bir kısmı (f=8) uzaktan eğime yönelik olumlu etkiden söz ederken yine adayların bir kısmı (f=11) sürecin bağlılığı olumsuz etkilediğini vurgulamaktadır. Bu doğrultuda öğretmen adaylarından Ö11 "Uzaktan eğitime karşı olan ön yargılarımı aştığımı düşünüyorum, bu süreçte uzaktan eğitimin yararlarını görme imkanım oldu ve uzaktan eğitime olan inancım arttı." ifadesiyle uzaktan eğitimin bağlılığı olumlu etkilediğine değinirken Ö12 ise "Derslere devam zorunluluğunun olmaması bizi rahat ettiriyor. Devam olmayınca da derse genelde katılmıyoruz." ifadesiyle sürecin olumsuz etkisine değinmektedir. Ayrıca Ö15 "Uzaktan eğitimin normal bir eğitimle bir olduğunu düşünmüyorum. Etkisiz ve verimsiz dersler oluyor bu da benim motivasyonumu düşürüyor ve dersleri tekrar etmiyorum, süreçte etkin rol almıyorum." şeklinde etkin katılım olmamasının süreci olumsuz etkilediğini ifade etmektedir.

Tablo 9.Uzaktan eğitim öğrenme sürecine bağlılığı arttırmak için yapılması gerekenler

| Kodlar | Katılımcılar | f(x) | % |
|--------|--------------|------|---|
| Dersi eğlenceli hale getirme | Ö3, Ö4, Ö5, Ö10, Ö12, Ö17 | 6 | 33,33 |
| Derse uygun materyal hazırlama | Ö1, Ö11, Ö12, Ö15 | 4 | 22,22 |
| Öğretmenlerle olumlu etkileşim kurma | Ö7, Ö8, Ö9, Ö18 | 4 | 22,22 |
| Yüz yüze ortama benzer şekilde yapılandırma | Ö6, Ö14, Ö16 | 3 | 16,67 |
| Ders içinde tartışma yapabilme | Ö3, Ö4, Ö12 | 3 | 16,67 |
| Dersi verimli hale getirme | Ö2, Ö13 | 2 | 11,11 |

Öğrenme sürecine bağlılığı arttırmak için dersi eğlenceli hale getirmesi (f=6), derse uygun materyaller hazırlaması (f=4) ve öğretmenlerle olumlu etkileşim kurulması (f=4) gerektiği öğretmen adayları tarafından belirtilmektedir. Buna yönelik Ö17 "Ders içerikleri daha eğlenceli hazırlanmalı ki derse katılımımız artsın yoksa dersler sıkıcı ilerliyor." ifadesiyle derslerin eğlenceli olması koduna vurgu yapmaktadır. Öğretmen adaylarından Ö15 "Her ders için dersin yapısına uygun olacak şekilde materyaller hazırlanmalı…" şeklinde uygun materyal hazırlamaya yönelik görüş bildirirken Ö7 "Hocaların bana sıcak davranması uzaktan eğitime olan bağlılığımı arttırır, derslere katılımım artar." görüşüne yer vermektedir.

Tablo 10. Meslek hayatında uzaktan eğitim platformu kullanım durumu

| Temalar | Kodlar | Katılımcılar | f(x) | % |
|---------|--------|--------------|------|---|
| Kullanırım | Ek ders/ Telafi dersi verme | Ö1, Ö3, Ö6, Ö10, Ö13, Ö15, Ö17 | 7 | 38,89 |
| | Geleneksele alternatif | Ö2, Ö3, Ö6, Ö10, Ö12, Ö16 | 6 | 33,33 |
| | Olağan dışı durumlar | Ö3, Ö5, Ö7, Ö15 | 4 | 22,22 |
| | Kısıtlı zamanlar | Ö8, Ö10 | 2 | 11,11 |
| | Seminer, toplantı yapma | Ö11, Ö14 | 2 | 11,11 |
| Kullanmam | Verimsiz ders | Ö4, Ö18 | 2 | 11,11 |
| | Pasif öğrenci | Ö9 | 1 | 5,56 |
| | Teknik sorunlar | Ö9 | 1 | 5,56 |

Öğretmen adaylarından bir kısmı meslek hayatlarında uzaktan eğitim uygulamalarını daha çok ek ders/ telafi dersi (f=7) vermek için kullanabileceğini belirtmektedir. Bu bağlamda Ö6 "Yüz yüze ders yapamadığım durumlarda telafi dersi yapmak için uzaktan eğitim platformları kullanabilir." ifadesine yer vermiştir. Bunun yanı sıra öğretmen adaylarından bazıları uzaktan eğitimin geleneksel yönteme bir alternatif (f=6) olarak kullanılabileceğine de vurgu yapmaktadır. Buna yönelik Ö16 "Geleneksel yönteme alternatif olarak kullanabilirim özellikle anlaşılmayan konularda video-animasyon, şekil, grafik, görselleri bu ortamda çok daha kolay öğretim için kullanabilirim." şeklinde görüş bildirmektedir.

## Tartışma ve Sonuç

Uzaktan eğitime katılacak öğrencilerin ders öncesinde derslere katılabilmeleri için yeterli imkanlara sahip olmaları gerekmektedir. Araştırma sonucunda uzaktan eğitime katılabilecekleri teknolojik altyapının her öğrenciye eşit şartlarda sunularak uzaktan eğitim yapılması gerektiği sonucuna ulaşılmıştır. Benzer şekilde donanım sorunları, internet erişim sıkıntıları gibi teknik zorluklarla karşılaşılması uzaktan eğitimin olumsuz yönleri olarak belirtilmektedir (Fadlelola ve diğerleri, 2019; Knipfer ve diğerleri, 2019). Kurumlar ve eğitimciler ihtiyacı olan öğrenciler için hem bilgisayar becerilerini geliştirmelerine yardımcı olmak ve hem de teknolojik olarak desteklemek için fırsatlar yaratmalı ve kaynaklar ayırmalıdır (Sahin & Shelley, 2008). Araştırmada öğrencilerin uzaktan eğitim derslerine etkin katılımının sağlanması ders içi dikkate alınması gereken en önemli unsur olarak ortaya çıkmıştır. Öğrencilerin derslere katılmasını sağlamak adına geleneksel sınıf ortamına benzer bir ders ortamı hazırlamak, somuttan soyuta, yaşama yakın içerikler oluşturmak ve öğrencilerin derse aktif katılımlarını sağlayacak yöntemler seçmek önem arz etmektedir.

Araştırma sonucunda öğrenciler uzaktan eğitimin olumlu yönlerini ders kayıtlarını tekrar tekrar izleme, istedikleri mekandan derse girebilme, zamandan tasarruf sağlama, çok sayıda öğrenen ile iletişim kurabilme olarak belirtmiştir. Alanyazın incelendiğinde birçok çalışmada öğrencilerin çevrimiçi öğrenmenin zaman ve mekan bağımsızlığı konusunda esneklik sağlaması, derslerin ve kaynakların tekrarlanabilirliği gibi avantajlarını belirttiği görülmeltedir (Chow ve Shi, 2014; Turan ve Gürol, 2020). Uzaktan eğitim, öğrencilere zaman, yer ve esnek öğrenme fırsatları sunar; ancak öğrencilerin daha özerk hareket etmelerini ve öğrenme hedeflerine ulaşmak için

öğrenme süreçlerini düzenleme konusunda daha fazla sorumluluk almalarını gerektirir (Shearer & Park, 2018). Bu bağlamda araştırma sonucunda uzaktan eğitiminde derslere esnek katılımın öğrencide rehavet yaratması, kamera ve ses açmayınca etkileşimin olmaması, öğrencilerde motivasyonun düşmesine neden olurken, ekranlarda dikkat dağıtıcı unsurlar olması uzaktan eğitimin olumsuz yönleri olarak tespit edilmiştir. Öğrenciler öğretmenleri ile yüz yüze öğrenme ortamındaki gibi iletişim kurabildiklerini fakat öğrenciler arasında iletişiminin eksik kaldığını belirtmiştir. Bu çalışma ile benzer olarak bazı çalışmalarda öğrencilerin öğretim elemanları ve diğer öğrenciler ile iletişim kurmakta sorun yaşadıkları görülmektedir (Tang vd., 2020; Almajali vd., 2022). Sınıf ortamında yüz yüze eğitimde öğrenciler daha kolay iletişim kurmakta ve sosyalleşmektedir. Uzaktan eğitimde ders dışında iletişimi sağlamak adına Whatsapp grupları ve tartışma platformları oluşturulabilir.

Adnan ve Anwar (2020), öğrencilerin çevrimiçi derslerde aktif olarak katılamadıkları ve öğretim görevlileriyle doğrudan etkileşim kuramadıkları için öğrenme motivasyonlarının düştüğünü belirtmektedir. Benzer şekilde araştırma sonucunda uzaktan eğitimde yüz yüze eğitim gibi ciddi ortam sağlanamaması ve öğrenci motivasyonunu düşürdüğü öğrenciler tarafından vurgulanmıştır. Bu durumun dersten derse, eğitmenden eğitmene değişiklik gösterdiği de belirtilmiştir. Uzaktan eğitimde öğrenci motivasyonunu arttırmak için olumlu sınıf iklimi oluşturmak, aktif katılımı sağlayacak tartışma gibi yöntemler kullanmak, derslerde farklı çoklu ortam destekli materyaller kullanmak, kamere ve ses açılımını zorunlu tutarak yüz yüze ortama benzer etkileşimli bir ders ortamı sağlamak gerekebilir. Ders dışında da grup ödevleri ve işbirlikli çalışmalar yaptırılarak öğrencilerin dersten uzaklaşmamaları sağlanabilir. Alt yapı ve teknik araç gereçlerin sağlanması ve rehberlik hizmeti sunulması da öğrencinin derse sorunsuz katılmasını sağlamak ve ders boyunca motivasyonunun düşmemesi adına önemlidir.

Araştırmada uzaktan eğitimin öğrenme sürecine bağlılığa etkisi incelendiğinde öğrencilerin uzaktan eğitime karşı önyargılı oldukları fakat süreç içerisinde uzaktan eğitime inançlarının arttığını, öğrenme sürecine etkin katılımlarının arttığını belirten öğrenciler bulunmasına rağmen öğrencilerin çoğunun derse devamım azaldı, öğrenme sürecine etkin katılım azaldı gibi olumsuz görüşler belirttiği görülmüştür. Öğrencilerin uzaktan eğitim derslerine etkin katılması, devamı önemsemesi derslerin verimliliği ve bağlılığın artması için önemlidir. Buna ek olarak bilgisayar kullanma becerileri ve çevrimiçi ortamlara aşina olmak uzaktan eğitimde öğrenme sürecine bağlılığı etkileyebilecek unsurlar olabilir. Yapılan araştırmalar yüksek düzeyde bilgisayar deneyiminin, kullanıcıların uzaktan öğrenmeden daha fazla keyif almasıyla bağlantısı bulunduğunu ortaya koymuştur (Sahin & Shelley, 2008). Ayrıca bilişim teknolojilerini kişisel ve profesyonel yaşamlarında kullanan öğrencilerin, çevrimiçi öğrenme ortamlarında daha rahat davrandıkları tespit edilmiştir (Jones ve diğerleri, 2004; Maor, 2003). Bağlılığı arttırmak adına öğrencilerin bilgisayar kullanım becerilerini arttırmaya yönelik uygulamalar yapılması, derslerin eğlenceli hale getirilmesi, buna yönelik derse uygun materyaller hazırlanması, öğrenci merkezli etkileşimli ders ortamı sağlamak, tartışma, sunum yaptırma gibi öğrencinin derse katılımını sağlayan öğretim etkinlikleri yapmak gerekmektedir.

Araştırma sonucunda öğretmen adayları meslek hayatlarında uzaktan eğitimi geleneksel yönteme alternatif olarak kullanabilecekleri, kısıtlı zamanlarda, olağan dışı durumlarda, ek ders telafi dersleri yaparken, seminer ve toplantılarda kullanabileceklerini belirtmiştir. Özellikle anlaşılmayan konularda video-animasyon, şekil, grafik gibi görsel materyallerle süreci destekleyerek öğretim yapmayı tercih edebilecekleri görülmüştür. Teknik sorunlar, öğrencinin pasif olması ve derslerin verimsiz geçmesini önleyen tedbirler alınırsa uzaktan eğitim çok daha tercih edilebilir bir eğitim ortamı olarak kullanılabilir.

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# Öğretmen Eğitiminde Teknolojik Pedagojik Alan Bilgisi Yeterliliği (TPAB): Bir Bibliyometrik Analiz Çalışması

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## Özet

Teknolojik Pedagojik Alan Bilgisi (TPAB), öğretmenlerin uygun ve bağlama özgü öğretim stratejileri geliştirmesini sağlayan teknoloji, pedagoji ve alan arasındaki karmaşık ilişkiler hakkında yeterliliği şeklinde tanımlanabilir. TPAB'ın temelinde alan bilgisi, pedagoji bilgisi ve teknoloji bilgisi olmak üzere üç temel bilgi alanı ve bunların kesişimlerinden oluşan yeterlilik alanları bulunmaktadır. Günümüzde öğretmenlerin TPAB' a sahip olmaları, öğrencilerin öğrenme deneyimlerini geliştirmelerine, öğretmenlerin öğretim becerilerini geliştirmelerine ve modern eğitim teknolojilerini etkili bir şekilde kullanmalarına fırsat verir ve teknoloji kullanımı öğrenmelerin dikkat çekici ve eğlenceli hale gelmesine yardımcı olur. Bu çalışmada Web of Science veri tabanında taranan hakemli dergilerde teknolojik pedagojik alan bilgisini konu edinen 2005 ile 2022 yılları arasında yayımlanmış 967 yayın bibliyometrik analiz ile incelenmiştir. Arama sorgusu olarak ("TPACK" OR "TPCK" OR "TECHNOLOGICAL PEDAGOGIC CONTENT KNOWLEDGE") AND (TEACHER EDUCATION) kullanılmıştır. Yapılan bu araştırmada Web of Science veri tabanındaki yayınlara yansıyan "teknolojik pedagojik alan bilgisi " ve "öğretmen eğitimi" alanındaki araştırma faaliyetlerinin büyümesi ve gelişimi analiz edilmiştir. Rstudio ve Bibliometrix paket programları kullanılarak yayın ve atıf trendleri, en sık kullanılan anahtar kelimeler, en etkili ülke, yazar ve dergiler ve araştırma odakları incelenmiştir. Elde edilen bulgularda araştırmalarda 2011 yılından itibaren genel olarak bir yükseliş trendi görülmektedir. Buna göre yıllık artış oranı "% 32.91" olarak hesaplanmıştır. Alanda 2114 farklı yazar 404 farklı kaynakta çalışmalar yayımlamıştır. TPAB (TPACK) terimi özellikle 2017-2021 yılları arasında ön plana çıkmaktadır. Bradford's Law sonuçlarına göre Zone-1'de 18 dergi bulunmaktadır. En sık kullanılan anahtar kelimeler; pedagojik alan bilgisi, TPAB, çerçeve, eğitim ve teknolojidir. Education and Information Technologies en etkili dergi olmuştur. Computers&Education en çok atıf alan dergidir. En etkili ülke ABD olmuştur. Ulusal Tayvan Üniversitesi alandaki en etkili üniversitedir. Mishra P.(2006) en çok atıf alan yayın olmuştur. Kümeleme analizi sonucu 2 farklı küme oluşmuş ve TPAB bunların sadece birinde yer almıştır.

**Anahtar Kelimeler:** TPAB, öğretmen yeterliliği, öğretmen eğitimi, bibliyometik analiz.

# 1. Giriş

21. yüzyılda eğitimin amacı, çağın gerekliliklerine ve toplumun ihtiyaçlarına uygun olarak sürekli değişen dünyaya hazırlıklı, nitelikli bireyler yetiştirmektir. Bunun yanında, teknoloji ve otomasyonun iş dünyasını değiştirdiği bu dönemde, öğrencilere dijital beceriler ve teknoloji kullanımı öğretilerek, iş dünyasına ve dijital hayata hazırlanmalarını sağlamaktır. Bu hazırlık aşamasında eğitim sisteminin en önemli paydaşı olan öğretmenlerin teknolojiyi kullanma bilgileri, teknolojiyi pedagojik amaçlarla nasıl kullanmaları gerektiği ile ilgili bilgileri, ile ilgili çok yönlü bilgi bütünlerinden oluşan eğitimde teknoloji entegrasyonu önemlidir (Hsu, 2010). Eğitimde teknoloji entegrasyonu günümüzde üzerinde çokça araştırılan, hakkında çeşitli modeller ortaya konulan önemli bir araştırma alanıdır. Bu modellerden birisi de Koehler & Mishra'nın TPAB'dır.

Teknolojik Pedagojik Alan Bilgisi; öğretmenlerin eğitim teknolojileri ile alana özgü etkili öğretim yapabilmelerinde teknoloji, pedagoji ve içeriğin birbiriyle nasıl etkileşim içinde olduğunun bilgisini ifade eder (Koehler&Mishra, 2005). TPAB; öğretmen yetiştirme programlarında büyük öneme sahip ve öğretmenlerin sahip olması gereken niteliklerin neler olduğuna yönelik bir model olan PAB'a (Pedagojik Alan Bilgisi) 'Teknoloji' boyutunun entegre edilmesiyle son şeklini almıştır (Koehler&Mishra, 2005). Bu açıdan bakıldığında, eğitime teknoloji entegrasyonunda TPAB modeli pedagoji odaklı olup, öğretmenlerin öğretim sürecinde teknolojiyi kullanımını pedagojik alan bilgileriyle bütünleştirmelerini hedeflemektedir. Teknolojik Pedagojik Alan Bilgisi (TPAB), öğretmenlerin uygun ve bağlama özgü öğretim stratejileri geliştirmesini sağlayan teknoloji, pedagoji ve alan arasındaki karmaşık ilişkiler hakkındaki yeterliliğidir. TPAB'ın temelinde alan bilgisi, pedagoji bilgisi ve teknoloji bilgisi olmak üzere üç temel bilgi alanı ve bunların kesişimlerinden oluşan yeterlilik alanları bulunmaktadır. Günümüzde öğretmenlerin TPAB' a sahip olmaları, öğrencilerin öğrenme deneyimlerini geliştirmelerine, öğretmenlerin öğretim becerilerini geliştirmelerine ve modern eğitim teknolojilerini etkili bir

şekilde kullanmalarına fırsat verir ve teknoloji kullanımı öğrenmelerin dikkat çekici ve eğlenceli hale gelmesine ve etkili bir eğitim süreci yürütülmesine yardımcı olur. (TPAB) kavramı, eğitimcilerin teknolojik araçları ve pedagojik yöntemleri birleştirerek etkili bir öğrenme ortamı oluşturmasına odaklanan önemli bir araştırma alanı olarak öne çıkmaktadır.

Bu çalışmada Teknolojik Pedagojik Alan Bilgisinin (TPAB) kuramsal çerçevesinin öğretmen eğitimi bağlamında en etkili yazar, yayın, öne çıkan anahtar kelimeler, dergiler, ülkeler ve atıf faktörlerini açıklayarak bu alandaki eğilimleri değerlendirmek için uluslararası bir bakış açısıyla ortaya konulması araştırmaya değer bulunmuştur ve Web of Science veri tabanında taranan öğretmen eğitimi ve TPAB çerçevesini konu edinen araştırmaların bibliyometrik analizinin yapılması amaçlanmıştır. Bu doğrultuda aşağıdaki sorulara cevap aranmıştır:

1. Öğretmen eğitimi ve TPAB çerçevesini ile en alakalı dergiler hangileridir ?

2. Öğretmen eğitimi ve TPAB ile en alakalı yazarlar hangileridir ?

3. Öğretmen eğitimi ve TPAB konusunda en alakalı üniversiteler ve ülkeler hangileridir ?

4. Öğretmen eğitimi ve TPAB alanındaki atıf durumu nedir ?

5. Öğretmen eğitimi ve TPAB alanındaki öne çıkan anahtar kelimeler ve trend olan konular nelerdir ?

6. Öğretmen eğitimi ve TPAB ile ilgili çalışmalarda yazar eşleşmesine göre kümelenmeler nasıl şekilleniyor ?

## 2. Yöntem

### 2.1. Araştırmanın Yöntemi

Bu çalışmada bibliyometrik analiz yöntemi benimsenmiştir. Bibliyometrik analiz, çalışmaların yazar sayısı, yıl, dergi, konu, yayın bilgisi, atıf yapılan kaynaklar gibi değişik parametrelerinin sayısal olarak analize tabi tutulmasıdır (Al&Tonta, 2004). Belirli alanlardaki araştırmaların bazı yönlerini nicelendirerek ve değerlendirerek alandaki eğilimlerin saptanması, belirlenen bilimsel konuyla ilgili çalışmaların, araştırmacıların, kurumların ve bilimsel akışın takibi bibliyometrik analiz ile mümkündür (Ahmi, 2022; Martí-Parreño vd., 2016). Üniversiteler, araştırma kurumları ve yayın organları gibi resmi kurum ve kuruluşlar bilimsel etkinliklerini ve etkilerini değerlendirmek, Yeni araştırma alanlarını tanımlamak, araştırmacıların çalışmalarını yönlendirmek, akademik performans değerlendirmeleri yapmak ve kaynak dağıtımı için kararlar almak adına bibliyometrik analiz yöntemlerinden fayda sağlayabilirler.

### 2.2.Veri Toplama Süreci

Bu araştırmada Web of Science veri tabanındaki yayınlara yansıyan "teknolojik pedagojik alan bilgisi " ve "öğretmen eğitimi" alanındaki araştırma faaliyetlerinin büyümesi ve gelişimi analiz edilmiştir. Web of Science veri tabanında taranan hakemli dergilerde önceki cümledeki terimleri konu edinen 2005 ile 2022 yılları arasında yayımlanmış 967 yayın bibliyometrik analiz ile incelenmiştir. WoS veri tabanı, taradığı yayınların bolluğu ve çeşitliliği ile dünyanın önde gelen akademik veri tabanı olarak kabul edilmektedir (Pranckutė, 2021). Bunun yanı sıra taradığı yayınların bibliyometrik verilerine ilişkin ülkeler, bilim alanları, dergiler vb. bazında dağılımı ve temel istatistikleri de sağlamaktadır. Çalışmada arama sorgusu olarak ("TPACK" OR "TPCK" OR "TECHNOLOGICAL PEDAGOGIC CONTENT KNOWLEDGE") AND (TEACHER EDUCATION) kullanılmıştır.

### 2.3.Verilerin Analizi

Bibliometric analiz için birçok farklı yöntem ve yazılım bulunmaktadır. Bu çalışmada, R, Rstudio paket programları ve Bibliometrix (R-studio package) kullanılarak yayın ve atıf trendleri, en sık kullanılan anahtar kelimeler, en etkili ülke, yazar ve dergiler ve araştırma odakları incelenmiştir. İndirilmiş olan «Raw Data» analiz arayüzüne «import» edildikten sonra istenilen analizler yapılmıştır.Analizler neticesinde çalışmanın betimsel istatistikleri aşağıdaki tabloda sunulmuştur.

Tablo 1. Betimsel İstatistikler

| Zaman aralığı | 2005:2022 |
|---|---|
| Kaynaklar (Dergiler, Kitaplar, vb.) | 394 |
| Belgeler | 967 |
| Yıllık artış oranı % | 32,91 |
| Yazarlar | 1981 |
| Tek yazarlı dokümanların yazarları | 173 |
| Uluslararası ortak yazarlıklar % | 17,18 |
| Doküman başına ortak yazarlar | 2,74 |
| Yazarların anahtar kelimeleri | 1849 |
| Referanslar | 25574 |
| Doküman başına ortalama atıf | 16,74 |

Tablo 1'de sunulduğu gibi TPAB ve öğretmen eğitimi konu alanında 2005 ve 2022 aralığında çalışmalar ele alınmıştır. Alanyazın taraması yapılırken herhangi bir zaman sınırlaması yapılmamasına rağmen TPAB alanyazının ortaya çıkış zamanı ile birlikte yayınların basım tarihi bu şekilde gelişmiştir. Bu konuları ele alan 967 çalışma bulunmuş ve yıllık artış oranı da %32 olarak hesaplanmıştır. Alana katkıda bulunan yazar sayısı 1981 olarak hesaplanmış ve tek yazarlı yayın sayısı 173 olmuştur.

## 3. Bulgular

### 3.1. En Alakalı Dergiler
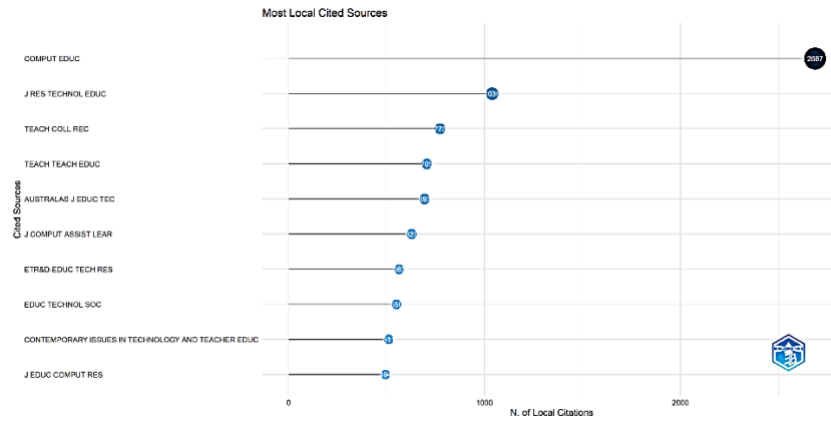


Şekil.1 En çok atıf yapılan kaynaklar

Web of Science veri tabanında öğretmen eğitiminde TPAB ile ilgili 394 dergide 902 çalışma bulunmaktadır. En çok yayın yapan 10 dergi Şekil 1'de verilmiştir. İlk 10 dergi arasında Computers & Education konuyla ilgili en fazla çalışma yayınlayan dergidir. Bu dergi aynı zamanda en yüksek toplam atıf puanına sahiptir. Ayrıca öğretmen eğitiminde TPAB konusunda en çok atıf alan dergidir.(bkz Çekirdek kaynakları gösteren Bradford Yasası'na göre 18 dergi alanın çekirdek kaynaklarını (zone-1'de bulunan dergiler) oluşturmaktadır (bkz. Şekil 2).
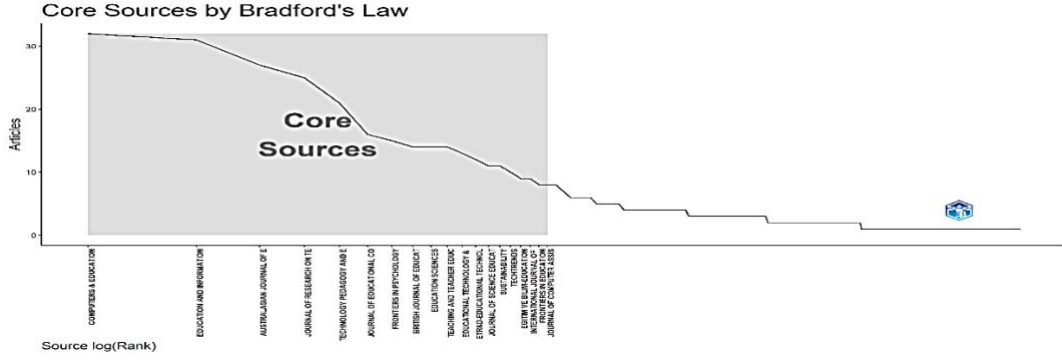
Şekil 2. Bradford's Law

## 3.2. En Alakalı Yazarlar

Web of Science veri tabanında öğretmen eğitiminde TPAB konusunda 1981 araştırmacı çalışmaktadır. Konuyla ilgili en çok yayın yapan 20 yazarın yayın sayıları çoktan aza doğru sıralı olarak verilmiştir (bkz. Şekil 3).Buna göre en çok yayına sahip olan yazar yaptığı 29 yayınla Chai Ching-sing'dir.
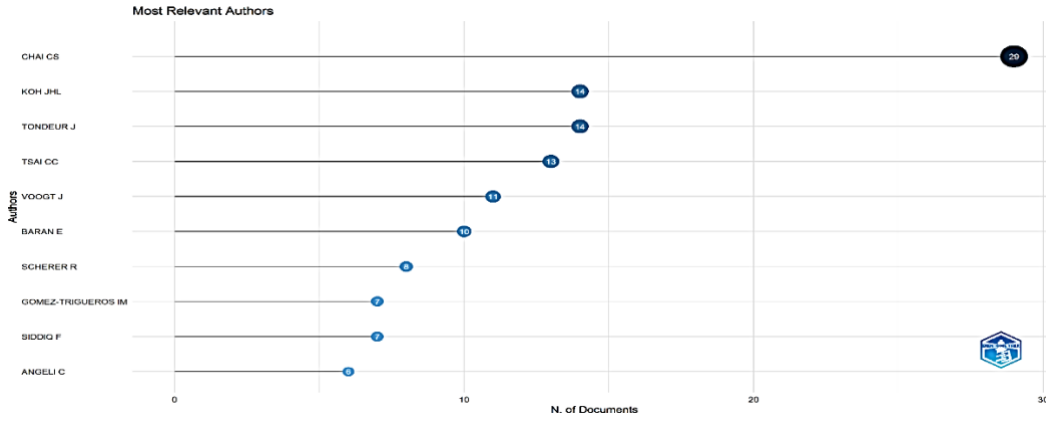


Şekil 3. Yazarlar ve yayın sayıları

## 3.3. En Alakalı Üniversiteler ve Ülkeler

En çok yayın yapan 10 üniversite ve yayın sayılarına ilişkin veriler Şekil 4'te verilmiştir. Bu 10 üniversite konuyla ilgili toplam 253 çalışma yayınlamıştır. En çok yayın yapan iki üniversitenin ilki Singapur'dan Nanyang Technological University ikincisi ise Tayvan'dan National Tayiwan university'dir.
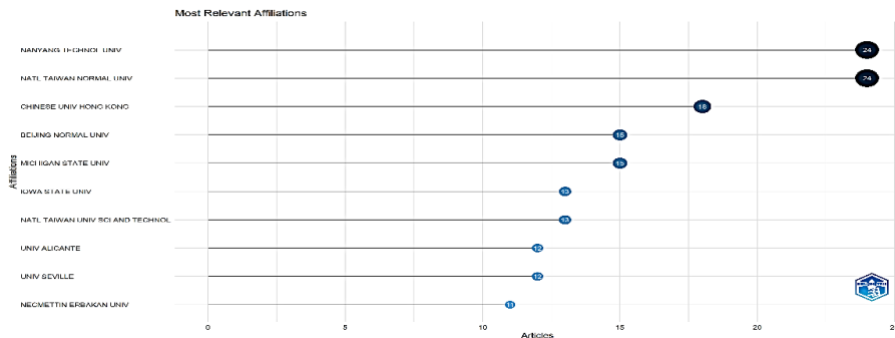


Şekil 4. Üniversiteler ve yayın sayıları

Ülkeler bazında en çok yayın yapan (bkz. Şekil 5) ve en çok atıf yapılan ülkeler (bkz. Şekil 6) ile ilgili veriler aşağıda sunulmuştur. Buna göre, ABD en fazla yayın yapan ve en fazla atıf alan yayın sayısına sahip ülkedir.

| region | Freq |
|--------|------|
| USA | 381 |
| CHINA | 280 |
| TURKEY | 180 |
| SPAIN | 115 |
| AUSTRALIA | 92 |
| INDONESIA | 67 |
| NETHERLANDS | 52 |
| GERMANY | 45 |
| SOUTH AFRICA | 42 |
| NORWAY | 41 |

Şekil 5. Ülkeler ve yayın sayıları
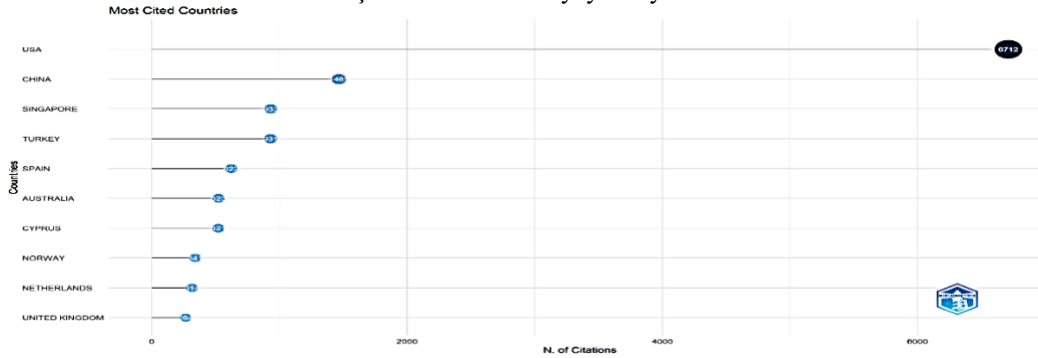


Şekil 6. Ülkeler ve atıf sayıları

## 3.4. Alanındaki Atıf Durumu

Çalışmaların küresel ve yerel düzeydeki atıf sayılarına ilişkin bulgular Şekil 7 ve Şekil 8'de sunulmuştur. Küresel düzeyde en çok atıf alan çalışma Punya Mishra ve Matthew J. Koehler'in 2006 yılında Teachers College Record'da yayınlanan "Technological Pedagogical Content Knowledge: A Framework for Teacher Knowledge" başlıklı makalesidir. Bu makale aynı zamanda yerel olarak da en çok atıf alan makaledir.

| Paper | DOI | Total Citations | TC per Year | Normalized TC |
|-------|-----|-----------------|-------------|---------------|
| MISHRA P, 2006, TEACH COLL REC | 10.1111/j.1467-9620.2006.00684.x | 3274 | 181.89 | 1.00 |
| SCHMIDT DA, 2009, J RES TECHNOL EDUC | 10.1080/15391523.2009.10782544 | 598 | 39.87 | 3.67 |
| ANGELI C, 2009, COMPUT EDUC | 10.1016/j.compedu.2008.07.006 | 499 | 33.27 | 3.06 |
| NIESS ML, 2005, TEACH TEACH EDUC | 10.1016/j.tate.2005.03.006 | 453 | 23.84 | 1.00 |
| CHAI CS, 2010, EDUC TECHNOL SOC | NA | 234 | 16.71 | 3.56 |
| CHAI CS, 2013, EDUC TECHNOL SOC | NA | 209 | 19.00 | 8.84 |
| CHAI CS, 2011, COMPUT EDUC | 10.1016/j.compedu.2011.01.007 | 197 | 15.15 | 3.89 |
| POLLY D, 2010, TEACH TEACH EDUC | 10.1016/j.tate.2009.10.024 | 163 | 11.64 | 2.48 |
| JIMOYIANNIS A, 2010, COMPUT EDUC | 10.1016/j.compedu.2010.05.022 | 156 | 11.14 | 2.37 |
| RIENTIES B, 2013, TEACH TEACH EDUC | 10.1016/j.tate.2012.09.002 | 147 | 13.36 | 6.22 |

Şekil 7. Küresel düzeyde atıflar

| Document | DOI | Year | Local Citations | Global Citations | LC/GC Ratio (%) | Normalized Local Citations | Normalized Global Citations |
|---|---|---|---|---|---|---|---|
| MISHRA P, 2006, TEACH COLL REC | 10.1111/j.1467-9620.2006.00684.x | 2006 | 691 | 3274 | 21.11 | 1.00 | 1.00 |
| SCHMIDT DA, 2009, J RES TECHNOL EDUC | 10.1080/15391523.2009.10782544 | 2009 | 292 | 598 | 48.83 | 4.12 | 3.67 |
| ANGELI C, 2009, COMPUT EDUC | 10.1016/j.compedu.2008.07.006 | 2009 | 199 | 499 | 39.88 | 2.81 | 3.06 |
| NIESS ML, 2005, TEACH TEACH EDUC | 10.1016/j.tate.2005.03.006 | 2005 | 161 | 453 | 35.54 | 1.00 | 1.00 |
| CHAI CS, 2010, EDUC TECHNOL SOC | | 2010 | 123 | 234 | 52.56 | 4.45 | 3.56 |
| CHAI CS, 2013, EDUC TECHNOL SOC | | 2013 | 101 | 209 | 48.33 | 10.69 | 8.84 |
| CHAI CS, 2011, COMPUT EDUC | 10.1016/j.compedu.2011.01.007 | 2011 | 85 | 197 | 43.15 | 3.90 | 3.89 |
| ABBITT JT, 2011, J RES TECHNOL EDUC | 10.1080/15391523.2011.10782573 | 2011 | 69 | 123 | 56.10 | 3.16 | 2.43 |
| JANG SJ, 2012, COMPUT EDUC | 10.1016/j.compedu.2012.02.003 | 2012 | 64 | 116 | 55.17 | 5.41 | 4.32 |
| JIMOYIANNIS A, 2010, COMPUT EDUC | 10.1016/j.compedu.2010.05.022 | 2010 | 61 | 156 | 39.10 | 2.21 | 2.37 |

Şekil 8. Yerel düzeyde atıflar

## 3.5. Alanındaki Öne Çıkan Anahtar Kelimeler ve Trend Olan Konular

Öğretmen eğitiminde TPAB ile ilgili çalışmalar üzerinde anahtar kelimeler arasında En Sık Kullanılan anahtar kelimeler analizi yapılmıştır. En çok kullanılan anahtar kelimelerine ilişkin bulgular Şekil 9'da ve zamana göre anahtar kelimelerin dağılım ve frekans bilgilerini gösteren grafik Şekil-10'da sunulmuştur.
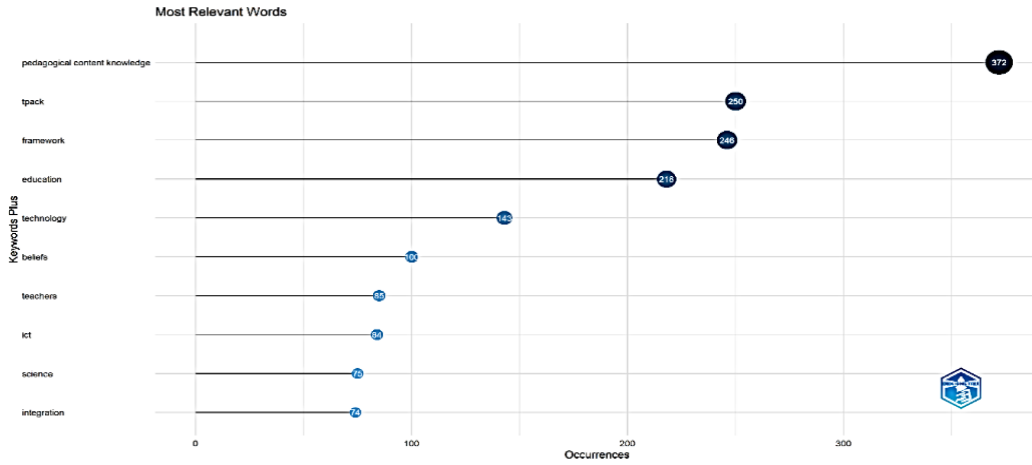


Şekil 9. En Sık Kullanılan Kelimeler

Alanyazında öğretmen eğitimi ve TPAB konu alanında basılmış yayınlarda; en çok kullanılan anahtar kelimeler pedagojik alan bilgisi (pedagogical content knowledge) (f=372), TPAB (TPACK) (f=250), çerçeve (framework) (f=246), eğitim (education) (f=218) ve teknolojidir (technology) (f=143).
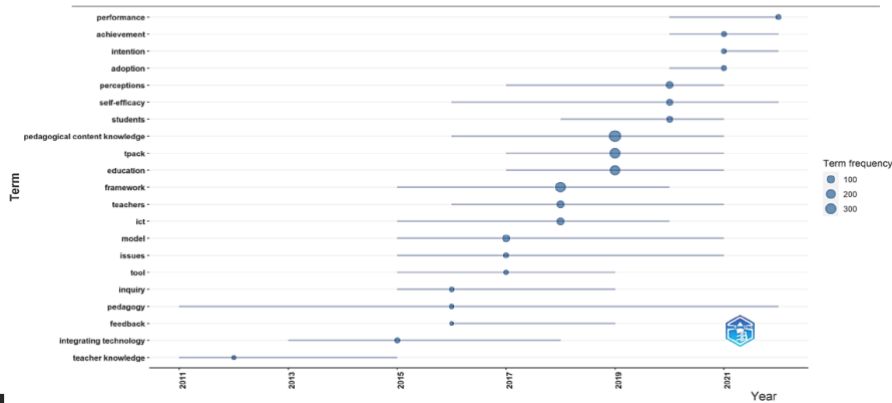
Şekil 10. Yıllara göre trend konular

Şekil 10 incelendiğinde TPAB konusunun 2017 yılından itibaren çalışılmaya başladığı belirtilebilir. Bunun yanında pedagoji konusu üzerinde 2011 yılından itibaren düzenli şekilde çalışmaya eğilimi olduğu söylenebilir.Çalışmalarda, pedagojik içerik bilgisi terimine 2015, TPAB terimine ise 2017 yılından itibaren aynı sıklıkta değinildiği yorumunda da bulunulabilir. Anahtar kelimelerin yayınlardaki frekansları incelendiğinde ise pedagojik içerik bilgisi (pedagogical content knowledge), TPAB(TPACK) ve eğitim (education) kavramlarının ön plana çıktığı görülmüştür. Performans (performance), başarı(achievement) ve niyet(intention) kavramlarının ise bu alanda son yıllarda araştırmalarda anahtar kelimeler olarak yer almaya başladığı tespit edilmiştir.

## 3.5. İlgili Çalışmalarda Anahtar Kelimelere Göre Kümelenmelerin Şekillenmesi

Alanyazında öğretmen eğitimi ve TPAB ile ilgili çalışmalar üzerinde anahtar kelimeler üzerinden kümeleme analizi yapılmıştır. Yapılan analiz sonucunda Şekil 11'deki grafik elde edilmiştir.



**Clusters by Documents Coupling**

pedagogical content knowledge - conf 48.5%
framework - conf 57.6%
education - conf 53.7%

tpack - conf 100%
pedagogical content knowledge - conf 51.5%
framework - conf 42.4%

Impact

Centrality
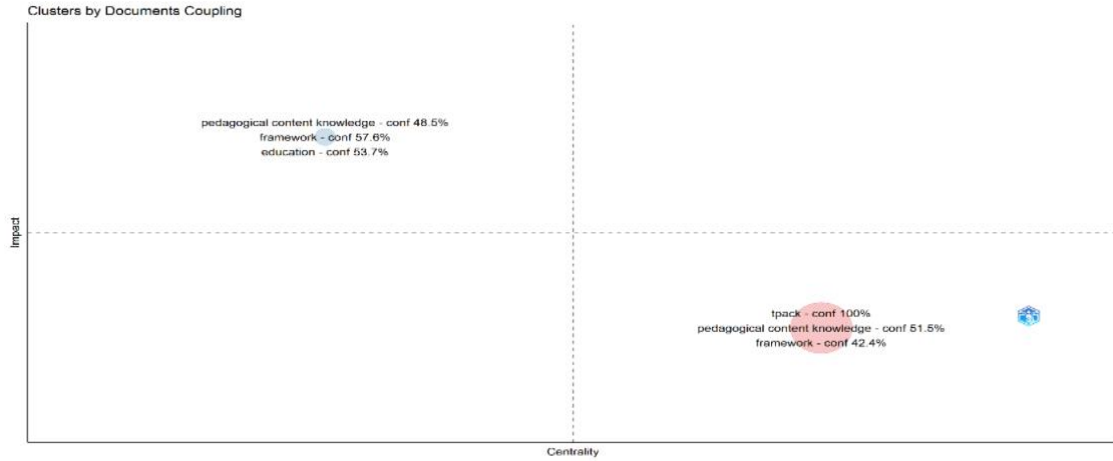
Şekil 11.Kümeleme Haritası

Şekil 11'de sunulduğu üzere öğretmen eğitimi ve TPAB konu alanında basılmış yayınların Anahtar kelimeleri üzerine yapılan kümeleme analizi sonucunda iki ana grup ortaya çıkmıştır. Bu iki küme incelendiğinde pedagojik içerik bilgisi (pedagogical content knowledge) ve Kavramsal çerçeve(framework) kavramlarının her ikisinde de yer aldığı görülmüştür.

## 4. Sonuç ve Tartışma

Bu çalışmanın amacı, öğretmen eğitiminde TPAB üzerine yapılan çalışmaları bibliyometrik bir bakış açısıyla incelemektir. 1981 farklı yazarın 394 farklı kaynakta yaptığı 967 çalışma araştırmaya dahil edilmiştir. Bu bağlamda, dahil edilen çalışmalar içinde, konuyla ilgili en çok yayın yapan dergiler, yazarlar, üniversiteler ve ülkeler belirlenmiştir. Yayınların atıf alma durumları kapsamlı bir şekilde ele alınmıştır. Öğretmen eğitiminde TPAB ile ilgili anahtar kelimeler ve trend başlıklar incelenmiştir. Yazar çalışmaları yazarların kümelenmesi yöntemi ile incelenmiştir. Genel olarak bakıldığında TPAB konusuna olan eğilimin yıllık artış oranının %32.91 olduğu görülmüştür. Konuyla ilgili en çok araştırma Computers & Education'da yayımlanmıştır. Çetinkıran (2022) da çalışmasında paralel bir sonuç elde etmiştir. Öğretmen eğitiminde TPAB konusuna ilişkin bu dergi en çok atıf alan dergi olmuştur. Bradford Yasası, bu alandaki birincil kaynakların onsekiz dergi olduğunu belirtmektedir. Atıf, toplam ve çalışma sayısı açısından diğer önemli dergiler Education And Information Technologies, Australasian Journal Of Educational Technology, Journal Of Research On Technology In Education, Technology Pedagogy And Education gibi dergilerdir. Bu dergilere bakıldığında, öğretim teknolojilerine odaklanan dergilerin konuya daha fazla ağırlık verdiği söylenebilir. Araştırma sonuçları, en etkili yazarın Chai Ching-sing olduğunu ortaya koymuştur. Soler-Costa ve diğerleri (2021), Xue ve He (2021) de çalışmalarında benzer bir sonuç ortaya koymaktadır. Singapur ve Tayvan en çok yayın yapan iki üniversiteye ev sahipliği yapmaktadır. Bunlardan birincisi olan Singapur'un ev sahipliğindeki Nanyang Teknoloji Üniversitesi en çok yayın yapan ilk 10 üniversite tarafından yapılan yayınların yüzde 9.4'ünü üretmiştir. Xue ve He (2021)' nin çalışmasında da Nanyang Teknoloji Üniversitesi ilk sıralarda yer almıştır. ABD genel olarak en fazla yayına sahip ülke olarak bulunmuştur. Yerel ve küresel boyutta Punya Mishra ve Matthew J. Koehler'in 2006 yılında Teachers College Record dergisinde yayınladıkları Technological Pedagogical Content Knowledge: A Framework for Teacher Knowledge isimli çalışma en çok atıf alan çalışmadır. Çetinkıran (2022) da çalışmasında bu sonucu destekleyen bir sonuç bulmuştur. En sık kullanılan anahtar kelimeler; pedagojik alan bilgisi, TPAB, çerçeve, eğitim ve teknoloji olarak

belirlenmiştir.Benzer şekilde Xue ve He (2021) çalışmalarında en çok kullanılan anahtar kelimelerin TPAB, PAB ve çerçeve olduğunu ifade etmiştir. Kümeleme analizi sonucunda ise iki farklı küme oluşmuş ve TPAB bunların sadece birinde yer almıştır. Teknolojik pedagojik alan bilgisi terimi 2017 senesinden itibaren çalışmalarda daha çok gündem olurken, pedagoji terimi çalışmanın başlangıç noktasını oluşturan 2005 yılından günümüze değin istikrarlı şekilde çalışmalarda kendine yer bulmuştur. Anahtar kelimelerin yayınlardaki frekansları incelendiğinde ise pedagojik içerik bilgisi (pedagogical content knowledge), TPAB(TPACK) ve eğitim (education) kavramlarının ön plana çıktığı görülmüştür. Performans (performance), başarı(achievement) ve niyet(intention) kavramlarının ise bu alanda son yıllarda araştırmalarda anahtar kelimeler olarak yer almaya başladığı tespit edilmiştir.

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# Tarih Eğitiminde Dijital Oyunların Kullanılması: Civilization VI Örneği

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## Özet

Öğrenme konusunda öğrencilerin ilgileri, tutumları son derece önem arz etmektedir. Oyunların eğlenirken öğretmesi ve eğlencenin itici gücü, derslerde oyun kullanımı konusunu önemli kılmaktadır. Diğer tüm derslerde olduğu gibi tarih dersinde de oyun kullanımı dersi monotonluktan kurtaran, eğlenceli bir araç olabilir. Günümüz teknolojisinde çağı yakalamak adına oyunlar dijital olarak da oynanabilmektedir. Eğitim öğretimde dijitalleşmenin giderek popülerleşmesine karşın, tarih eğitiminin hâlihazırdaki mevcut yapısı öğrencilerin tarih dersini sıkıcı bulmalarına hatta ve hatta soğumalarına sebep olabilmektedir. Bu durum da öğrencinin MEB'in hedeflediği tarih dersi kazanımlarını yeterince içselleştirememesine sebebiyet verebilmektedir. Oyun piyasasında Tarih dersinde kullanılabilecek çok sayıda dijital oyun bulunmaktadır. Ama sıra tabanlı bir stratejik oyun olması (Grand strategy), diğer gerçek zamanlı yada 4X strateji oyunlarına göre çok farklı mekaniklere sahip olması ve güncellenen paketleriyle (Rise and Fall, Gathering Storm) Civilization VI örneği bu oyunlar arasında öne çıkmaktadır. Bu çalışmada 'Civilization VI örneğinin tarih eğitimine katkıları neler olabilir?' sorusuna yanıt aranmaya çalışılmıştır. Bu doğrultuda , 4X sıralı strateji oyunlarından biri olan Civilization VI örneğinin Tarih eğitimi için ne gibi katkıları olduğu üzerinde durulmuş, ilgili oyunun tanıtımına ve ortaöğretim tarih dersi kazanımlarıyla ilişkili olduğu örneklere yer verilmiştir. Bu çalışma dijital oyunlardan Civilizition VI örneğinin tarih eğitimine katkısını araştırmak amacı ile ilgili oyunun tanıtımı yapılarak gerçekleştirilmiştir. Tarih dersi ortaöğretim programının etkinlik temeline dayanmaması ve ders esnasında öğrencinin pasif halde olması, tarih kazanımlarını istenilen düzeye ulaşamamasına sebep olabilmektedir. Bu nedenle Civilization VI gibi tarih temalı oyunların sağladığı imkanları değerlendirmek anlamlı olacaktır. Bu çalışmanın temeli de tarih kazanımlarının öğrenciye kazandırılması boyutunda geleneksel yöntemlerden ziyade, bu yöntemleri destekleyici bir öğe olarak da tarih temalı dijital oyunların da kullanılması fikrine dayanmaktadır. Bu fikir dijital oyunların hitap ettiği kalabalık kitleyi de hesaba kattığımızda daha da önem kazanmaktadır. Bu noktada oyunların hitap ettiği kalabalık kitle ve oyunun öğrenme üzerindeki müthiş etkisi göz önünde bulundurulduğunda araştırmanın önemi ortaya çıkmaktadır. Bu yönüyle araştırma henüz yeni yeni gelişmekte olan dijital oyunların öğretim programlarına yerleştirilmesi söylemine de katkı sağlayabilir. Civilization VI Sid Meier tarafından geliştirilen ilk olarak Microsoft Windows için 21 Ekim 2016'da piyasaya sürülmüş tarih temalı sıra tabanlı bir strateji oyunudur. Araştırmadan elde edilen bulgulara göre Civilization VI oyununun MEB'in kazanımlarıyla örtüşmesi, öğrencilerde hem duyuşsal hem bilişsel becerilerinin oluşmasına katkısı olduğu belirlenmiştir. Elde edilen sonuç ise tarih öğretiminde dijital oyunlara yer verilmesi gerekliliğini ortaya koymuştur.

**Anahtar Kelimeler**: : Sıralı strateji oyunları, Dijital Oyunlar, Civilization VI

## Giriş

Ertürk (1997), eğitimi kendi yaşantısı yoluyla ve planlanarak bireyin davranışlarında istenilen davranış değişikliği olarak niteler. Akyüz (2021) ise eğitimi kişinin zihni, bedeni, duygusal, toplumsal yetenek ve davranışlarının en uygun şekilde ya da istenilen doğrultuda geliştirilmesi olarak tanımlar.

Varış'ın (1991) eğitim tanımı ise sosyal ve kültürel 4 olgular ile bireysel olgulara ilişkin değişkenlerin etkileşimidir şeklindedir. Bütün bu tanımlardan yola çıkarak eğitimin bir süreç olduğu ve bu süreç sonunda bireylerde istenilen davranış değişikliğinin olmasının hedeflendiği bu davranış değişikliklerinin bireyin yaşantıları sonucunda tecrübe ederek gerçekleşeceği sonucuna ulaşabiliriz

Öğrenme bireyin yaşantılar sonucu davranışlarda meydana gelen oldukça uzun süreli değişmelerdir. Piaget'in de Öğrenme Teorisi'de belirttiği gibi öğrenme yalnızca değişim geçirme durumlarında anlamlanan bir süreçtir. İşte Bundan dolayı, öğrenme başka bir görüşle bu değişimlere uyum sağlamayı da bilmekten gelir. Bu teori, özümseme ve uyumsama süreçlerindeki adaptasyon dinamiklerini açıklar.

Özümseme toplumsal ve sosyal düzeydeki uyarıcıları alma biçimimiz, uyumsama ise hâlihazırdaki toplumun ve çevrenin getirdiği gerekliliklerle şekil almasıdır. Böylece kullanılan terime ise bilişsel yeniden yapılandırma süreci denir. Görüldüğü gibi öğrenme bu dengesiz durumu gidermek adına zor bir süreçtir oysa ki oyun öğrenme gibi zihinde oluşturması zor bir etkinliği bile iç sıkan bir halden çıkarıp neşeli bir hale getirir.

Oyun; hem fiziksel hem de zihinsel yetenek gerektiren, toplumsal adaptasyon ve duyguya dayalı olgunluğu belli bir düzeye ulaştırmak amaçlı, herhangi bir maddi menfaat gütmeyen, yer, zaman bakımından belirlenmiş çizgiler içerisinde devam eden,bireylerin hiçbir zorunluluğu,yükümlülüğü yokken katılım gösterdikleri ve katılımcıların hepsini etkisi altında tutan haz verici bir devinimdir.Oyunu tanımlarken de buna benzer birçok tanımı kullanabiliriz.Ama en önemlisi oyunun bireyin hayatındaki önemli etkinliklerden birisi olduğunu net olarak söyleyebiliriz.

İşte birey hayatı boyunca ona gerekecek davranış, bilgi birikimi ve becerileri oyunun içerisinde kendiliğinden kazanır, öğrenir. Gerek sosyal ilişkileri,gerek dayanışma,yardımlaşma,kazanma ve kaybetme gibi insani duyguları oyunla birlikte kazanır.Oyunun içerisinde birey kendini bulur ve ve kendisine egemendir.Çeşitli kısıtlamalardan çok daha ötededir.Birey oyunlara kendinden de bir takım şeyler katar bu da onun yaratıcılığına katkıda bulunur.Özgüveni artırır,duygusal tepkileri tolere etmeyi öğretir. Görüldüğü gibi oyun, yalnızca görünenin tersine bireyi de gerçek yaşama hazır eden gerekli bir devinimdir. Eğitimci ise oyunlar vasıtasıyla bireyi en doğalken ki halini de gözlemleme olanağı elde eder.

Hem çocuklarda hem de yetişkinlerde eğitim öğretim esnasında odaklanma ve dikkat yoğunluğunu uzun müddet sağlamaları konusunda zorlanma görülür.Birey belli bir müddet sonra sıkılır ve dikkati de dağılır.İşte bu öğrenme konusunu negatif etkileyen ve algılama konusunda ise küçük yaştaki çocukların öğrenmelerini engelleyen bir faktördür.

Oyunlar dikkat yoğunluğu, odaklanmayı da sağlar.Oyun sayesinde birey pasifken aktif hale geçtiği için dikkati diğer bütün öğretim yöntem tekniklerinden çok daha iyi gelişir.Oyunu bir eğitim öğretim aracı olarak kabul etmemiz ve bu eğitim öğretim aracına da derslerimizde mutlaka yer vermemiz gerekir.

Piaget'in de belirttiği gibi öğrenme, öğrenenin deneyimlerine göre gerçekleşir. Hayatın içinden aldığınız örnekler,bireyin önündeki yaşamları boyunca neler yapması,nasıl karar vermesi konusunda onlara birer deniz feneri olacaktır.Oyun sayesinde öğretmen faktörünün birey üzerindeki ağırlığı ve endişe durumundan sıyrılıp,bireyin rahatça ve özgürce öğrenmesi sağlanmış olur.Bu çalışmada, 4X sıralı strateji oyunlarından biri olan Civilization VI örneğinin Tarih eğitimi için ne gibi katkıları olduğu üzerinde durulmuş, oyunun tanımına ve ortaöğretim tarih dersi kazanımlarıyla ilişkili olduğu örneklere yer verilmiştir. Bu yönüyle bu araştırma henüz yeni yeni gelişmekte olan dijital oyunların programlara yerleştirilmesi söylemine de katkı sağlayabilir.

Tarih dersi ortaöğretim programının etkinlik temeline dayanmaması ve ders esnasında öğrencinin pasif halde olması tarih kazanımlarını istenilen düzeye ulaşamamasına sebep olabilmektedir.İşte tam da bu yüzden Civilization VI gibi tarih temalı oyunların sağladığı imkanları değerlendirmek anlamlı olacaktır.

Bu çalışmanın temelinde de tarih kazanımlarının öğrenciye kazandırılması boyutunda düz anlatım gibi klasik yöntemlerden ziyade onları destekleyici bir öğe olarak da tarih temalı dijital oyunların da kullanılması fikrine dayanır.Bu fikir dijital oyunların hitap ettiği kalabalık kitleyi de hesaba kattığımızda daha da önem kazanmaktadır.Bu noktada oyunların hitap ettiği kalabalık kitle ve oyunun öğrenme üzerindeki müthiş etkisi göz önünde bulundurulduğunda bu araştırma daha da anlam kazanmaktadır.

## Yöntem

Bu çalışma dijital oyunlardan Civilizition VI örneğinin tarih eğitimine katkısını araştırmak amacı ile ilgili oyunun tanıtımı yapılarak gerçekleştirilmiştir. Araştırma yaparken ilgili makale, tez ve internet sitelerinden yararlanılmıştır.

## Bulgular

Tarih Dersi ve CIVILIZATION VI Oyunu İlişkisi

Her bilim dalı gibi tarihte de başka bilim dallarının verilerinden faydalanıldığı bir gerçektir (Tüysüz, 2021, s. 14).

Coğrafya bu bilim dallarının en başında gelir. Coğrafya, yeryüzünde gerçekleşen coğrafi olayların insan faaliyetlerine etkisini ortaya koyan bilim dalıdır. (Tüysüz, 2021, s.14). Tarihte insanlar su kenarlarına yerleşmeyi tercih etmişler ve o gün şartlarındaki iklim koşulları söz konusu toplumların hem yaşayış biçimlerini etkilemiş, hem de günümüz kıtaları şekillendiren önemli bir olgu olan 'göç' kavramını ortaya çıkarmıştır. Civilization VI da yerleşim kuracağınız coğrafya çok önemlidir. Bu oyunun gidişatında doğru hamleler yapmanızı ve rahat ilerlemenizi ya da tam sağlaması olarak yanlış bölge seçiminde bir müddet sonra tıkanıklık yaşamanıza sebep olacaktır.

Bir diğer yardımcı bilim olarak ise kronoloji karşımıza çıkmaktadır. Kronoloji olayın zamanını tespit edip, bu olayları oluş sırasına göre sıralayarak aralarında neden-sonuç ilişkisi kurmaya yarar (Tüysüz, 2021, s.14).Civilization VI oyununda da tam olarak olayların zaman akışı sırasına göre düzenlendiğini görüyoruz.Hangi medeniyeti seçerek oyuna başlamış olursanız olun antik çağdan başlayarak günümüze kronolojik olayları yaşayarak geliyorsunuz.Böylece Türkiye'de ki tarih öğretiminin hedeflediği kronolojik olarak yorumlayabilme becerisine katkıda bulunacaktır. Tarih şeritlerinde sunulan bilgileri yorumlayabilmek (MEB, 2009, s.8),

CIVILIZATION VI

Civilization VI  Sid Meier tarafından geliştirilen ilk olarak Microsoft Windows için 21 Ekim 2016'da piyasaya sürülmüş tarih temalı sıra tabanlı bir strateji oyunudur. Oyunu oynamaya başlamadan önce bazı önemli simgeleri bilmek oyuncuya önemli bir avantaj sağlayacaktır.
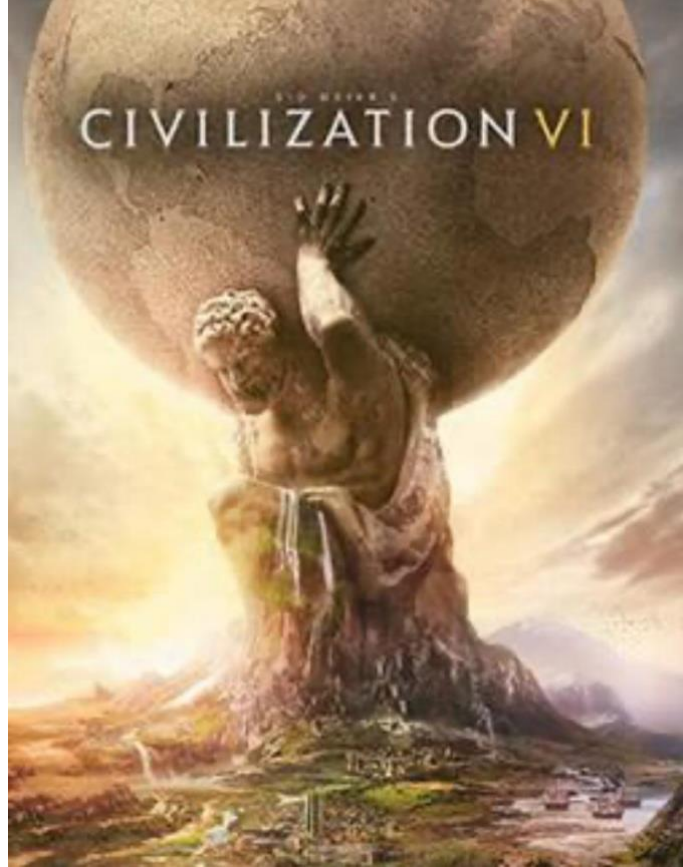


Şekil 1. Civilization VI Kapak Görseli

Oyunda Kullanılan Simgeler

Yiyecek (Food)

Oyunda yiyecek faktörü Mısır koçanı,ayçiçeği,buğday gibi görsellerden yararlanarak resmedilir..Beslenme Maslow'un ihtiyaçlar hiyerarşisinde birincil ihtiyaçlardandır. Oyun gerçek yaşam gibi beslenmeyi de ele almış, beslenmenin  ve üretimin yaşamın temeli olduğu vurgulanmıştır. Oyunda food'a  farklı anlamlar yüklenmiş ve food arazinin yaşamaya elverişliğini, toprağın verimliliğini, göstermektedir.  Food kurulan şehrin yiyecek ihtiyacını da karşılamaya yarıyor. Yiyecek, Temiz su kaynakları popülasyonun artmasını sağlıyor.

Üretim (Production)

Dişli çark görseliyle temsil edilmiştir.Ne kadar üretim yapılırsa gelişim o kadar fazla olmaktadır.

Yurttaşlık Ağacı (Civic Tree)

Şehirlerin nasıl yönetileceğinin kartları burada dağıtılır. Otokrasi, oligarşi, klasik cumhuriyet gibi ilk çağ yönetim şekillerinin yanında faşizm gibi günümüze yakın yönetim şekillerinin de uygulanma sırasına göre işlenmesi öğrencilerde tarihteki kronoloji farkındalığı kazandırmaktadır. .Bu durum da öğrenciye Türkiye'de ki tarih öğretiminin hedeflediği kronolojik olarak yorumlayabilme becerisine katkıda bulunacaktır.

Teknoloji Ağacı (Teknology Tree)

Madencilik, çömlekçilik, hayvancılık gibi yaşamı yine kronolojik olarak ele almaktadır.

Din ve İnanış

Hayatın her zaman içerisinde bulunan olgulardan biri de din ve inanıştır. Söz konusu halkın bu tapınma ihtiyacı konusunda putlardan,ilkel dinlerden başlayıp daha sonra peygamberler alabilmeye kadar uzanan bir din kronolojisi mevcuttur.



Şekil 2. Civilization VI Bazı Simge Örnekleri

Civilopedia

Civilization VI oyunundaki gelişmelerin tarihi arka planı oyundaki "Civilopedia" özelliği sayesinde oyuncuya sunulmuştur.

Şekil 3. Tarihsel Arka Planı Açıklayan Civilopedia

Oyunu Tanımlayan Unsurlar

Oyunu öğrenmek için elbette belli başlı simgeleri bilmek elbette yeterli gelmeyecektir. Civilization VI oyununun amacı ve oyunu oluşturan unsurlar ancak oyunu oynadıkça zamanla kavranacaktır.

Ordular

Civilization VI nın daha önceki oyunlarında en ilkel çağda olsak dahi şehirlerin kendi askerleri vardı. Herhangi bir şehrin yanına düşman askerleri geldiğinde, onlara kendi askerlerinizle zarar verebiliyordunuz. Fakat Civilization 6'da şehirlerinizin saldırı özelliğini kazanması için hemen asker almanız gerekiyor. Oyun ilerledikçe savunma ile ilgili kısım savunma ağacında açılıyor.

Oyunun en başında çok savunmasız olmanız nedeniyle, toprak almak yerine birkaç askeri birliğe önem vermek gerekiyor. Bu askeri birlikler, şehirlerde savunma görevi görürken aynı zamanda başka şehirler kurmak için giden yerleşimcileri korumaktadır. Özellikle yeni oyunda, barbarların çok daha saldırgan olması nedeniyle, askerlere ve savunmaya önem vermek gerekmektedir. Oyunun ilerleyen zamanlarında, teknoloji ve kültür alanında ilerlediğinizde askeri ve savunma gücünüz yetersizse, diplomatik ilişkiler sıkıntıya girebiliyor ve diğer dost ülkeler tarafından uyarı alabiliyorsunuz.



Şekil 4. Civilization VI Askeri Güçler Örneği

Bölgeler

Civilization 6 ile birlikte bölgelerde önemli değişiklikler yapılmıştır. Oyunun her bir sürümünde şehirlerin yapılaşması değişmiştir. Civilization 6 dan önce oyunlarda yapıların hepsi şehrin içine kurabiliyor, diğer altıgenleri de madencilik ve tarım gibi bölümlere ayrılabiliyor.Yaptığınız harikalar şehirlerin çevresine gelişi güzel biçimde yerleştirilebiliyordu.

Civilization 6 da askeri, konaklama, bilim, tarım gibi harikalar için de şehrin altıgenlerini kullanıyorsunuz. Oyunda başarılı olmak için ve şehrinizin gelişmişlik düzeyini nirvana ya çıkarmak için oyunun en başında tarım arazilerini belirlerken, doğru bir coğrafya seçmeniz ve ilerleyen turlarda kuracağınız bölgeleri düşünerek hamle yapmanız gerekmektedir. Eğer gelişi güzel seçimlerle devam etmeye karar verirseniz oyunun belli bir aşamasından sonra şehrin ileriye gitmediğini yerinde saydığını ve yeni özellikler ekleyemediğinizi ( uzay araç gereçleri gibi)görürsünüz.

 Araziyi plansız bir şekilde kullanıp daha önce bir şey yaptığınız bölgede daha farklı bir şey yapmak isterseniz ilk yapmış olduğunuz yapıyı yıkmak düzlemek zorunda kalacaksınız. Böyle bir durumda ilk yapılan boşa gitmiş olacak ve ondan elde etmiş olduğunuz gelirde sona erecektir. Bu durumda stratejinin önemini ortaya koymaktadır.

 Su kaynaklarından ve verimli tarım arazilerinden uzak yerler yerleşim olarak tercih edilirse ilerleyen süreçte gelişim olumsuz etkilenecek ve büyümeniz duracaktır Bu olumsuzlukla karşılaşmamak adına oyundaki tüm halleri ileriye dönük bir plan dahilinde ve analiz yaparak hareket etmek gerekmektedir. Tarihte de yerleşim yerlerin coğrafyanın iklimin, konumun insanların yaşam şekilleri üzerinde doğrudan etkisi vardır.



Şekil 5. Civilization VI Bölgeler Örneği

Kentsel Planlama

 Yukarıda bahsettiğimiz gibi yapılabilecek birçok hamle olmasına rağmen şehirlerimizin ait olduğu altıgen alanı çok küçük ise şehirlerimizi birbirlerine yakın kurmaya dikkat edebiliriz. Bu sayede bir bölgede inşa ettiğiniz endüstri sektörünün bir diğer bölge içinde görev yapmasını sağlamış olursunuz. Civilization 6 dan önceki sürümlerde uzak bölgelerden daha verim sağlanırken yeni sürümde bunun tam aksine şekilde değiştiğini söyleyebiliriz.

Şekil 6. Civilization Kentsel Planlama Örneği

Genişleme

Bu yeni sürümde bölgenizin alanını büyütmekten çekinmeyin eski sürümlerde alan ya da bölge büyütmek yani yeni şehir oluşturmak ve altıgenler kurmak hem maliyetli ve zaman harcayan işler iken bir tek şehre sahip olsanız bile abartısız oyunda çok güçlü olmanız bile gerçek olabiliyordu. Civilization 6 da ne kadar fazla şehir oluşturursanız o denli hızlı büyüdüğünüzü ve geliştiğinizi aklınızdan çıkarmamalısınız. B u sebeple oyuna başladığınız anda hemen ilk bölgenizde inşaat işçisi oluşturmak yerine yerleşimci oluşturursanız o aradaki ciddi farklı gözlemleyebilirsiniz. Ayrıca şehir için doğru alan seçmek ilerde sizin o bölgede üstün güç olmanızı sağlayacaktır. Mesela kıtaya sahip bir harita üzerinde oynuyorsanız bu kıtalar arası geçiş noktasına yerleşim bölgesi kurarak diğer medeniyetleri kendinize muhtaç hale getirebilir olası ticaret noktalarını vergiye bağlayabilirsiniz.

Kamera Açısı

Oyuna farklı kamera açılarından bakma imkanınız vardır Bu durumda size oyunu farklı gözle görmenizi ve düşüncenizi geliştirecektir. ALT tuşuna basıp ve fareyle kameranızı döndürün gerekli bakış açısını sağladığınızda ALT tuşunu bırakın kamera eski açıya geri dönecektir.

Elçiler

Bu oyunda diğer devletler ile temasa geçmenin yeni bir yöntemi olarak elçi olayını ortaya çıkarmıştır. Eğer yakınızda bulunan önemli bir devleti tarafınızda görmek istiyorsanız bu şehir devletine yeterli miktarda elçi sunmanız gereklidir. Bu seçilmiş elçiler ekranın sağ üst kısmında bulunan pencereden yönlendirilebiliyor ve belli aralıklarla elçi sunma fırsatınız doğuyor bu sebeple göndereceğiniz elçileri en doğru biçimde yönlendirme hususunda dikkatli olmalısınız çünkü elçi sunduğunuz devletler size bir çok ödülde veriyorlar.

Örneğin yiyecek ve inanç puana kadar bir çok kategori destek sağlıyor hatta onlara ait olan özel eşyaları bile elde edebiliyorsunuz. Elçiler sunarak kendi tarafınızda gördüğünüz devletlere bir diğer başka devlete savaş ilan ettiğinizde sizin tarafınızda savaşmaya da ikna etmiş oluyorsunuz bu açılan savaş şehir devletlerine yakın bir bölgede ise onlar için büyük sorunlar ortaya çıkartacaktır.

Ticaret

Civilization 6'dan önceki versiyondan farklı olarak bu oyunda ticaret oyuncuya değil basiretli tacirlere bırakılmıştır. İki şehir devleti bir biri ile ticareti geliştiğinde o şehirler arası bir ticaret yolu da oluşuyor. Eğer oyunda birimleriniz bir yerden başka bir yere ulaşırken bu yol güzergahını kullanırsa oyun daha hızlı ilerleme sağlıyor. Ticaret yapacağınız şehirleri çok iyi seçmek zorundasınız. Ticaret yaptığınız şehirlerle diplomatik ilişkileriniz her zaman iyi olmalıdır. Zira ticaret yaptığınız şehirle savaş durumuyla karşı karşıya kalırsanız

düşman askerlerinin sizin şehre bu ticaret yolu sayesinde daha hızlı ulaşacağınızı oyunun hiçbir aşamasında göz ardı etmemelisiniz.

Seçtiğiniz bölgenin gelişime açık olmayan bir yerde olması durumunda yiyecek ve üretim sıkıntısı çekeceğiniz yadsınamaz bir durumdur. Bunu da yine kendi kurduğunuz şehirleriniz arası ticaret yollarını kullanarak bertaraf edebilirisiniz.

CIVILIZATION VI: Gathering Storm

Kanuni Sultan Süleyman (Suleiman The Magnificent): Oyunun Osmanlı eklentisinde muhteşem Süleyman Grand vizier yeteneği sayesinde vali Pargalı İbrahim'i ve kendine has ünitesi janissary'i (yeniçeri) atayabiliyor. Yükselme dönemi ortaöğretim 10. sınıf müfredatında yer alan kanuninin seslendirmesinde söylediği 'madem ki milletin hep ahenktar akvam-ı muhtelif eden, hikmet-i Süleyman-ı idrakin zaruridir' (halkın uyum halinde yaşaması Süleyman'ın ne yapmak istediğini anlamamız için gereklidir) sözünde kanuninin döneminde izlediği politika hakkında fikir sahibi olunmasını sağlıyor. 10.5.5. 'Kanuni döneminden itibaren Osmanlı devletinin siyasi sınırlar ve devlet teşkilatı bakımından olgunluğa eriştiğini kavrar' (MEB, 2018)



Şekil 7. Civilization VI Kanuni Sultan Süleyman



Şekil 8. Kanuni Sultan Süleyman Görseli-Yeni Paket

Vali: Baş Vezir İbrahim (Pargalı İbrahim):

Hem askeri hem diplomatik konularda avantaj sağlıyor. Diğer medeniyetlere yerleştirilebilen ilk vali olarak karşımıza çıkıyor.



Şekil 9. Osmanlı–Pargalı İbrahim Paşa

Ünite: Yeniçeri: Yeniçeri oyunda musketmanın (tüfekçi) yerini alıyor ve daha ucuza üretilip daha kuvvetli. eğer kendi şehrinizde üretiyorsanız yeni asker şehrin nüfusunu 1 eksiltiyor, başka medeniyetlerden ele geçirdiğiniz bir şehirde kurarsanız şehir popülasyonunu eksiltmiyor.



Şekil 10. Civilization VI Yeniçeri Ünitesi

Bina: Büyük Pazar (Grand Bazaar): Büyük Pazar bankanın yerini alıyor ve commercial hub yaniticaret merkezi bölgesinde üretilebiliyor. Bankadan farklı olarak mutluluk puanı (amenity) sağlıyor.10.7.5 Osmanlı Devleti'nde vakıfların sosyal hayattaki yerini ve önemini kavrar' Mili Eğitim Bakanlığı (MEB) 2018 kazanımını destekler şekilde olduğunu görüyoruz.



Şekil 11. Civilization VI Büyük Pazar

Donanma Ünitesi Kadırga (Barbary Corsair): Privateer ünitesinin yerine gelen kadırga daha erken üretilebiliyor. Bu turda toprak yağmalayıp (coastal raid) kaçabilirsiniz çünkü hareket puanı eksiltmiyor.



Şekil 12. Civilization VI Kadırga

Şahi Topu (Great Turkish Bombard): Osmanlının ürettiği kuşatma üniteleri daha kısa sürede gerçekleşiyor ve saldırı kuvvetleri artıyor.Bu sayede ele geçirdiğimiz şehirlerimizde nüfus düşmüyor.

Şekil 13. Civilization VI Yeniçeriler ve Şahi Topu

## SONUÇ

Günümüzde eğitim öğretimde dijitalleşmenin giderek popülerleşmesine karşın, tarih eğitiminin hâlihazırdaki mevcut yapısı öğrencilerin tarih dersini sıkıcı bulmalarına hatta ve hatta soğumalarına sebep olabilmektedir. Bu durum da öğrencinin MEB'in hedeflediği tarih kazanımlarını yeterince içselleştirememesine sebebiyet vermektedir. Tabi burada bahsettiğimiz tarihin disiplin içi amaçlarıdır. Tarihin disiplin içi amaçlarını öğrencilere sunarken en çok eleştirilen nokta öğrencilerin derste pasif durumda kalmaları gösterilir. Öğretmen merkezli olan bu tarz öğretimin tarih derslerinin hedeflerine ulaşması önünde büyük bir engel teşkil ettiği açıktır. Bu sebeple farklı yöntem teknik kullanımı uzmanlarca da zaten önerilmektedir. Bu proje de bu konuda dijital oyun kullanımıyla tarih öğretiminde Civilization VI oyununun destekleyici bir öğe olarak kullanılabileceğini ifade etmeye çalışmıştır.

Oyunun empati geliştirmede katkısı da incelemeye değerdir. Oyuncunun sanki o toprakların hükümdarı/kralı/padişahı gibi hissederek gerekli stratejileri üretmesi beklenir. Tıpkı gerçeğe yakınlığı ile bilinen simülasyonlar misali oyunun içinde yaparak yaşayarak tarih öğrenmek, diplomatik ilişkilerde taraf olmak üretmek, yenilmek yenilmek,'büyük insanlar' (sanatçılar, bilim adamları, mimarlar, yazarlar, sanatçılar)olarak ifade edilen tarihin önemli kişilerini o dönemi yaşayarak öğrenme oyunun en önemli katkılarından biridir.

Bir diğer nokta ise 'tarih tekerrürden ibarettir' sözünü oyunun içinde bulmak, oyunun kendi doğasında onu devamlı olarak tekrar etmek vardır böylece edinilen tarih bilgisinin niceliği de aratacaktır. oyunu defalarca kez oynayabilmek aynı yanlışları bir daha yapmamaya çalışmak gibi birçok noktada tarih ile kesişecektir.

Tarihte olayların deneyi yapılamaz ve gözlemlenemez. Tarih öğretiminin en büyük handikaplarından bir tanesi de budur tarih biliminde bilgi kaynaklara bakarak objektif bir biçimde yorumlanmasıyla oluşur. Kazanımlar oluştururken öğrencilerin bunları zihinlerinde hayal etmeleriyle öğrenmeleri beklenir.' Tarihsel kavrama becerisi, öğrencilerin metinleri zihinlerinde canlandırarak okumaları şartını da kapsamaktadır' (MEB, 2018, s. 13). Öğrenenin bu kavrama becerisini oluşturabilmesi bununla birlikte o döneminde koşullarını hesaba katmayı gerekli kılar. Civilization VI oyununda da oyucuların bunu dikkate alarak strateji üretmeleri beklenir. Öğrenci bu sayede o dönemin şartlarını da hesaba katacak ve kendi öznel bilgisini elde edecektir. Carr'in de belirttiği gibi' tarihin geçmişle bugün arasındaki diyalogtan başka bir şey olmadığını, konuşanın gerçekler değil de tarihçinin bizzat kendisi olduğunu anlayacaktır (Carr, 2011).

Son olarak Civilization VI oyununun MEB'in kazanımlarıyla örtüşmesi, öğrencilerde hem duyuşsal hem bilişsel becerilerinin oluşmasına yararı yadsınamaz boyuttadır. Bu durum oyunun katkısını araştırmaya değer kılmıştır. Elde edilen sonuç ise tarih öğretiminde dijital oyunlara yer verilmesi gerekliliğini bir kez daha ortaya koymuştur.

Tarih öğretimi yalnızca bilişsel değil duyuşsal hedefler de içerir. Öğrencilerin Tarih öğrenmeye istekli olmaları, keyif almaları ve bu konuda motivasyona sahip olmaları konusunda dijital oyunların haz verici yönünden

yaralanmakta akıllıca olacaktır. Tarih kazanımlarını öğrencilere kazandırmakla mükellef olan öğretmenlerin düz anlatımın yanında farklı yöntem tekniklerden yararlanmaları faydalı olacaktır.

Bu yöntem tekniklerden biri de dijital oyunlardan faydalanmak olacaktır. Öğretmenlerin söz konusu bu oyunları tanımaları, öğrencilerin bu oyunlara merakının sebeplerini belirlemelerine ve Bu merakın kaynağının belirlenip bunu tarih dersi üzerine odaklamak fayda getirecektir.,

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# İlkokulda Zeka Oyunları İle İlgili Yapılan Çalışmaların İçerik Analizi

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## Özet

Bu çalışmada Türkiye'deki ilkokullarda zeka oyunlarına yönelik yapılan araştırmaların çeşitli yönleri incelenmiştir. Betimsel içerik analizi yöntemi kullanılarak nitel araştırma yöntemi benimsenmiş ve doküman incelemesi tekniği kullanılarak veriler toplanmıştır. Ölçüt örnekleme yöntemi kullanılarak belirlenen çalışmaların çoğunun araştırma makalesi düzeyinde olduğu ve en yaygın kullanılan çalışma deseninin deneysel tasarım olduğu ortaya çıkmıştır. Çalışmaların çoğunun üçüncü ve dördüncü sınıf öğrencileriyle ve öğretmenlerle yapıldığı, görüşme formunun tercih edildiği ve öğrencilerin bilişsel faydalar açısından en yüksek akademik başarıya ulaştığı, duyuşsal faydalar açısından ise en çok paylaşma, yardımlaşma, iş birliği duygularının ve özgüvenlerinin geliştiği sonuçlarına ulaşıldığı belirtilmiştir. Ayrıca, çalışmaların amaçlarının öğretmen ve öğrenci bakış açılarına en çok yer verildiği belirlenmiştir. Çalışmalardan elde edilen bulgular doğrultusunda öneriler sunulmuştur. Bu çalışma, Türkiye'deki ilkokullarda zeka oyunlarına yönelik yapılan araştırmalar hakkında bilgi vermektedir ve bu alanda ileride yapılacak çalışmalara da ışık tutabilir.

**Anahtar Kelimeler**: : İlkokul, Akıl ve Zekâ Oyunları, Oyun

## Giriş

Oyun, bebeklikten yetişkinliğe kadar hayatımızın her döneminde olan sonucu pek bir çıkara dayanmayan bir eğlence şekli denilebilir. İnsanların vaktini hoş geçirmesini sağlar, belli bir zaman kişilerin oyalanmasını yarar. Bazen serbest şekilde kuralsız oynanırken bazen de belli kuralları olan bir eğlence şeklidir. Bir çocuk için de oyun çok önemlidir. Oyun çocuğun kendisini tanımasını, dış dünyayı kavramasına yardımcı olur. Bu anlayış içinde oyun, çocukların kendilerini ifade etmelerini, yeteneklerini anlamalarını,dil, muhakeme, sosyal,duygusal ve motor becerilerini geliştirmelerini amaçlayan önemli olaylar olarak tanımlanabilir (Egemen vd.,2004:39).

Oyun kavramının tarihi çok eskilere dayanmaktadır. İnsanlık tarihine bakıldığında oyunların antik medeniyetlerden günümüze kadar oynandığı bilinmektedir (Gülsoy, 2019). İnsanlık tarihi kadar eski olan oyun kavramının hayatın birçok noktasıyla bütünleşmiş olması oyunu ilgi çekici hale getirmiştir. Bu sebeple birçok alanda oyundan faydalanmaya çalışılmıştır. Oyunun kullanıldığı alanlardan biri hatta en önemlisi eğitimdir.

Okul öncesi dönemden başlayarak neredeyse her kademede eğitim için oyundan faydalanılır. Öğrenci merkezli anlayışın gelişmesiyle eğitim- öğretimde öğrenciyi daha aktif kılacakları etkinlikler yapılması uygun görülmüş ve eğitim Oyun, bebeklikten yetişkinliğe kadar hayatımızın her döneminde olan sonucu pek bir çıkara dayanmayan bir eğlence şekli denilebilir. İnsanların vaktini hoş geçirmesini sağlar, belli bir zaman kişilerin oyalanmasını yarar. Bazen serbest şekilde kuralsız oynanırken bazen de belli kuralları olan bir eğlence şeklidir. Bir çocuk için de oyun çok önemlidir. Oyun çocuğun kendisini tanımasını, dış dünyayı kavramasına yardımcı olur. Bu anlayış içinde oyun, çocukların kendilerini ifade etmelerini, yeteneklerini anlamalarını,dil, muhakeme, sosyal,duygusal ve motor becerilerini geliştirmelerini amaçlayan önemli olaylar olarak tanımlanabilir (Egemen vd.,2004:39).

Oyun kavramının tarihi çok eskilere dayanmaktadır. İnsanlık tarihine bakıldığında oyunların antik medeniyetlerden günümüze kadar oynandığı bilinmektedir (Gülsoy, 2019). İnsanlık tarihi kadar eski olan oyun kavramının hayatın birçok noktasıyla bütünleşmiş olması oyunu ilgi çekici hale getirmiştir. Bu sebeple birçok alanda oyundan faydalanmaya çalışılmıştır. Oyunun kullanıldığı alanlardan biri hatta en önemlisi eğitimdir.

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Eğitsel Oyun

Eğitsel oyun, geniş bir kavramdır. Günümüzde önemi artmış bir şekilde yerini alan zekâ oyunları da eğitsel oyunun bir alt başlığı olarak karşımıza çıkmaktadır. Zekâ oyunları belirli bir bilgi gerektirmeyen, kültür, dil veya milliyetten bağımsız ipuçları yardımıyla mantıksal bir çerçevede düşünülerek çözülen bir oyundur (Özdevecioğlu ve Hark Söylemez, 2021).

Zeka Oyunları

Zeka oyunları, bireylerin potansiyellerini gerçekleştirmeleri, hızlı ve doğru karar almaları, sorunlara kendi çözümlerini geliştirmeleri ve hepsinden önemlisi kendisini sürekli yenilemeleri için tasarlanmış, sunulan bir aktivite olarak tanımlanabilir (Devecioğlu ve Karadağ, 2014).

Zekâ oyunları eğitim için potansiyelinin iyi olduğu ülkemizde de fark edilmiştir. 2012-2013 eğitim- öğretim yılından itibaren Milli Eğitim Temel kanununda belirtilen kapsamlı hedefler çerçevesinde seçmeli ders adı altında ortaokullarda zekâ oyunları oynatılmaya başlandı. Böylesine zihin geliştirici oyunların oynandığı derslerde öğrenciler, potansiyellerini fark eder ve geliştirir, problemlerle yüzleşmek için çeşitli stratejiler geliştirir, hızlı ve doğru kararlar verir ve sistematik düşünmeyi geliştirir, rekabetçi bir ortamda bireysel ve takım olarak çalışma becerilerini geliştirir.

## Yöntem

Araştırmanın Modeli

Bu çalışmada ilkokulda zekâ oyunları ile ilgili yapılan çalışmaların betimsel içerik analizi yapılmış olup nitel araştırma yöntemi benimsenerek desenlenmiştir. Nitel araştırma, insanların potansiyellerini anlamalarına, gizemlerini çözmelerine ve çabalarıyla inşa ettikleri sosyal yapı ve sistemlerin derinliklerini keşfetmelerine yardımcı olmak için geliştirilmiş bir bilgi üretim şeklidir (Baltacı, 2019). Karataş (2015)'a göre nitel araştırma, konuyu derinlemesine anlamaya çalışır. Bu açıdan araştırmacı, ek sorularla gerçeği takip ederek ve muhatabın öznel bakış açısını vurgulayarak bir kâşif gibi hareket eder. Betimleyici araştırma yöntemleri,herhangi bir durumu, olayı veya sorunu ayrıntılı olarak tanımlar,yorumlar ve araştırır,kriterler belirler ve incelenen olaylar ve değişkenler arasındaki ilişkilerin varlığını ve kapsamını sorgular (Aydoğdu vd., 2017).Betimsel içerik analizinin kullanıldığı araştırmalar, elde edilen bilgileri sunup analiz etmeli, doğru ve sistemli bir şekilde yorumlamalı ve sonuçları açık bir şekilde sunmalıdır (Ültay ve Akkurt, 2021).

Çalışma Grubu

Araştırmanın çalışma grubunu; yurt içinde ilkokullarda zekâ oyunlarıyla ilgili yapılmış olan yüksek lisans tezlerinden ve araştırma makalelerinden oluşmaktadır. İlkokullarda zekâ oyunlarıyla ilgili bulunan çalışmalar 2016 – 2022 yılları arasındadır. Araştırma için çalışma grupları belirlenirken amaca yönelik örnekleme yöntemlerinden biri olan ölçüt örnekleme tercih edilmiştir. Bu örneklemenin nedeni,

önceden belirlenmiş önemli kriterleri karşılayan tüm vakaları incelemek ve doğrulamaktır (Patton,2014). Bu ölçüt kapsamında ilkokul alanında zekâ oyunlarıyla ilgili 12 çalışmayla sınırlıdır.

Veri Toplama Araçları ve Teknikleri

Bu araştırmada doküman analizi yapılarak gerekli verilere ulaşılmıştır. Doküman analizi, araştırma konusunun olgu ve olaylar hakkında bilgi içeren belgeler üzerinde araştırma kapsamında analiz etme ve veri sağlama sürecine denir (Karataş,2015). Sönmez ve Alacapınar (2016)' a göre doküman incelemesi, kitap, dergi, makale, tez vb. yazımı; imgeler, filmler ve araçlar gibi materyallerle sistematik bir etkileşim olarak tanımlanabilir.

Araştırma kapsamında bulunan dokümanlar incelenmiştir. Verilere "zekâ oyunları, zeka oyunları, akıl oyunları" terimleri yazılarak ulaşılmıştır. Bulunan içeriklerden ilkokul için olan çalışmalar seçilmiştir. İlkokul kısmı için yazılan ve izin alınarak yayınlanan çalışmalar bir bütün halinde incelenmiştir. Yurt içinde ilkokullarda yapılan zekâ oyunları ile ilgili çalışmalara ilişkin 2016'dan günümüze kadar hazırlanan çalışmalar ele alınmıştır. 2016-2022 yılları arasında ilkokullarda zekâ oyunları çerçevesinde 12 çalışma, araştırma kapsamına dâhil edilmiştir. Bu çalışmalardan 8 tanesi araştırma makalesi, 4 tanesi yüksek lisans tezidir. Veri toplama sürecinde aşağıdaki adımlar uygulanmıştır:

• Bulunan içerikler pdf şeklinde indirilip bilgisayara kaydedilmiştir.

• İndirilen pdf dosyalarının gruplanması araştırma makalesi ve yüksek lisans tezleri şeklinde yapılmıştır.

• Araştırma makalesi ve yüksek lisans tezi şeklinde gruplanan çalışmalar araştırma soruları çerçevesinde tablolar hazırlanmıştır.

Verilerin Toplanma Süreci

Bu araştırmada görüşme yöntemi tercih edilmiştir. Balıkesir ili Altıeylül ilçesinde bulunan akademik başarı düzeyleri farklı üç ortaokulda çalışmakta olan İngilizce öğretmenleri ile 2022 yılı Kasım ve Aralık ayları içerisinde, her biri yaklaşık 45 dakika süren görüşmeler yapılmış ve yapılan görüşmeler bilgisayar ortamında kayıt altına alınmıştır.

Verilerin Analizi

Bu araştırmada içerik analizi yapılarak veriler elde edilmiştir. Bunun için betimsel araştırma kullanılmıştır. Betimsel araştırma, birçok olayın, grubun, kurumun ve çeşitli disiplinin ne olduğunu tasvir etmeye ve açıklamaya çalışır. Bu şekilde iyi anlaşılır, gruplanır ve aralarındaki ilişkiler belirlenir (Kaptan,1998). Betimleyici içerik analizi çalışması yapılırken kullanılacak sorular, veri analiz yöntemleri ve verilerin yorumlanmasına yönelik sistematik bir yaklaşım belirlenmelidir (Ültay ve Akkurt,2021).

Çalışmada doküman analizi yapılmıştır. İlkokulda zeka oyunlarına yönelik yapılan çalışmalar, belirlenen ölçütlere ve değerlendirilen verilere göre frekans ve yüzde olarak değerlendirilmiştir. Elde edilen veriler, frekans (f) ve yüzde değerleri (%) ile birlikte sistematik ve anlaşılır bir şekilde tablo halinde sunulmuştur. Bulgular tanımlandıktan sonra veriler yorumlanmıştır.

# Bulgular

Zekâ oyunlarının ilkokullar için olan çalışmaların dağılımları Tablo 1'de gösterilmektedir.

Tablo 1. İlkokulda Zekâ Oyunlarıyla İlgili Yapılan Çalışma Türlerinin Dağılımları

| Çalışma türü | f | % |
|---|---|---|
| Yüksek lisans tezi | 4 | 33,33 |
| Araştırma makalesi | 8 | 66,67 |
| toplam | 12 | 100,00 |

Yukarıda verilen tabloda zeka oyunlarının ilkokulları için yapılan çalışmaların çoğunun araştırma makalesi (f=8) olarak yapıldığını görebiliriz. Çalışmalardaki % 33,33'lük kısmın yüksek lisans tezlerine ait olduğu görülmektedir. Bu bulgulara dayanarak, çalışmaların araştırma makalesi türüne odaklanıldığı anlaşılmaktadır. İlkokullar için olan çalışmaların yayın yıllara göre dağılımı Tablo 2'de verilmiştir.

Tablo 2. Yapılan Çalışmaların Yıla göre Dağılımları

| | Yüksek Lisans Tezi | Araştırma Makalesi | Toplam | |
|---|---|---|---|---|
| Çalışmaların Yılları | frekans | frekans | frekans | % |
| 2016 | - | 1 | 1 | 8,33 |
| 2017 | - | 1 | 1 | 8,33 |
| 2018 | - | - | 0 | 0 |
| 2019 | 1 | 1 | 2 | 16,67 |
| 2020 | 1 | 2 | 3 | 25 |
| 2021 | 1 | 1 | 2 | 16,67 |
| 2022 | 1 | 2 | 3 | 25 |

Tablo 2'de, zekâ oyunlarının ilkokullara yönelik araştırmaların ağırlıklı olarak 2020 (f=3)'den beri yapıldığını görüyoruz. 2018 yılında ilkokulda zekâ oyunlarıyla ilgili yapılan bir çalışmaya rastlanmamaktadır. Çalışmaların toplamda %83,34 gibi bölümü ise 2019 yılı ve sonrasına aittir. Bu durum da çalışmaların yüzdelik olarak büyük bir bölümünün 2019'dan sonra gerçekleştiğini göstermektedir.

Zekâ oyunlarının ilkokullar için olan çalışmaların amaçlarına göre dağılımları Tablo 3'te verilmiştir.

Tablo 3. Yapılan Çalışmaların Amaçlarının Dağılımları

| | Yüksek Lisans Tezi | Araştırma Makalesi | Toplam | |
|---|---|---|---|---|
| Çalışmaların Amaçları | f | f | f | % |
| Üç boyutlu düşünme becerilerine ve akademik başarılarına etkisi | - | 2 | 2 | 14,29 |
| Zekâ oyunları dersinin seçmeli ders olarak verilmesi hakkındaki öğretmen görüşleri | - | 1 | 1 | 7,14 |
| Karar verme, sabırlı davranış gösterme ve okul doyumu ile değişkenlerin üzerindeki etkisi | - | 1 | 1 | 7,14 |
| Okuma becerileri ve okuma tutumları üzerindeki etkisi | 1 | - | 1 | 7,14 |
| Akıl ve zekâ oyunlarının ilkokul öğrencileri üzerindeki etkilerine dayalı öğretmen görüşleri | 1 | - | 1 | 7,14 |
| Problem çözme becerileri ve bu algıların üzerindeki etkileri | 1 | - | 1 | 7,14 |
| Öğrencilerin, öğretmenlerin ve velilerin zekâ oyunları hakkındaki görüşleri | - | 1 | 1 | 7,14 |
| Zihinsel beceri düzeylerine etkisi | - | 1 | 1 | 7,14 |
| Orta Asya'daki zekâ ve strateji oyunlarının destekli öğrenmeye dayalı uygulamaların akademik başarıya ve tutuma etkisi | - | 1 | 1 | 7,14 |
| Sınıf öğretmeni adaylarının zekâ oyunlarının sınıf ortamındaki kullanma sürecine görüşleri | - | 1 | 1 | 7,14 |
| Okuduğunu anlama becerisine etkisi | 2 | - | 2 | 14,29 |
| Öğrencilerin çeşitli özelliklerine yansımaları ve öğretmen görüşleri | - | 1 | 1 | 7,14 |
| Toplam | 5 | 9 | 14 | 100 |

Tablo 3'de zekâ oyunları dersinin seçmeli ders olarak verilmesi hakkındaki öğretmen görüşleri açısından değerlendirilmesi (f=4) amacı en çok araştırma makalesi olarak görülmektedir. Bu amaçla yapılan tüm araştırmalar araştırma makalesi türünde olup, yüksek lisans tezinde bu amaçla ilgili herhangi bir araştırmaya rastlanmamıştır. Bir başka amaç olarak zeka oyunun öğrencideki okuma tutumlarıyla okuduğunu anlama becerilerini inceleyen (f=3) araştırmalar yapıldığı görülmüştür. Bu amaçtaki 3 çalışma da yüksek lisans tezleri olarak görülmektedir. Ayrıca zekâ oyunlarının akademik beceri ve tutum düzeyleri etkisinin incelendiği (f=3) araştırmalar bulunmaktadır. Bu amaçtaki 3 çalışma araştırma makalesi şeklinde yazıldığı görülmüştür. Yüksek lisans tezi düzeyinde bir çalışmaya rastlanmamıştır. Zekâ oyunlarının karar verme, sabırlı davranış gösterme ve okul doyumu ile değişkenlerin üzerindeki etkisi inceleyen (f=1) çalışma da bulunmaktadır. Bu çalışma araştırma makalesi

düzeyindedir. Zekâ oyunlarının ilkokullar için yapılan araştırmalarda tercih edilen araştırma yöntemleri Tablo 4 olarak verilmiştir.

Tablo 4. Yapılan Araştırmalarda Tercih Edilen Araştırma Yöntemleri Dağılımı

| Araştırma Yöntemi | Yüksek Lisans Tezi | Araştırma Makalesi | Toplam | |
|---|---|---|---|---|
| | frekans | frekans | frekans | % |
| Nicel Araştırma | 3 | 4 | 7 | 58,33 |
| Nitel Araştırma | 1 | 4 | 5 | 41,67 |

Tablo 4'e bakıldığında ilkokullardaki yapılmış olan 12 çalışmada yüksek lisans tezlerine bakıldığında nicel araştırmanın (f=3) ve nitel araştırmanın (f=1) olarak görülmüştür. Yüksek lisans tezlerinde daha çok nicel araştırma tezlerine başvurulduğu görülmektedir. Araştırma makalesi çalışmalarına bakıldığında nicel araştırma yöntemi(f=4) ve nitel araştırma yöntemi (f=4) olarak görülmektedir. Araştırma makalelerinde eşit miktar olarak nicel ve nitel araştırma yöntemlerine başvurulduğu görülmektedir. Bu alan için yapılan çalışmaların tümüne bakıldığında, toplam olarak, en çok nicel araştırmanın (f=7) kullanıldığı görülmektedir.

Tablo 5'te zekâ oyunlarının ilkokullar için yapılan araştırmalarda kullanılan araştırma desenlerinin dağılımı yer almaktadır.

Tablo 5. Yapılan Çalışmalarda Kullanılan Araştırma Desen Dağılımı

| Araştırma Deseni | Yüksek Lisans Tezi | Araştırma Makalesi | Toplam | |
|---|---|---|---|---|
| | frekans | frekans | frekans | % |
| Deneysel Araştırma | 3 | 4 | 7 | 58,34 |
| Durum Çalışması | - | 3 | 3 | 25 |
| Olgu Bilim Deseni | 1 | - | 1 | 8,33 |
| Eylem Araştırması | - | 1 | 1 | 8,33 |

Yukarıdaki tabloda zeka oyunları üzerine yapılan araştırma makalesi(f=4) ve yüksek lisans tezi (f=3) çalışmalarının deneysel araştırmayı daha fazla desteklediğini göstermektedir. Seçilen çalışmalardaki tüm desenler incelendiğinde %58,34 ile kullanılan deneysel desenin (f=7) yapılan araştırmalarda en sık kullanılan desen olduğu görebiliriz. Araştırma makalelerinin ise %25 oranının (f=3) çalışılan desenlerin durum çalışması şeklinde yapıldığı görülmektedir. Yapılan yüksek lisans tezleri arasında durum deseni kullanılarak çalışma yapılmadığı görülmüştür. Olgu bilim deseni(f=1) kullanılarak yapılan çalışma yüksek lisans tezi, eylem araştırması(f=1) kullanılarak yapılan çalışma ise araştırma makalesi olarak görülmektedir

Zekâ oyunlarının ilkokullar için olan çalışmalardaki veri toplama araçlarının nasıl dağılmış olduğu Tablo 6'da gösterilmektedir.

Tablo 6. Yapılan Çalışmalarda Kullanılan Veri Toplama Araç Dağılımları

| Veri Toplama Aracı | Araştırma Türü | | | | Toplam | |
|---|---|---|---|---|---|---|
| | Yüksek Lisans Tezi | | Araştırma Makalesi | | | |
| | f | % | f | % | f | % |
| Görüşme formu | 2 | 22,22 | 4 | 40 | 6 | 31,58 |

| Ölçek | 3 | 33,33 | 2 | 20 | 5 | 26,32 |
|---|---|---|---|---|---|---|
| Test | 1 | 11,11 | 3 | 30 | 4 | 21,05 |
| Değerlendirme rubriği | 1 | 11,11 | - | 0 | 1 | 5,26 |
| Değerlendirme formu | 1 | 11,11 | - | 0 | 1 | 5,26 |
| Envanter | 1 | 11,11 | - | 0 | 1 | 5,26 |
| Gözlem Notları | - | - | 1 | 10 | 1 | 5,26 |

Tablo 6 incelendiğinde, ilkokulda zekâ oyunlarıyla ilgili yapılmış araştırmalarda birçok veri toplama aracından yararlanmış oldukları görülmektedir. Bunun için yapılmış olan araştırmalara bakıldığında araştırma makalelerinde görüşme formu (f=4) en çok tercih edilirken yüksek lisans tezlerinde ise ölçeklerin (f=3) ilk sırada tercih edildiği görülmektedir. Toplamdaki değerleri incelediğimizde %31,58 ile görüşme formları çalışmalarda en fazla görülen (f=6) araçlar olmuşlardır. Bu tablo, görüşme formlarından sonra en sık kullanılan aracın %26,32 ile ölçek olduğunu göstermektedir. Yüksek lisans tezlerinde değerlendirme rubriği (f=1), değerlendirme formu(f=1), envanter (f=1), veri toplama aracı olarak kullanıldığı görülürken araştırma makalesinde bu araçlar kullanılmamıştır. Ayrıca gözlem notları incelenen araştırma makalelerinde (f=1) olduğu görülmektedir. Bu da seçilen araştırma makaleleri için en az tercih edilen bir araç olduğunu göstermektedir.

Tablo 7'de ilkokullarda zekâ oyunları konusunda araştırmalardaki çalışılan gruplarının ilkokul sınıf düzeylerine, öğretmen ya da öğretmen adayı ve veli olma durumlarına göre dağılımı yer almaktadır.

Tablo 7. Yapılan Araştırmalardaki Çalışılan Grubun Eğitim Düzeyi ya da İlkokul Sınıf Düzeyine Göre Dağılımı

| | Yüksek Lisans Tezi | | Araştırma Makalesi | | Toplam | |
|---|---|---|---|---|---|---|
| Çalışma Grubu | f | % | f | % | f | % |
| İlkokul 1.sınıf | 1 | 25 | - | 0 | 1 | 7,14 |
| İlkokul 2.sınıf | - | 0 | 2 | 20 | 2 | 14,29 |
| İlkokul 3.sınıf | 1 | 25 | 2 | 20 | 3 | 21,43 |
| İlkokul 4.sınıf | 1 | 25 | 2 | 20 | 3 | 21,43 |
| Öğretmen | 1 | 25 | 2 | 20 | 3 | 21,43 |
| Öğretmen Adayı | - | 0 | 1 | 10 | 1 | 7,14 |
| Veli | - | 0 | 1 | 10 | 1 | 7,14 |

Tablo 7'deki çalışmaların ilkokul 3. Sınıf (f=2) ,ilkokul 4.sınıf (f=2) ve öğretmen ( f=2) ile araştırma makalesi olarak daha fazla tercih edilmiştir. İlkokul 1. Sınıf (f=1) ile yapılan çalışmanın yüksek lisans türünde görülürken araştırma makalesi olarak yapılan bir çalışma görülmemektedir. Tezler bir bütün olarak incelendiğinde ise %64,29 ile daha çok İlkokul 3. Sınıf (f=3, %21,43) , İlkokul 4. Sınıf (f=3, %21,43) ve öğretmen (f=3, %21,43) ile çalışıldığı sonucuna ulaşılmıştır. Öğretmen Adayı (f=1) ve Veli( f=1) ile olan çalışmaların araştırma makalesi olarak yapılmıştır.

Tablo 8 zekâ oyunu çalışmasında elde edilen sonuçların dağılımını göstermektedir.

Tablo 8. Yapılan Çalışmalardaki Zekâ Oyunlarının Öğrenciler Üzerindeki Sonuçları

| Zeka Oyunlarının Öğrenciler Üzerindeki Sonuçları | | Yüksek Lisans Tezi | Araştırma Makalesi | Toplam | |
|---|---|---|---|---|---|
| Sonuçlar | | f | f | f | % |
| Bilişsel Etkileri ile İlgili Sonuçlar | Akademik başarılarını artırır. | 1 | 4 | 5 | 13,51 |
| | Düşünme becerilerini geliştirir. | 1 | 3 | 4 | 10,81 |
| | Problem çözme becerisini geliştirir. | 1 | 1 | 2 | 5,40 |
| | Denge, ince-motor gelişimlerine katkı sağlar. | 1 | 1 | 2 | 5,40 |
| | Hızlı hareket etme becerisi gelişir. | 1 | 1 | 2 | 5,40 |
| | Okuduğunu anlama becerisi gelişir. | 2 | - | 2 | 5,40 |
| | Üst düzey düşünme becerisi gelişir. | 1 | - | 1 | 2,70 |
| | Zihinsel beceri düzeyleri gelişir. | - | 1 | 1 | 2,70 |
| | Muhakeme becerileri gelişir. | - | 1 | 1 | 2,70 |
| Duyuşsal Etkileri ile İlgili Sonuçlar | Paylaşma, işbirliği, yardımlaşma duyguları gelişir. | 2 | 1 | 3 | 8,10 |
| | Özgüvenleri gelişir. | 1 | 2 | 3 | 8,10 |
| | Motivasyonlarını artırır. | 1 | 1 | 2 | 5,40 |
| | Okuma tutumları gelişir. | 1 | - | 1 | 2,70 |
| | Sorumluluk duyguları gelişir. | 1 | - | 1 | 2,70 |
| | Kişilik gelişimlerine katkı sağlar. | 1 | - | 1 | 2,70 |
| | Empati becerisi gelişir. | - | 1 | 1 | 2,70 |
| | Derslere aktif katılım sağlar. | - | 1 | 1 | 2,70 |
| | Başarısızlık hissiyle baş etmesine yardımcı olur. | - | 1 | 1 | 2,70 |
| | Okul ortamındaki doyumlarını artırır. | - | 1 | 1 | 2,70 |
| | Karar verme becerilerini geliştirir. | - | 1 | 1 | 2,70 |
| | Sabırlı davranış gösterme becerisini olumlu etkiler. | - | 1 | 1 | 2,70 |

Tablo 8'de zekâ oyunun öğrencilerle ilgili sonuçlarını görülmektedir. Buradaki sonuçlarda, oyunların öğrencinin bilişsel ve duyuşsal durumlarıyla ilgili olmak üzere iki alt başlık olarak sunulmuştur. Araştırmaların genelinde çeşitli etkiler olduğu görülmektedir. Oyunların öğrenciler üzerindeki etkisi incelendiğinde bunun yaklaşık %54,02'sinin öğrencilerin bilişsel durumları üzerindeki etkisiyle ilgili olduğu görülmekrtedir.

Bilişsel etkilerinin %54,02 oluşturduğu bölümde, araştırma makalelerin sonuçları yaklaşık %60' ını oluştururken, yaklaşık %40'ı ise yüksek lisans tez çalışmalarının olduğunu görmekteyiz. Yüksek lisans tezleri ile araştırma makaleleri arasındaki yüzdelerdeki fark, araştırma makalelerinden daha az yüksek lisans tezi bulunmasından kaynaklanmaktadır. Sonuçların bilişsel etkileri açısından incelendiğinde öğrencilerin akademik başarılarını artırır (f=5) ve düşünme becerilerini geliştirir (f=4) maddelerinin daha çok yer aldığı görülmektedir. Buradaki iki sonucun payı yaklaşık %24,32 olarak görülmektedir. Bilişsel etkilerine dair sonuçlar da problem çözme becerisini geliştirir(f=2),okuduğunu anlama becerisi gelişir (f=2), hızlı hareket etme becerisi gelişir(f=2),denge, ince-motor gelişimlerine katkı sağlar(f=2) olarak devam ettiği görülür. Yazılan bu dört sonucun payı ise yaklaşık %21,6'dır. Buradaki %21,6'lık payın yüksek lisans tezleri yaklaşık %62,5'ini, araştırma makaleleri ise yaklaşık %37,5'ini oluşturmaktadır. Tablo 8 incelediğimizde oyunların öğrenciler açısından duyuşsal etkilerinin yaklaşık % 45,98 olduğu görülür. Duyuşsal etkilerinin %45,98 olduğu bölümde ise araştırma makalelerindeki pay yaklaşık

%58,82'tir. Yaklaşık %41,17'de ise yüksek lisans tezlerine ait olan çalışmalardır. Duyuşsal etkileri açısından bakıldığında paylaşma, işbirliği, yardımlaşma duyguları gelişir (f=3), Özgüvenleri gelişir (f=3) sonuçları ön plana çıkmaktadır. Bu sonuçları motivasyonlarını artırır (f=2) maddesiyle devam etmektedir. Buradaki üç maddenin payı duyuşsal etkilerin geneline göre yaklaşık %47,05 olarak bulunmuştur. %47,05 payındaki yüksek lisans tezleri yaklaşık %50'sini diğer %50'sini de araştırma makaleleri oluşturmaktadır.

Tablo 9. Zekâ Oyunlarıyla İlgili Programa Yönelik Öğretmen Görüşleri Açısından Sonuçları

| Zekâ Oyunlarıyla İlgili Programa Yönelik Görüşlerin Sonuçları | Yüksek Lisans Tezi | Araştırma Makalesi | Toplam | |
|---|---|---|---|---|
| | f | f | f | % |
| Ayrı bir ders olarak verilmelidir. | - | 2 | 2 | 18,18 |
| Seçmeli zekâ oyunları dersi zorunlu olmalıdır. | - | 2 | 2 | 18,18 |
| Materyal eksikliği var. | - | 1 | 1 | 9,09 |
| Zekâ oyunları ile ilgili eğitimler sınırlı kalmıştır. | - | 1 | 1 | 9,09 |
| Oyunlar kazanımlarla bağlantılı değildir. | - | 1 | 1 | 9,09 |
| Oyunlar sınıflandırılmamıştır. | - | 1 | 1 | 9,09 |
| Eğitimlerde oyunların nasıl öğretileceği öğretilmiyor. | - | 1 | 1 | 9,09 |
| Program güncel değil | - | 1 | 1 | 9,09 |
| Program sınıf seviyelerine uygun değil | - | 1 | 1 | 9,09 |

Tablo 9'da seçmeli zekâ oyunları dersi ve bu derse ait programla ilgili öğretmen görüşlerini içeren sonuçlara yer verilmiştir. Yapılmış olan çalışmalarda ayrı bir ders olarak verilmelidir (f=2), seçmeli zekâ oyunları dersi zorunlu olmalıdır (f=2) sonuçları öne çıkmaktadır. Elde edilen sonuçlara baktığımızda yaklaşık %36,36 'lık bir pay aldığını ve bunların araştırma makalelerine ait olduklarını görmekteyiz. Araştırılan yüksek lisansa ait çalışmalarda bu başlığa ait bir sonuca ulaşılamamıştır. Programla ilgili öğretmen görüşlerine ilişkin sonuçlar incelendiğinde materyal eksikliği var, zeka oyunları ile ilgili eğitimler sınırlı kalmıştır, oyunlar kazanımlarla bağlantılı değildir, oyunlar sınıflandırılmamıştır, eğitimlerde oyunların nasıl öğretileceği öğretilmiyor, program güncel değil, sınıf seviyelerine uygun değil şeklinde 7 sonuca ulaşılmıştır. Buradaki 7 maddenin frekansı ise 1'dir.

Tablo 10 zekâ oyunu konusunda ilkokul için yapılmış olan araştırmalarda bahsedilen önerileri göstermektedir.

*Tablo 1. Yapılan Çalışmalarda Verilen Öneri Dağılımları*

| Verilen Öneri | Yüksek Lisans Tezi | Araştırma Makalesi | Toplam | |
|---|---|---|---|---|
| | f | f | f | % |
| Oyunlarla ilgili eğitimler, seminerler verilmelidir. | 3 | 4 | 7 | 18,92 |
| Öğrencilere yönelik kitaplar veya elektronik yazılımlar hazırlanmalıdır. | 2 | 1 | 3 | 8,10 |
| Okullarda zekâ oyunları sınıfları açılabilir. | 1 | 2 | 3 | 8,10 |
| Öğretmen ve öğrenci görüşleri için nitel ve nicel çalışmalar yapılabilir. | 1 | 2 | 3 | 8.10 |
| Grubun hazır bulunuşluğu dikkate alınmalıdır. | 1 | 2 | 3 | 8,10 |

| | | | |
|---|---|---|---|
| Öğretmenler sözel beceri oyunlarını oynatmaları sağlanabilir. | 1 | 1 | 2 | 5,41 |
| Yerel, ulusal, uluslar arası zekâ oyunları yarışmaları düzenlenebilir | 1 | 1 | 2 | 5,41 |
| Zekâ oyunlarının derslere yönelik tutumları üzerinde etkisi incelenebilir. | 1 | 1 | 2 | 5,41 |
| Öğretmen ve öğretmen adaylarının farkındalığı artırılmalıdır. | 1 | 1 | 2 | 5,41 |
| Zekâ oyunlarının her sınıf düzeyinde zorunlu bir ders olması önerilir. | 1 | 1 | 2 | 5,41 |
| Sınıflarda zekâ oyun köşeleri oluşturulabilir. | - | 2 | 2 | 5,41 |
| Serbest etkinlik derslerinde kolay ulaşılabilir zekâ oyunları öğretilebilir. | - | 2 | 2 | 5,41 |
| Oynamaları için öğrenciler ve veliler teşvik edilebilir. | - | 2 | 2 | 5,41 |
| Materyal desteği sağlanmalıdır. | 1 | - | 1 | 2,70 |
| Türkçe derslerinde düşündürücü sorulara yönlendirilebilir. | 1 | - | 1 | 2,70 |

Tablo 10'daki önerilere bakıldığında, sunulan önerilerin yaklaşık %59,45'i araştırma makalesi iken yüksek lisans tezleri için öneri oranı yaklaşık %40,54'tür.Yüksek lisans tezlerindeki öneri oranı, araştırma makalelerinin oranından düşük olduğu görülmektedir.

Tablo 10 incelendiğinde ilk sırada oyunlarla ilgili eğitimler, seminerler verilmelidir (f=7) olarak öne çıkmaktadır. Bu çalışmalardan araştırma makalesi (f=4) , yüksek lisans tezi (f=3) olarak görülmektedir. Tablo 9'daki 2. Sırada yer alan öğrencilere yönelik kitaplar veya elektronik yazılımlar hazırlanmalıdır, okullarda zekâ oyunları sınıfları açılabilir, öğretmen ve öğrenci görüşleri için nitel ve nicel çalışmalar yapılabilir, grubun hazır bulunuşluğu dikkate alınmalıdır şeklinde 4 öneri maddesi yer almaktadır ve bu 4 öneri maddesinin frekansı 3'tür.

Sınıflarda zekâ oyun köşeleri oluşturulabilir ( f=2), serbest etkinlik derslerinde kolay ulaşılabilir zekâ oyunları öğretilebilir (f=2) ve oynamaları için öğrenciler ve veliler teşvik edilebilir (f=2) öneri maddelerinin araştırma makalelerine ait olduğu görülmektedir. Yüksek lisans tezi çalışmalarında bu maddeleri içeren öneriler görülmemektedir.

Materyal desteği sağlanmalıdır (f=1), Türkçe derslerinde düşündürücü sorulara yönlendirilebilir (f=1) önerilerinin yüksek lisans tezlerine ait çalışmalarda yer almaktadır. Aynı şekilde araştırma makalelerinde bu maddelerle ilgili öneriler görülmemektedir.

## Sonuçlar

Eğitimde zekâ oyunlarına olan ilginin ve önemin artmasıyla birlikte farklı disiplinlerde birçok araştırmaya konu olmuştur. Bu çalışmada zekâ oyunlarının ilkokullar için yapılan araştırmaların incelenerek çeşitli açılardan analizi yapılmıştır. Bu sebeple 12 tane çalışma bulunmuştur. Bunlardan 8 tanesi araştırma makalesi, 4 tanesi de yüksek lisans tezi olan çalışmalardır. Çeşitli açılardan analizi yapılan çalışmaların türü, yayın yılı, amacı, yöntemi, kullanılan araştırma deseni, çalıştığı grup, veriler için toplanan araç, çıkarılmış olan sonuçlar ve verilen öneriler açısından incelenmiştir.

İlkokulda zekâ oyunları konusunda incelenen çalışmaların türlerine bakıldığında araştırma makaleleri büyük çoğunluğu oluştururken, bu konudaki yüksek lisans tezleri azdır. Bu konuda 4 yüksek lisans tezi ve 8 araştırma makalesi bulunmaktadır. Yapılan çalışmalar karşılaştırıldığında yüksek lisans tezlerinde son yıllarda daha çok kullanılan bir konu olduğu için daha az sayıda görülmüş olabilir.

Çalışmaların yapıldığı yılların dağılımları incelendiğinde zekâ oyunları konusunda 2016 yılında araştırma makalesi olarak görülmektedir. Çalışma yılları açısından incelerken 2016 yılında Türkiye'de zekâ oyunları

konusunda ilkokullar için yapılmış yüksek lisans tez çalışmasının olmadığı tespit edilmiştir. Çalışmaların olduğu yıllar 2016-2022 yılları olarak görülmektedir.2018 yılında bu alanda bir çalışma bulunmamıştır. Bu konuda ilkokullar ile ilgili yapılan çalışmaların 2019 yılından itibaren arttığı görülmektedir. İlkokullar için yapılan çalışmaların genelinde 2019 yılından sonra %83,34 oranında araştırma bulunmuştur dolayısıyla bu tarihten itibaren Türkiye'de bu konuyla ilgili farkındalığın arttığını söyleyebiliriz. 2012-2013 yılından itibaren ortaokullarda seçmeli zeka oyunları dersinin programa konulması ve derslerde kullanılması, ilkokullarda da zeka oyunları konusunda bir farkındalik geliştirmiş olabilir.

Araştırma amaçlarına yönelik yapılan çalışma sayısına bakıldığında, araştırma sayısı arttıkça araştırma amaçlarının da çeşitlendiği görülmektedir. Anlaşılan o ki ilkokulda bu konuyla ilgili oyunlara yönelik araştırmalar arttıkça çalışmayı yapanların farklılaşma eğiliminde olduğunu, hedef alanlarında genişleme olduğunu söyleyebiliriz. Zeka oyunları üzerine yapılan çalışmaların analizi, çoğu çalışmanın zeka oyunlarının birçok değişken üzerindeki etkilerini araştırdığını ortaya çıkardı. Buradaki farklı değişkenler incelendiğinde üç boyutlu düşünme yetisi, okuduğunu anlama becerisi, problem çözme yeteneği gibi değişkenler ön plana çıkmaktadır. Bu değişkenlere ek olarak öğretmen görüşleri, öğrenci ve veli görüşleri açısından da değerlendirilen çalışmaların olduğunu görmekteyiz. Serbest zamanlarında ya da okullardaki kurulan atölyelerde oynatılan bu oyunların öğrencilere yansıması açısından öğretmen görüşlerinin alınmasının önemli görüldüğü düşünülebilir.

İncelenen çalışmaların araştırma yöntemine ilişkin sonuçlara bakıldığında ilkokullardaki çalışmalarda ağırlıklı olarak nitel ve nicel araştırma yöntemlerinin kullanıldığı görülmektedir. Nicel araştırmaların nitel araştırmalardan daha fazla kullanıldığını görmekteyiz. Zeka oyunlarının birçok değişken üzerindeki etkilerinin açıklığa kavuşturulması amaçlanan çalışmaların yapılan araştırmalarda nicel çalışmaların daha yoğun bir şekilde uygulandığı düşünülmektedir. Araştırma kapsamında incelenen 12 çalışmada nitel yöntem olarak sadece 1 yüksek lisans tezinde tercih edilmiştir. Yapılan çalışmalarda nitel araştırma yöntemi kullanılması toplamda az görülmesine karşılık araştırma makalelerinde nicel ve nitel yöntemler olarak eşit sayıda (f=4) görülmektedir. Bu bağlamda nicel araştırma yöntemleri kadar nitel araştırma yöntemlerinin de önemli olduğu kabul edilmekte ve araştırmalarımızda nitel araştırma yöntemlerinin eşit oranda kullanılması araştırmamızı desteklemektedir.

Zeka oyunlarının ilkokullar için yapılan çalışmaları incelendiğinde çoğunun nicel bir yaklaşımla deneysel araştırma tasarımlarını seçtiğini ortaya çıkardı. Deneysel araştırma desenleri, değişkenleri ölçmek, bunların aralarındaki nedensel ilişkileri çıkarmak amacıyla kullanılır (Çepni,2014).Bu açıdan bakıldığında, zekâ oyunları ile çeşitli değişkenler arasındaki ilişkiyi inceleyen çalışmaların deneysel araştırma desenlerinin kullanılmasına yol açmıştır diyebiliriz.

Araştırmada ilkokulda zekâ oyunları ile ilgili incelenen 12 çalışmada birçok farklı veri toplama aracından yararlanıldığı görülmüştür. İncelenen çalışmalarda görüşme formu en çok tercih veri toplama aracı olmuştur. Bunun sebebi de daha çok nicel araştırma yönteminin seçilip deneysel desen olan araştırma deseninden olması ile açıklanabilir. Araştırma türlerinde 2. Sırada en çok kullanılan ölçekler yer almaktadır. Nicel araştırma, gözlemler, görüşmeler, belge tarama, testler ve ölçekler dâhil olmak üzere çeşitli yollarla veri toplayabilir. Sosyal ve eğitim bilimlerinde ise ölçekler ve anketler nicel araştırmalar için bir veri toplama aracı olarak kullanılır ( Yılmaz,2020). Ölçekler, bir olayı, olguyu, nesneyi, varlıkların belirli özelliklerinin sayısallaştırılması (ölçümlere dayalı olarak) tanımlamayı/ belirmeyi sağlar (Bayat,2014).Bu doğrultuda çalışmalarda ölçek kullanılması yapılan araştırmaların güvenirliğini artırmak için seçilen bir veri toplama aracı olabilir.

İlkokulda zekâ oyunları ile ilgili yapılan çalışmalarda çalışılacak grupların eğitim düzeyi ya da öğretim kademesi açısından dağılımları incelendiğinde en çok ilkokul 3. Ve 4. Sınıf ile yapılan çalışmalar ve öğretmen görüşlerine yer verilmiştir. Yüksek lisans tezlerinde ve araştırma makalelerinde bu sınıf düzeylerinde çalışmalar ve öğretmen görüşlerinin alındığı görülmektedir. Yapılan çalışmalarda daha çok ilkokul 3. ve 4. Sınıf seviyelerinin seçilmesi, o sınıf düzeyindeki öğrencilerin bilişsel özellikler açısından daha elverişli olmasından kaynaklanıyor olabilir. Araştırmalarda öğrenci, veli, öğretmen adaylarının görüşleri görülse de öğretmen görüşleri daha çok tercih edilmiş. 2012-2013 yılı eğitim dönemi itibariyle ortaokullarda seçmeli zeka oyunları etkinliğinin programa ders olarak girmesinin ardından öğretmenler, ilkokullarda da serbest etkinlik saatlerinde zekâ oyunları oynatabilmektedir. Bu etkinliklerin yararları, zorlukları hakkındaki öğretmen görüşleri önemlidir. Bu görüşler sayesinde ilkokullarda da seçmeli ders şeklinde zekâ oyunları programa eklenebilir.

İlkokulda zekâ oyunları ile ilgili yapılan çalışmalarda ulaşılan sonuçları açısından bakıldığında bilişsel etkilerinin ve duyuşsal etkilerinin olacak şekilde iki grupta değerlendirilmiştir. Bilişsel etkileri açısından en çok; akademik başarıları artırdığı ve düşünme becerilerini geliştirdiği sonuçlarına ulaşılmıştır. İncelenen çalışmalarda öğrencilerin akıl yürütme beceriler, akademik performansları, zihinsel gelişim, uzamsal beceriler, görsel biliş, kritik düşünebilme yetisi, problem çözme yeteneği, yaratıcı düşünme yetisi, konsantrasyon, odaklanma şeklinde değişkenlerin etkileri araştırıldığı görülmektedir. Buna bağlı olarak akademik başarılar artırdığı, düşünme becerileri geliştirdiği, üst düzey düşünme becerilerini geliştirdiği, zihinsel beceri düzeylerini geliştirdiği sonuçlarının çıkması öğrencilerde zekâ oyunları ile ilgili bilişsel alandaki gelişimlerine katkı sağladığı

söylenebilir. Duyuşsal alandaki etkilerine baktığımızda ise; paylaşma, işbirliği, yardımlaşma duyguları gelişir ve özgüvenleri gelişir sonuçlarına iki türde de eşit olarak ulaşılmaktadır. Duyuşsal amaçla yapılan çok az çalışma bulunmaktadır. Aslında daha çok bilişsel gelişim alanında yapılmak istenen çalışmalardan çıkan sonuçlar, bilişsel alandaki gelişimlerini desteklemesinin yanında duyuşsal alandaki gelişimlere de katkı sağlanıldığını söyleyebiliriz. Öğretmen görüşleri için öğrenciler için olan sonuçlarının yanında zeka oyunları seçmeli ders şeklinde programa eklenmesi açısından da sonuçlar alınmış. Yüksek lisans tezlerinden buna ait bir sonuç bulunmamaktadır. Bu dersin henüz ilkokul programlarına eklenmemesi sebebiyle böyle bir çalışma ele alınmamış olabilir. Araştırma makalesine ait olan sonuçta ise ayrı bir ders olarak verilmesi gerektiği ve seçmeli zekâ oyunları dersi zorunlu olmalıdır görüşü en önde çıkan 2 sonuç olmuştur.

İlkokullarda zekâ oyunları ile ilgili yapılmış olan çalışmalarda verilen öneriler incelendiğinde en çok oyunlarla ilgili eğitimler, seminerler verilmesi gerektiği yönündedir. İlkokullarda da zekâ oyunları etkinliklerinin önemi arttıkça bu alanda duyulan eksiklikler fark edilmiş olup bu eksikliklerin giderilmesi adına bu öneri verilmiş olabilir. Diğer öneriler, öğrencilere yönelik kitaplar ve elektronik yazılımlar hazırlanmalıdır; öğrencilerin hazır bulunuşluğu dikkate alınmalıdır, şeklinde devam etmektedir. Burada da ilkokullarda zekâ oyunları ile ilgili etkinliklerin artmasıyla öğrencilerde bu alandaki eksiklikler fark edilip bu eksikliklerin giderilmesi adına öneriler verilmiş olabilir. Okullarda zekâ oyunları sınıfı açılmalıdır önerisi de dikkat çekici boyuttadır. Yapılan çalışmaların sonuçlar kısmındaki ayrı bir ders olarak verilmesi ve seçmeli zekâ oyunları dersi zorunlu dersi zorunlu olması gerektiği görüşü; burada okullarda zekâ oyunları sınıfı açılmalıdır önerisiyle birbirini destekler niteliktedir.

Öneriler

- Yapılan çalışmalar daha çok ortaokul öğrencilerine yönelik olduğu görülmüştür. İlkokullarda zekâ oyunları ile ilgili çalışmalara daha sınırlı yer verilmiştir. Bu alanda da yeterli düzeyde çalışma yapılmalıdır.
- İlkokullar için yapılan araştırmalarda daha çok 3. ve 4. sınıftaki öğrencilerle çalışıldığı görülmektedir. İlkokul 1. ve 2. Sınıf düzeylerindeki öğrenci seviyelerine uygun olarak çalışmalar düzenlenebilir.
- Genel olarak bu çalışmaların geniş bir evrende dar örneklemler üzerinde yapıldığını görmekteyiz. Bu noktada örneklemler daha geniş ve heterojen gruplar üzerinde yapılması araştırmaların sonuçlarını gerçekçi kılarak projeye daha fazla katkı sağlayabilir. Bu bağlamda araştırmaların seçilen desenleri çeşitlendirilebilir.
- Yapılan analiz sonucunda ilkokullar için zekâ oyunlarıyla ilgili çalışmalar daha çok araştırma makalesi yönünde yapıldığı görülmüştür. Yüksek lisans tezlerinde ve doktora tezlerinde de bu doğrultuda yeterli çalışma yapılmalıdır.
- Araştırmaların çeşitlenmesi adına akademisyenlere konunun önemini anlatan tanıtımlar, seminerler düzenlenebilir. Bu alandaki eksiklikler ile ilgili çalışmalar yapılması önerilebilir.
- Yapılan araştırmalarda veli görüşlerine az da olsa yer verilmektedir. Hâlbuki aileler bu oyunları okul dışında da çocuklarıyla birlikte vakit geçirmek için tercih etmektedirler. Bu anlamda velilerin görüşleri de oldukça kıymetlidir. Araştırmalarda veli görüşlerine ait çalışmalar artırabilir. Yine bu şekilde de örneklemler genişleyerek çalışmalara şeffaflık sağlayabilir.

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# Uzaktan Eğitim Merkezlerinin Web Sitelerinin Çeşitli Etik İlkeler Bağlamında İncelenmesi

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## Abstract

This study was conducted to examine the websites of distance education implementation and research centers (UZEM) established in foundation universities in Turkey within the context of various criteria related to ethical principles. The research adopted a qualitative approach, and document analysis technique was applied. In data collection, the "Faculties/Institutes/Vocational Schools/Research and Application Centers" section under the "unit statistics" tab of the Higher Education Information Management System page was filtered to identify existing distance education implementation and research centers in Turkey. Accordingly, there are a total of 173 UZEMs in Turkey, 123 of which are state universities, and 50 are foundation universities. In the scope of this study, the UZEM websites of 50 foundation universities were examined based on a seven-item checklist developed by the researchers to obtain data. Content analysis technique was employed for data analysis. The majority of UZEMs are located in Istanbul, and most of them were established during the COVID-19 process. None of the websites shared netiquette rules, and there were no senate decisions regarding the operations to be conducted within the UZEMs of the institutions.

**Keywords:** Distance education implementation and research centers, Distance education, Ethical principals, Websites.

## Özet

Bu çalışma Türkiye`deki vakıf üniversitelerinde kurulan Uzaktan Eğitim Uygulama ve Araştırma Merkezlerinin (UZEM) web sitelerinin etik ilkelere ilişkin çeşitli kriterler bağlamında incelenmesi amacıyla gerçekleştirilmiştir. Nitel araştırma yaklaşımının benimsendiği araştırmada doküman analizi tekniği kullanılmıştır. Verilerin toplanmasında öncelikle Yüksek Öğretim Bilgi Yönetim Sistemi sayfasının "birim istatistikleri" sekmesi altındaki "Fakülteler/Enstitüler/YO/MYO/Arş.Uyg.Merkezleri" bölümü filtrelenerek mevcut uzaktan eğitim uygulama ve araştırma merkezleri belirlenmiştir. Buna göre Türkiye'de 123`ü devlet ve 50`si vakıf olmak üzere toplam 173 üniversitede UZEM bulunmaktadır. Bu çalışma kapsamında 50 vakıf üniversitesinin UZEM web siteleri araştırmacılar tarafından geliştirilen yedi maddelik bir kontrol listesine göre incelenerek veriler elde edilmiştir. Verilerin analizinde içerik analizi tekniği kullanılmıştır. Buna göre, UZEM'lerin çoğu İstanbul'dadır ve COVID-19 sürecinde kurulmuştur. Web sitelerinin hiçbirinde netiket kuralları paylaşılmamıştır ve kurumların UZEM bünyesinde yürütülecek işlemlere ilişkin alınmış senato kararları bulunmamaktadır.

**Anahtar kelimeler:** Uzaktan eğitim uygulama ve araştırma merkezi, UZEM, Uzaktan eğitim, etik, web sitesi

## Giriş

Uzaktan eğitim uygulama ve araştırma merkezlerinin (UZEM), üniversiteler için önemi her geçen gün artmaktadır çünkü bu merkezler, erişilebilir, esnek ve nitelikli yüksek öğrenimi farklı özelliklere sahip ulusal ya da küresel öğrenci kitlesine sunma misyonlarını desteklemekte önemli bir rol oynar. Bu merkezler, dijital teknolojileri ve çevrimiçi öğrenme platformlarını kullanarak geniş bir yelpazede lisans ve lisansüstü programlar sunarak öğrencilerin akademik hedeflerine ulaşmalarını sağlar. UZEM`lerin temel rollerinden biri, coğrafi veya zaman kısıtlamaları nedeniyle geleneksel yüz yüze derslere katılamayan bireylerin öğretime erişimini artırmaktır. Uzaktan eğitim, uzak ve hizmete erişimi zor bölgelerde yaşayan öğrencilere, üniversitelerin sunduğu nitelikli eğitim programlarına katılma imkanı sunar (Çakır & Göktaş, 2018). Bu kapsayıcılık, eğitimin daha geniş bir kitleye ulaşmasını sağlayarak, bireylerin bilgi ve beceri kazanmak suretiyle sosyal ve ekonomik gelişime katkıda bulunmalarına olanak tanır.

UZEM`ler, ayrıca, çeşitli öğrenci popülasyonunun değişen ihtiyaçlarına hitap etmeyi hedefler. Kariyerlerini geliştirmek isteyen halihazırda çalışan bireyler, ailevi sorumlulukları olan kişiler ve fiziksel engeli olan öğrenciler uzaktan eğitimi akademik hedeflerine uygun bir seçenek olarak değerlendirebilirler (Altıner, 2019). Bu bakımdan UZEM`ler, öğrenci kitlesinin çeşitliliğine katkıda bulunur ve farklı yaşam tarzları ve koşullarına uygun bir öğrenme ortamı sağlar. UZEM`ler aynı zamanda yaşam boyu öğrenme ve sürekli mesleki gelişimi teşvik eden platformlar olarak işlev görür. Sertifika programları, kısa süreli eğitimler ve alan dışı kurslar sunarak bireylerin yaşamları boyunca yeni beceriler ve bilgi edinmelerine olanak tanır (Yıldırım ve Yılmaz, 2019). Yaşam boyu öğrenme, hızla değişen küresel bilgi ekonomisinde önemli bir gerekliliktir ve UZEM`ler, uygun eğitim kaynaklarına erişimi kolaylaştırarak bu alandaki önemli ihtiyaçları karşılarlar.

UZEM`lerin bir diğer rolü de yüksek öğrenimde dijital teknolojilerin entegrasyonunu ve yenilikçi pedagojileri teşvik etmesidir. Çevrimiçi platformlar, sanal sınıflar ve etkileşimli öğrenme materyalleri gibi dijital araçları kullanarak öğretenler dinamik ve etkileşimli bir öğrenme deneyimi oluşturabilirler (Açıkgöz, 2019). Bu pedagojik dönüşüm, dijital çağda başarı için elzem görülen öğrencilerin aktif katılımı, işbirliğine dayalı öğrenme ve dijital yeterlilik becerileri gibi temel niteliklerin gelişimini teşvik eder.

Öte yandan, etik ilkeler, eğitim kurumlarının ve eğitmenlerin etik davranışlarını sağlamanın yanı sıra sanal öğrenme ortamında öğrencilerin haklarını ve refahını korumak açısından hayati önem taşımaktadır. Bu doğrultuda bir UZEM`in web sitesi, gizliliğin korunması, erişilebilirlik, akademik dürüstlük, şeffaflık, telif hakkı uyumluluğu ve siber güvenliği kapsayan çok önemli etik unsurları bünyesinde barındırmalıdır. Bu web siteleri, söz konusu etik standartları koruyarak, destekleyici bir çevrimiçi öğrenme ortamını teşvik etmek ve tüm kullanıcılarının refahını ve memnuniyetini sağlamakla yükümlüdür (Dunleavy ve Dede, 2019). Bunun yanı sıra, bir UZEM`in web sitesi, etik açıdan kullanıcıların gizliliğini ve kişisel bilgilerini korumaya en yüksek önceliği vermek durumundadır. Güvenli veri depolamanın sağlanması, veri işleme için bilgilendirilmiş onam alınması ve kritik veri koruma önlemlerinin uygulanması, kullanıcı güvenini teşvik etmek ve etik normlara uyumu sağlamak için önemlidir (Hogge, 2019). Nitekim Avrupa Birliği Genel Veri Koruma Yönetmeliği (GDPR) gibi yasal çerçeveler, kişisel verileri korumanın öneminin altını çizmektedir (Avrupa Komisyonu, 2018).

Etik ilkelerden bir diğeri, UZEM web sitelerinin engelliler de dahil olmak üzere tüm kullanıcılar için erişilebilirliği benimsemesini gerektirir. Web İçeriği Erişilebilirlik Yönergeleri (WCAG) gibi web erişilebilirlik standartlarına bağlı kalmak, görsel, işitsel veya motor bozukluğu olan bireylerin web sitesinin içeriğine sorunsuz bir şekilde erişebilmesini ve etkileşimde bulunabilmesini sağlar (World Wide Web Consortium, 2018). Kapsayıcılığın benimsenmesi ilkesi, tüm öğrenciler için eşitlikçi eğitim fırsatları sunma konusundaki etik taahhüdün altını çizmektedir. Öte yandan, akademik dürüstlüğün teşvik edilmesi, uzaktan eğitim alanında temel bir etik ilke teşkil eder. Web sitesi, özgünlüğün, uygun alıntı yapmanın ve intihalden kaçınmanın önemini vurgulamalıdır (Academic Integrity Council, 2020). Akademik dürüstlüğün korunması, öğrencilerin başarılarının kendi kişisel çaba ve bilgileri üzerine kurulduğu adil ve dürüst bir öğrenme ortamı yaratır.

Telif hakkı yasalarına ve fikri mülkiyet haklarına saygı göstermek, bir UZEM`nin web sitesi için büyük önem taşır. Kurum, telif hakkıyla korunan materyalleri kullanmak için gerekli izinleri almalı ve kullanıcıları telif hakkına uygunluk, doğru atıf ve adil kullanım konularında eğitmelidir (Alemneh ve Alperin, 2017). Yaratıcıların çalışmalarına saygı göstermek, yaratıcılığın el üstünde tutulduğu ve korunduğu bir ortamı teşvik eder. Son olarak, etik yükümlülükler kullanıcıların verilerini yetkisiz erişime ve siber tehditlere karşı korumak için sıkı siber güvenlik önlemlerinin alınmasını zorunlu kılar. Veri bütünlüğünün sağlanması ve güvenli kimlik doğrulama yöntemlerinin kullanılması, çevrimiçi öğrenme platformunun genel güvenilirliğini güçlendirir (Vasquez & Saldaña, 2020).

Buna göre, bu araştırmada Türkiye`deki vakıf üniversitelerinde kurulan uzaktan eğitim uygulama ve araştırma merkezlerinin (UZEM) web sitelerinin yukarıda belirtilen etik ilkelere ilişkin çeşitli kriterler bağlamında incelenmesi amacıyla gerçekleştirilmiştir. Araştırmada şu sorulara cevap aranmıştır: Söz konusu kurumların web sitelerinde,

1. uzaktan eğitim yönetmeliği var mı?
2. Kişisel Verileri Koruma Kanunu (KVKK)`nun kuruma özel uyarlanmış versiyonu var mı?
3. aydınlatma metni var mı?
4. veri güvenliğine ilişkin açıklamalar var mı?
5. netiket kuralları var mı? Varsa neler?
6. kurumun UZEM bünyesinde yürütülecek işlemlere ilişkin alınmış bir senato kararı var mı?
7. KVKK veri sahibi başvuru formu paylaşılmış mı?

## Yöntem

### Araştırma Modeli

Nitel araştırma yaklaşımının benimsendiği bu çalışmada, doküman analizi tekniği kullanılmıştır. Doküman analizi, anlam çıkarmak, ilgili konu hakkında bir anlayış oluşturmak ve ampirik bilgi geliştirmek amacıyla basılı ve elektronik materyaller olmak üzere tüm belgelerin içeriğini titizlikle ve sistematik olarak analiz etmek, incelemek ve değerlendirmek için kullanılır (Watch, 2013; Corbin ve Strauss, 2008). Buna göre üniversitelerin uzaktan eğitim uygulama ve araştırma merkezlerinin web siteleri taranarak araştırma sorularını oluşturan etik öğeler bakımından sistematik olarak incelenmiştir.

### Örneklem

Araştırmanın örneklemini Türkiye'deki yükseköğretim kurumları içerisindeki "vakıf üniversitesi" özelliğini taşıyan kurumlar arasından uzaktan eğitim uygulama ve araştırma merkezine sahip olanları oluşturmaktadır. Örneklemin belirlenmesinde Yükseköğretim Kurumu (YÖK)'nun web sitesindeki Yükseköğretim Bilgi Yönetim Sistemi kullanılmıştır. Buradaki "birim istatistikleri" sekmesi altındaki "Fakülteler/Enstitüler/YO/MYO/Arş.Uyg.Merkezleri" bölümüne girilerek araştırma ve uygulama merkezleri kutucuğu işaretlendiriğinde toplamda 173 adet sonuçla karşılaşılmıştır. Bu sonuç "vakıf üniversitesi" olarak sınırlandırıldığında ise 50 adet kurumun ismine ulaşılmıştır. Bu 50 üniversiteden 5'inin UZEM web sitesi olmadığı tespit edilmesine karşın, bu kurumlara ait resmi web sitelerinin genelinde araştırma sorularına cevap aranmaya çalışılmıştır. Örneklemi oluşturan üniversitelerin listesi Tablo 1'de gösterilmiştir:

Tablo 1. Örneklemi oluşturan kurumlar.

| | |
|---|---|
| 1. ACIBADEM MEHMET ALİ AYDINLAR ÜNİVERSİTESİ | 26. İSTANBUL GEDİK ÜNİVERSİTESİ |
| 2. ALTINBAŞ ÜNİVERSİTESİ | 27. İSTANBUL GELİŞİM ÜNİVERSİTESİ |
| 3. ANKARA MEDİPOL ÜNİVERSİTESİ | 28. İSTANBUL KENT ÜNİVERSİTESİ |
| 4. ANTALYA BELEK ÜNİVERSİTESİ | 29. İSTANBUL KÜLTÜR ÜNİVERSİTESİ |
| 5. ANTALYA BİLİM ÜNİVERSİTESİ | 30. İSTANBUL MEDİPOL ÜNİVERSİTESİ |
| 6. ATAŞEHİR ADIGÜZEL MESLEK YÜKSEKOKULU | 31. İSTANBUL NİŞANTAŞI ÜNİVERSİTESİ |
| 7. AVRASYA ÜNİVERSİTESİ | 32. İSTANBUL RUMELİ ÜNİVERSİTESİ |
| 8. BAHÇEŞEHİR ÜNİVERSİTESİ | 33. İSTANBUL SAĞLIK VE TEKNOLOJİ ÜNİVERSİTESİ |
| 9. BAŞKENT ÜNİVERSİTESİ | 34. İSTANBUL ŞİŞLİ MESLEK YÜKSEKOKULU |
| 10. BEYKOZ ÜNİVERSİTESİ | 35. İSTANBUL TİCARET ÜNİVERSİTESİ |
| 11. BİRUNİ ÜNİVERSİTESİ | 36. İSTANBUL TOPKAPI ÜNİVERSİTESİ |
| 12. ÇAĞ ÜNİVERSİTESİ | 37. İSTANBUL YENİ YÜZYIL ÜNİVERSİTESİ |
| 13. ÇANKAYA ÜNİVERSİTESİ | 38. İSTİNYE ÜNİVERSİTESİ |
| 14. DEMİROĞLU BİLİM ÜNİVERSİTESİ | 39. İZMİR TINAZTEPE ÜNİVERSİTESİ |
| 15. DOĞUŞ ÜNİVERSİTESİ | 40. KONYA GIDA VE TARIM ÜNİVERSİTESİ |
| 16. FATİH SULTAN MEHMET VAKIF ÜNİVERSİTESİ | 41. KTO KARATAY ÜNİVERSİTESİ |
| 17. FENERBAHÇE ÜNİVERSİTESİ | 42. LOKMAN HEKİM ÜNİVERSİTESİ |
| 18. HASAN KALYONCU ÜNİVERSİTESİ | 43. MALTEPE ÜNİVERSİTESİ |
| 19. IŞIK ÜNİVERSİTESİ | 44. NUH NACİ YAZGAN ÜNİVERSİTESİ |
| 20. İBN HALDUN ÜNİVERSİTESİ | 45. OSTİM TEKNİK ÜNİVERSİTESİ |
| 21. İSTANBUL AREL ÜNİVERSİTESİ | 46. TOROS ÜNİVERSİTESİ |
| 22. İSTANBUL ATLAS ÜNİVERSİTESİ | 47. TÜRK HAVA KURUMU ÜNİVERSİTESİ |
| 23. İSTANBUL BİLGİ ÜNİVERSİTESİ | 48. UFUK ÜNİVERSİTESİ |
| 24. İSTANBUL ESENYURT ÜNİVERSİTESİ | 49. ÜSKÜDAR ÜNİVERSİTESİ |
| 25. İSTANBUL GALATA ÜNİVERSİTESİ | 50. YÜKSEK İHTİSAS ÜNİVERSİTESİ |

### Verilerin Toplanması ve Analizi

Verilerin toplanmasında öncelikle alanyazın taraması yapılarak uzaktan eğitim ve çevrimiçi ortamlara ilişkin etik ilkelerle ilgili araştırma yapılmış, elde edilen bilgiler ışığında UZEM'lerin web sitelerinde bulunması gereken etik öğelere ilişkin yedi maddeden oluşan bir kontrol listesi hazırlanmıştır. Bu maddeler aynı zamanda araştırma sorularını oluşturmaktadır. YÖK'ten elde edilen vakıf üniversiteleri listesindeki kurumların herbirinin UZEM web siteleri tek tek ziyaret edilerek ilgili kontrol listesi doğrultusunda incelenmiş, mevcut olan ya da olmayan özellikler bir Excel dosyasında listelenmiştir. Bu aşama tamamlandığında elde edilen veriler, yine Excel uygulaması üzerinde analiz edilerek görselleştirilmiştir.

## Bulgular ve Yorum

Türkiye'deki vakıf üniversitelerine bağlı uzaktan eğitim uygulama ve araştırma merkezlerinin web sitelerinin çeşitli etik ilkeler bağlamında incelenmesi amacıyla gerçekleştirilen bu araştırmanın örneklemini oluşturan kurumların illere göre dağılımına bakıldığında yarısından fazlasının İstanbul'da bulunduğu görülmektedir.

Tablo 2. İllere göre vakıf üniversitelerindeki UZEM sayıları.

| Yıllar | UZEM Sayıları |
|---|---|
| Ankara | 8 |
| Antalya | 2 |
| Gaziantep | 1 |
| İstanbul | 32 |
| İzmir | 1 |
| Kayseri | 1 |
| Konya | 2 |
| Mersin | 2 |
| Trabzon | 1 |
| **TOPLAM** | **50** |

Ayrıca Tablo 3'e göre bu kurumların yine yarısından fazlasının (n=30) COVID-19'a bağlı geçilen acil uzaktan eğitim sürecinde kurulduğu görülmektedir.

Tablo 3. Açılış yılına göre Vakıf Üniversitelerindeki UZEM sayıları.

| Yıllar | UZEM Sayıları |
|---|---|
| 2011 | 4 |
| 2013 | 5 |
| 2014 | 2 |
| 2015 | 4 |
| 2017 | 3 |
| 2018 | 1 |
| 2019 | 1 |
| 2020 | 26 |
| 2021 | 4 |
| **TOPLAM** | **50** |

UZEM web sitelerinin incelenmesi sonucu elde edilen bulgular, araştırma soruları bağlamında aşağıda sırasıyla verilmiştir:

**1. UZEM Yönetmeliği var mı?**
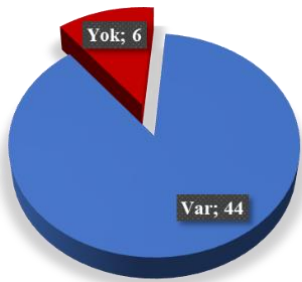


Merkezlerin kurulması için gerekli olan ve Resmi Gazetede ilan edilen yönetmelikler, bazı UZEM'lerin kendi sayfasında bazılarının ise bağlı bulunduğu kurumun ana sayfasında bulunmaktadır. 6 kurumda ise yönetmeliklere ilişkin bir bilgilendirmeye çevrimiçi resmi ortamda rastlanmamıştır..

Grafik 1. UZEM yönetmeliğine sahip olan kurumlar

## 2. Kurum için hazırlanan KVKK var mı?
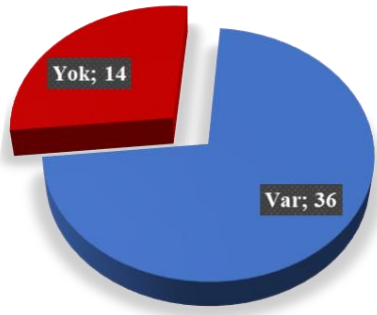


Kişisel Verilerin Korunması Kanunu'nun (KVKK, 2023a) amacı, kişisel verilerin işlenmesinde başta özel hayatın gizliliği olmak üzere kişilerin temel hak ve özgürlüklerini korumak ve kişisel verileri işleyen gerçek ve tüzel kişilerin yükümlülükleri ile uyacakları usul ve esasları düzenlemektir. Bu kanun ile kişisel verilerin işlenmesi, silinmesi, yok edilmesi, aktarılması vb. şartlar belirlenir. Uzaktan verilen eğitimlerde kullanıcıyı bilgilendirmek amacıyla kişisel verilerinin hangi amaçlar ve şartlar ile işlendiği aktarılmalıdır. Kurum sayfaları incelendiğinde bu bilgilendirmeler 36 kurumda bulunmaktadır. Ayrıca bu bilgilendirmelerin UZEM web sitelerinde değil kurumların ana sayfalarında yer aldığı ve mevcut kanunu temel alarak bazı kurumların kendine özgü uyarladığı görülmüştür.

Grafik 2. Kurum için hazırlanmış KVKK'ya sahip kurumlar

## 3. Aydınlatma metni var mı?
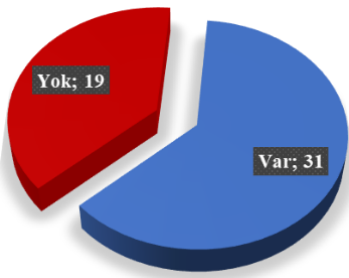


KVKK (2023b), kişisel verileri işlenen ilgili kişilere bu verilerinin kim tarafından, hangi amaçlarla ve hukuki sebeplerle işlenebileceği, kimlere hangi amaçlarla aktarılabileceği hususunda bilgi edinme hakkı tanımakta ve bu hususları, veri sorumlusunun aydınlatma yükümlülüğü kapsamında ele almaktadır. Bu kapsamda veri sorumlusu ilgili kanuna göre kişisel verilerin hangi amaçla işlendiği, kimlere ve hangi amaçla aktarılabileceği, kişisel verileri toplama yöntemi ve sebebi gibi bilgileri ilgili kişilere sağlamakla yükümlüdür. Kısaca, ilgili kişi, kişisel verilerinin işlendiği her durumda aydınlatılmalıdır. Bu kapsamda UZEM web siteleri incelendiğinde 31 kurumda aydınlatma metni yer alırken, diğerlerinde ilgili metne rastlanmamıştır.

Grafik 3. Aydınlatma metnine sahip olan kurumlar

## 4. Veri güvenliği açıklaması var mı?
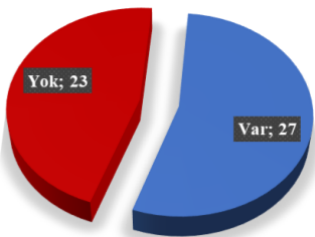


UZEM web siteleri incelendiğinde 27 kurumda veri güvenliğine ilişkin olarak açıklamalar yer almaktadır. Kurumlar bu açıklamaları KVKK'nın dışında ayrı bilgilendirme olarak paylaşmışlardır. Ancak bu bilgiler UZEM web sitelerinde değil kurumun ana sayfasında bulunmaktadır. 23 kurumda ise veri güvenliği konusunda ayrıca bir bilgilendirme bulunmamaktadır.

Grafik 4. Veri güvenliği açıklaması olan kurumlar

## 5. Netiket Kuralları var mı?

Alanyazında görgü/nezaket kuralları olarak da karşılık bulan netiket kavramı, internet sözcüğünün kısaltması anlamındaki "net" ile "etiket" sözcüklerinden türetilmiştir, ve çevrimiçi iletişim ve etkileşimlerde bireylerden beklenen etik ve saygılı davranışları içermektedir (Kaye, 1998). Netiket kuralları ile ilgili yapılan inceleme sonucunda öğrencilerin UZEM bünyesindeki her türlü süreç ve adımda uyması beklenen uygun davranış ve yaklaşımlara ilişkin herhangi bir bilgilendirme yapılmadığı görülmüştür.

### 6. Senato Kararı var mı?
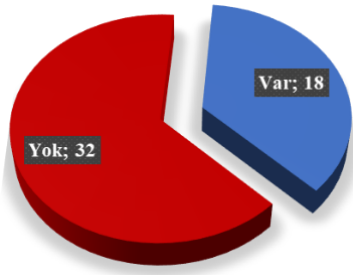


UZEM yönetmeliği ve Yükseköğretim Kurumlarında Uzaktan öğretime ilişkin usul ve esaslarının merkezin ve kurumun ihtiyaç ve amaçları doğrultusunda süreçleri düzenleyen senato kararları 18 kurumun web sitesinde yer almaktadır. Söz konusu senato kararları ise genellikle sınavların uygulanmasına ilişkin usul ve esasları kapsamaktadır.

Grafik 5. Senato kararları yayınlanan kurumlar

### 7. KVKK Veri sahibi başvuru (bilgi talep) formu var mı?
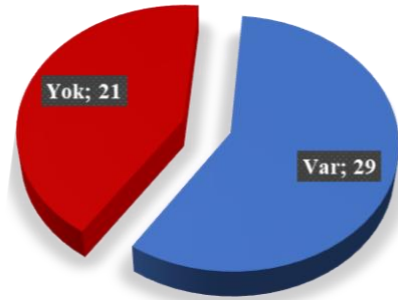


Veri sahiplerinin KVKK'da belirtilen haklarını kullanmak için yapacakları başvurularda kullanılması amacıyla oluşturulan başvuru formları 29 kurumunda sayfasında yer almaktadır. Bu form kurumların UZEM sitesinde değil, bağlı oldukları kurumun web sitesinde paylaşılmıştır.

Grafik 6. KVKK veri sahibi başvuru formu bulunan kurumlar

## Sonuç ve Öneriler

Türkiye'deki Uzaktan Eğitim Uygulama ve Araştırma Merkezlerinin (UZEM) web sitelerinin çeşitli etik ilkeler bağlamında incelenmesini hedefleyen bu araştırmada, bu merkezlerin güncel durumuna ortaya koyan dikkat çekici sonuçlara ulaşılmıştır. Buna göre, söz konusu kurumların çoğu COVID-19 pandemisi sonucu ülke genelinde ivedilikle geçilen acil uzaktan eğitim sürecinde kurulmuştur. UZEM web sitelerinin çoğunda kurumların uzaktan eğitim uygulama ve araştırma merkezi yönetmeliğinin paylaşılmasına karşın, neredeyse hiçbirinde UZEM bünyesinde yürütülecek işlemlere ilişkin alınmış bir senato kararı bulunmamaktadır. Kurumların tamamına yakını genel Kişisel Verileri Koruma Kanunu (KVKK) hükümlerini baz almış ve UZEM'in değil üniversitenin ana sayfasında bu kanun metnini paylaşmıştır. Az sayıda kurum ise KVKK'yı kendi kurumlarının özellik ve ihtiyaçları doğrultusunda yeniden düzenleyerek yine ana sayfalarında konumlandırmıştır. Ayrıca, incelenen UZEM web sitelerinin hiçbirinde netiket kuralları (internet görgü kuralları) ve bu kuralların ihlali durumunda uygulanacak yaptırımlar yer almamaktadır.

Araştırmada ulaşılan sonuçlar ışığında üniversite yetkilileri ve UZEM yöneticileri ile gelecekte gerçekleştirilecek araştırmalar için şu önerilerde bulunulabilir:

- Doğru, güvenilir bilgiye erişim için kurumların web sitelerinin güncel tutulması
- Kurumun KVKK'sı ve bu doğrultuda hazırlanan aydınlatma metni, veri güvenliği açıklaması ve veri sahibi başvuru formunun UZEM'lerin web sitelerinde da yer alması
- Uzaktan eğitimin açıklık ilkesi doğrultusunda UZEM yönetmeliği ile uzaktan öğretimin işleyişine ilişkin usul ve esaslara yönelik alınan senato kararlarının UZEM sayfasında paylaşılması
- Kişisel verilerin korunmasına yönelik bilgilendirmeler için KVKK metinlerinin yer alması
- Uzaktan eğitim sürecinde sağlıklı ve güvenli iletişim için kurumsal Netiket kurallarının belirlenmesi ve yayınlanması

- Devlet üniversitelerindeki UZEM'lerin web sitelerini etik unsurlar bakımından inceleyen araştırmaların yapılması
- UZEM'lerin web sitelerinin kullanılabilirlik ve tasarım gibi farklı özellikler bağlamında inceleyen araştırmaların yapılması önem arz etmektedir.

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# Doğal Felaketlerde Uzaktan Eğitimin Önemi: AÇEV Örneği

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## Özet

1993 yılında kurulan Anne Çocuk Eğitim Vakfı (AÇEV), ihtiyaç sahibi çocukları ve anne babalarını eğitim yoluyla destekleyen bir sivil toplum kuruluşudur. AÇEV doğal afetlerde faaliyetlerini kesintisiz olarak sürdürerek çocukların, anne ve babalarının yanlarında olmuştur. 2020 yılı pandemi salgınına kadar eğitim faaliyetlerini yüz yüze sürdüren AÇEV, o tarihten itibaren eğitimlerini uzaktan eğitim ile sürdürmektedir. 2023 depremi sonrasında bölgedeki çocukları, yaşadıkları zorlayıcı duygularla baş etmeleri konusunda desteklemek amacıyla "okuyanbirgelecek.org" platformuna yeni sesli kitaplar ekledi. Bu bildiriyi sunmadaki amaç uzaktan eğitim sistemlerinin yaygın kullanımına örnek oluşturmaktır. Bildirinin birinci kısmında STK, erken çocuk eğitimi ve uzaktan eğitimin teorileri yorumlanacaktır, ikinci kısmında AÇEV'in çeşitli uzaktan eğitim uygulamaları örneklendirilecek, son kısmında ise AÇEV'in uzaktan eğitim uygulamalarının ekonomiye olan katkıları değerlendirilecektir.

**Keywords**: Sivil toplum kuruluşu, erken çocukluk eğitimi, uzaktan eğitim, ekonomi

# The Importance of Distance Education in Natural Disasters: The Case of AÇEV

### Abstract

Founded in 1993, the Mother Child Education Foundation (MCEF - AÇEV) is a non-governmental organization that supports children in need and their parents through education. AÇEV has stood by children and their parents by continuing its activities uninterruptedly during natural disasters. AÇEV, which continued its education activities face-to-face until the pandemic epidemic of 2020, has been continuing its education with distance education since then. After the 2023 earthquake, it added new audiobooks to its "okuyanbirgelecek.org" platform to support children in the region to cope with the challenging emotions they experienced. The purpose of presenting this paper is to set an example for the widespread use of distance education systems. In the first part of the paper, the theories of NGOs, early childhood education and distance education will be interpreted, in the second part, various distance education applications of AÇEV will be exemplified, and in the last part, the contribution of AÇEV's distance education applications to economy will be evaluated.

**Keywords**: Non-governmental organization, early childhood education, distance education, economy

## Giriş

Sivil toplum kuruluşları (STK); siyasi otoriteden bağımsız bir biçimde, maddi menfaat beklemeden, bireylerin kendi özgür iradeleriyle örgütlenen, yasalara uygun olarak kurulan, toplumdaki sosyal problemi çözümünde sosyal inovasyon gerçekleştirmesi sonucunda sosyal değer yaratılmasıyla ekonomiye ve toplumsal barışa katkı sağlayan örgütlerdir. STK'rı eğitim, yoksullukla mücadele, sağlık ve toplumsal cinsiyet eşitsizliği gibi farklı alanlarda faaliyet sürdürmektedirler. Erken çocukluk eğitimi (EÇE), STK'nın faaliyet gösterdiği alanlardan biridir. EÇE 0-6 yaş grubundaki çocukların gelişmelerini ve öğrenme süreçlerini destekleyen, aynı zamanda anne ve baba eğitimini de içeren programlardır. Çocuğun ev yaşamı ile ilköğretimi arasında bir köprü olan EÇE, çocuğun yaşam boyu eğitiminde başarılı olmasını sağlayan ve geleceğin yetişkinlerinin refahını, dayanıklılığını ve üretkenliğini artıran önemli en temel eğitimdir. Anne Çocuk Eğitim Vakfı (AÇEV), 30 yıldır yoksul çocukları ve anne babalarını eğitim yoluyla destekleyen bir sivil toplum kuruluşudur. AÇEV "Hayalimiz, erken yaştaki her çocuğun güvende, sağlıklı, mutlu ve öğreniyor olması…" olduğunu açıklamıştır (AÇEV, 2020, 4). AÇEV sivil toplum kuruluşu olarak ihtiyaç sahibi ailelerin çocuklarına EÇE'ri için destek olarak, üretken bireyler olarak ekonomiye katkı sağlamaları ve yoksulluk kısır döngüsünden çıkmaları için çeşitli projeler gerçekleştirmektedir. EÇE alanındaki başarılı projeleri 16 ülke örnek alarak uygulanmaktadır. AÇEV uluslararası birçok kuruluşla işbirliği gerçekleştirmiş, başarılı projeleriyle ulusal ve uluslararası alanda birçok ödül kazanan bir STK'dur. Covid-19 Pandemi salgını sürecinde yoksul ailelerin çocukları ve anne babalarına uzaktan eğitim aracılığıyla eğitimlerini

sürdürmelerine yardımcı olmuştur. 2 Şubat 2023 tarihinde Kahramanmaraş ve Hatay merkezli çevre 11 ilde yaşanan büyük depremlerden direk ve dolaylı etkilenen çocuklara ve ailelerine AÇEV destek olmaktadır. Depremden etkilenen çocukların hayata tutunabilmeleri için psikologların hazırladığı, ünlü sanatçıların seslendirdiği hikâye kitapları "okuyanbirgelecek.org" sitesinde açık erişime açılmıştır.

Bildiri "sivil toplum kuruluşları", "erken çocukluk eğitimi" ve "uzaktan eğitimi" kapsayan disiplinler arası bir araştırmadır. Bildirinin ana amacı uzaktan eğitim sistemlerinin yaygın kullanımına örnek oluşturmaktır. Bildirinin birinci kısmında STK, erken çocuk eğitimi ve uzaktan eğitimin teorileri yorumlanmıştır. İkinci kısmında AÇEV'in çeşitli uzaktan eğitim uygulamaları örnekler verilerek açıklanmıştır. Son kısmında ise AÇEV'in uzaktan eğitim uygulamaları ile eğitimlerini çok fazla kişiye ulaştırma fırsatı yaratarak bireylerin refahına ve ülke ekonomisine olan katkıları değerlendirilmektedir. Bu araştırma AÇEV'in yıllık faaliyet raporları ve kurumun web sayfasındaki bilgilere dayalı olarak yapılmıştır.

## Literatür İncelemesi

### Sivil Toplum Kuruluşları

"Sivil toplum; aile, devlet ve piyasanın dışında kalan; birey, grup ve kuruluşların ortak amaçlarını geliştirmek için oluşturdukları alan" olarak tanımlanmaktadır (TÜSEV, 2011, 12). Sivil toplum, ülkelerin tarihsel gelişimi, sosyokültürel yapısı ve iktisadi koşullarına göre farklılık göstermektedir (Erdoğmuş, 2020, 34). STK'rı sivil toplumun yasal olarak örgütlenmiş halidir.

"Avrupa Konseyi Bakanlar Komitesi'nin 2007 yılında kabul ettiği Rec(2007)14 sayılı Tavsiye Kararı'nda STK'rı, gönüllü olarak kendi kendini yöneten ve kurucu veya üyelerinin belirlediği amaç doğrultusunda kâr amacı gütmeyen yapılar veya örgütler olarak kabul edilmektedir" (Ayata ve Karan, 2015, 40). STK kavramı bünyesinde birçok unsuru kapsar. Bunlar (Erdoğmuş, 2020, 21; KUSIF, 2017, 12):

- Devletten özerk yapıda ve bağımsız olması,
- Kâr amacı gütmemesi,
- Yönetiminde özerk olması,
- Bireyler kendi özgür iradeleri ile gönüllü olması,
- Bireyler kendi özgür iradeleriyle bağış yapması ve üye aidatı ödemesi,
- Sosyal bir probleme yenilikçi bir çözümle sosyal değer/fayda yaratılması ve sürdürülebilirliği,
- Yaratılan sosyal etkiyi değerlendirirken, ölçerken ve raporlarken şeffaf olunması,
- Kuruluşunu ve faaliyetlerini yasalara uygun olarak sürdürmesidir.

STK'ları tüm bu unsurların bünyesinde bulunduran yasal örgütlerdir. STK'ları küresel boyutta 20. yüzyılda yaygınlaşmıştır. "Sivil toplum kuruluşu" terimi ile aynı anlama gelen başka terimler vardır. Bir terim karmaşası vardır: Kâr Gütmeyen Kuruluşlar, Sosyal Girişimcilik, Hükümet-Dışı Kuruluşlar, Kâr Gütmeyen Kuruluşlar ve diğerleri.

STK'ları bulundukları ülkelerin yasalarına uygun olarak kurulurlar. Türkiye'de STK'na ait bir yasa maddesi olmadığı için, STK'ların vakıf ve dernek yasalarına göre kurulurlar. STK'lar kuruluş aşamasında yapmayı planladıkları tüm faaliyetleri Dernek Tüzüğü veya Vakıf Resmi Senedine açık ve net bir şekilde beyan ederler. STK'rı faaliyetlerini sürdürdüğü sürece Dernek Tüzüğü veya Vakıf Resmi Senedinde beyan ettikleri bilgilere uymaları yasal bir zorunluluktur. Resmi senedin dışında bir faaliyette bulunamazlar. Faaliyet değişikliği yapmak istedikleri zaman ise ilgili mahkemelere başvurarak Tüzük veya Resmi Senetlerinde değişiklik yapmak mecburiyetindedirler (Ayata ve Karan, 2015, 40).

"Sosyal etki, gerçekleştirilen bir inovasyon sonucunda (program, proje, kampanya, etkinlik) ortaya çıkan sosyal, toplumsal sonuçlar olarak özetlenebilir" (YADA, 2019, 7). STK'ları sosyal bir problemin çözümündeki birincil amacı sosyal etki/değer yaratmaktır. Özel sektör kuruluşlarının ticari faaliyetlerindeki birincil amacı ise finansal değer yaratmaktır (kâr elde etmektir) (Kök ve Mert, 2016, 164; KUSIF, 2017, 28). STK'ların sosyal amaçlı projeleri ile sosyal bir probleme yenilikçi bir çözüm üretmesi ihtiyaç sahibi bireylerin yaşantısında olumlu değişikliklere neden olarak, bireyin ve toplumun refahına katkı sağlamaktadırlar.

STK'ların sosyal problemleri çözümü için yarattıkları yenilikçi sosyal değerleri; ekonomik girişimlerde insan merkezli olması, topluma karşı sorumluluk, bir ortak refah olarak kolektif refahın gerçekleştirilmesi "pozitif dışsallık" olarak ve muhtemelen daha fazla katkı sağlayacaktır. STK'ları, işgücü piyasası entegrasyonuna, sosyal içermeye ve ekonomik kalkınmaya katkıda bulunan hem sosyal hem de ekonomik hedefleri karşılayan bir modeldir. STK'ları birer sosyal inovasyon araçlarıdır (Noya, 2009, 13-14).

### Erken Çocukluk Eğitimi

Kaliteli erken çocukluk bakımı ve eğitimine dahil olma, kapsamlı, çok sektörlü, entegre, çocuk merkezli ve oyun temelli olarak karakterize edilir ve tüm çocukların ve ailelerinin sürece dahil edilmesini sağlamaktadır Kaliteli erken çocukluk eğitim programları, çocukların gelişimsel ihtiyaçlarına bütüncül bir şekilde katıldıklarında en faydalı olanlardır. Küçük çocuklar, bütünsel ihtiyaçları karşılandığında en iyi şekilde öğrenir ve tam potansiyellerini geliştirebilirler. Çocuk gelişimini anlayan ve onu tanıdık ortamlarda desteklemek için stratejileri olan ilgili yetişkinler tarafından desteklenmektedirler. Yüksek kaliteli EÇE'nin, çocukların okulda ve yaşamlarında başarılı olmalarına yardımcı olacak bilişsel ve sosyo-duygusal becerileri, yürütme işlevini ve motivasyonu geliştirmelerine yardımcı olabileceğini gösteren birçok araştırma bulunmaktadır (Kaga and Sretenov, 2021, 2). EÇE sistemleri tasarımında üç önemli bileşeni; erişim, kalite ve ebeveyn katılımıdır (Hall and Schmautzer, 2023, 31). EÇE'inde oluşturulan kalite standartlarının tüm eğitim sisteminin kalitesi üzerinde derin etkileri olabilmektedir (UNICEF, 2019, 92). EÇE, çocukların evleri ile ilköğretim arasında vazgeçilmez bir köprü oluşturmaktadır.

Kaliteli EÇE'i toplumların, çocukların yaşam boyu öğrenmesini destekleyecek güçlü temeller oluşturmasına yardımcı olmak için yapabilecekleri en önemli yatırımlardan biridir. Küçük çocuklar, ilk yıllarında muazzam bir öğrenme kapasitesine sahiptir; bu kapasiteyi güçlendirmeli ve çocukların ilk yıllarının yüksek kaliteli, eğlenceli öğrenme deneyimleriyle dolu olmasını sağlanmalıdır (Bendini and Devercelli, 2022, xiii).

Öğrenme ve gelişmedeki eşitsizlik, erken çocukluk döneminde, çocuklar ilkokula başlamadan önce ortaya çıkar. Çocuklar ilkokula başladığında kaynaştırmayı ele almaya başlamak için çok geç kalınmıştır. EÇE'i eşitsizliklerle mücadelede güçlü bir araçtır. Çocuğun gelişim sürecinin erken dönemlerinde eşitsizliklerle mücadele mümkündür. EÇE'i sürecinde daha fakir evlerden gelen çocuklar ile daha varlıklı evlerden gelen akranları arasındaki temel becerilerindeki uçurum azaltılabilmektedir.

Çocuklar dünyadaki en yetenekli öğrencileridir. Çocukların ilk yıllarındaki eğitilmeleri, onları yaşam boyu öğrenmeleri için zemin hazırlamaktadır. Bu nedenle, bir çocuğun ilk yıllarındaki eğitimi kritik öneme sahiptir, çünkü çocukların ilk yıllarındaki eğitimi onların ergenlik ve yetişkinlik hayatının geri kalanı için temel oluşturmaktadır. İyi yetiştirilen çocuklar iyi yaşayabilir ve herkes için daha iyi toplumlar yaratabilirler. Çocuklar içinde yaşadıkları toplumun geleceğidir, onlara erken yaşta eğitim yatırımı yapılması (eğitilmeleri), gelecekteki herkesin insani ve ekonomik gelişimine yatırım yapılmasıdır (Bendini and Devercelli, 2022, xiii).

Erken çocukluk dönemindeki eğitim getiri oranı diğer dönemlere göre en yüksek orana sahip olduğu çeşitli araştırmalarda görülmüştür. Çocuğun yaşı ilerledikçe EÇE'den sonra insan sermayesine yapılan yatırımın getiri oranı giderek düşmektedir. İnsan beyninin en hızlı gelişim süreci erken çocuk eğitim dönemine olduğu için, EÇE'ne yapılan yatırımların getiri oranı çok yüksektir (Bekman ve Gürselen, 2005, 32). Bir akademik çalışma, yüksek kaliteli EÇE'ne yatırılan her doların yıllık %7-10 oranında bir yatırım getirisi sağladığı göstermiştir (Hall and Schmautzer, 2023, 31).

Erken çocuk eğitiminin, çocuklar, yetişkinler ve toplum için faydalarını eğitim, sağlık, sosyal sermaye ve eşitlik başlıkları altında gruplayarak şu şekilde örnek verilebilir (AÇEV, 2007, 4; Kaga and Sretenov, 2021, 3; Kaytaz, 2005, 7; Young, 2002, 73).

*Eğitime olan faydaları*

- *Çocukluk dönemindeki faydaları*; gelişmiş zekâ, uyum sağlama, göz ve el koordinasyonu; işitme ve konuşma, okuma hazırlığı; geliştirilmiş okul performansı, başarısızlığın azaltılması, daha az sınıf tekrarı ve okul terkin azaltılması ve okullaşmada artıştır. 0-6 yaş arasındaki eğitim; eşitliği, sosyal adaleti, empatiyi, başkalarına saygıyı ve birlikte yaşamayı destekleyen değerler ve tutumlar geliştirmede önemli rolü bulunmaktadır.
- *Yetişkinlik için uzun dönem faydaları*; eğitim sistemlerini daha etkili ve verimli hale getirmeye katkıda bulunması geleceğin yetişkinlerinin refahını, dayanıklılığını ve üretkenliğini artırır. Gelişmiş çocuk bakımı ve aile sağlığı ve ekonomik refahta artıştır.
- *Toplum için faydaları*; sosyal uyumda artış, yoksulluk ve suç oranlarında azalma; doğurganlık oranlarında düşüş, yeni teknolojilerin daha fazla benimsenmesi; demokratik süreçlerdeki iyileşme, ekonomik büyümede artış sağlamaktadır.

*Sağlığa olan faydaları*

- *Çocukluk döneminde çocuklara olan faydaları*; hastalık ve ölüm oranlarında düşüş, sağlıklı beslenmede artış, çocuk istismar oranlarında düşüş; hijyen ve sağlık hizmetlerdeki artıştır.
- *Yetişkinlik için uzun dönem faydaları*; sağlıklı bünye, gelişmiş bilişsel gelişim; enfeksiyon ve kronik hastalık oranlarında düşüştür.
- *Toplum için faydaları*; verimlilik ve üretkenlikte artıştan kaynaklana gelir artışıdır.

*Sosyal sermayeye olan faydaları*

- *Çocukluk döneminde çocuklara olan faydaları*; daha yüksek benlik kavramı, sosyal uyumda artış; agresif davranışlarda düşüş, iş birliğinde artış; grup içindeki uyumlu davranışların artışıdır.
- *Yetişkinlik için uzun dönem faydaları*; daha yüksek benlik saygısı, gelişmiş sosyal yeterlilik, motivasyon, normların ve değerlerin kabulü; suç oranlarındaki düşüştür.
- *Toplum için faydaları*; sosyal sermayenin geliştirilmiş kullanımı ve gelişmiş sosyal değerlerdir.

*Eşitliğe olan faydaları*

- *Çocukluk döneminde çocuklar için faydaları*; yoksulluğun azaltılması, beslenme koşullarına iyileşme, bilişsel ve sosyal gelişim ve sağlı yaşamdır.
- *Yetişkinlik için uzun dönem faydaları*; eğitim, sağlık ve gelirde fırsat eşitliğidir.
- *Toplum için faydaları*; yoksulluğun ve suç oranlarının azaltılması, toplumsal sağlıkta artış; artan sosyal adalet ve yüksek sürdürülebilir ekonomik büyümede artıştır.

EÇE; eğitim, sağlık, insan sermayesi, sosyal sermaye ve eşitlik alanlarında ekonomik büyümeye önemli katkı sağlayarak, ulusun ekonomik ve insani gelişimine katkı sağlamaktadır.

Erken çocukluk, başkalarına ve topluma karşı temel değer ve tutumların şekillendiği biçimlendirici bir dönemdir. Bu dönemdeki kapsayıcı EÇE' programları; değerleri, tutumları ve eşitlik, sosyal adalet, herkese saygı ve çeşitliliği ve farklılıkları kutlama gibi davranışları geliştirmektedir. Ayrıca belirli kültürel bağlamları ele alırlar ve daha yüksek eğitim seviyelerine dahil olma ve yaşam boyu öğrenme fırsatları yaratmaktadırlar.

**Dünyada Erken Çocukluk Eğitimi**
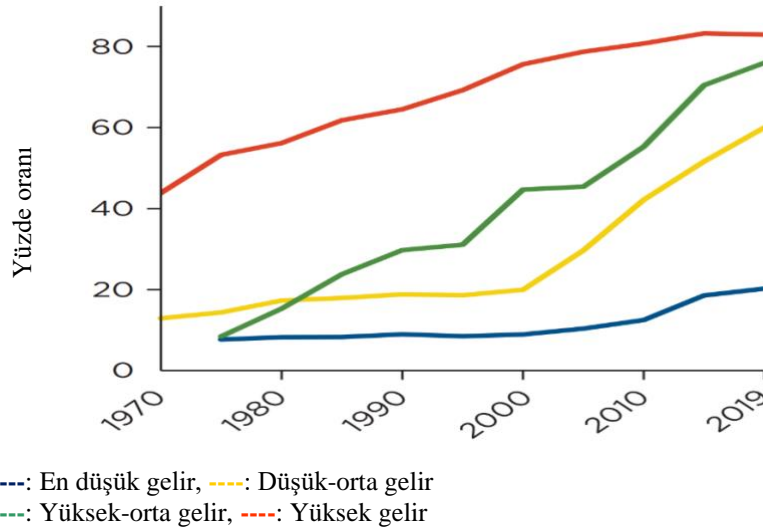


---: En düşük gelir, ---: Düşük-orta gelir
---: Yüksek-orta gelir, ---: Yüksek gelir
**Kaynak**: Bendini and Devercelli, (2022). *Quality Early Learning*. s. 5.

Şekil 1: Ülkelerin gelir düzeyine göre erken çocuk eğitimine katılım, 1970-2019

EÇE'ne yönelik politikaları ve planlaması hazırlarken dünyadaki EÇE ait gerçek verilerle değerlendirilmesi önemlidir. Şekil 1'de dünyadaki ülkeler gelir farklılıklarına göre dört gruba ayrılarak incelenmiştir. 1970-2019 yılları arasındaki 49 yıllık zaman dilimindeki EÇE'ne katılım verileri karşılaştırılmaktadır. "Yüksek gelir grubuna dahil olan ülkelerde" EÇE'ne katılım 1970 yılındaki yüzde 42 oranından 2019 yılına gelindiğinde yüzde 80 oranına yükselmiştir. "Yüksek gelir grubuna dahil olan ülkelerde" EÇE'ne katılım 49 yıllık artış oranı yüzde yüzlük atışla diğer ülke gruplarına göre en yüksek oranda artışın gerçekleştiği ülke grubu olmuştur.

"En düşük gelir grubuna dahil ülkelerde" EÇE'ne katılım 1970 yılında yaklaşık yüzde 8 oranından 2019 yılına gelindiğinde yaklaşık yüzde 20 oranına yükselmiştir. "En düşük gelir grubuna dahil ülkelerde" EÇE'ne katılımın 49 yıldaki artış oranı yaklaşık yüzde 12'dir.

Diğer "düşük-orta gelir grubuna dahil ülkeler" ve "yüksek-orta gelir grubuna dahil ülkelerdeki" EÇE'ne katılımın 49 yıldaki artış oranı "en düşük gelir grubuna dahil ülkelere" göre daha yüksek oranda gerçekleştiği görülmektedir. Şekil 1'deki 49 yıllık süreç değerlendirildiğinde, "gelir düzeyi yüksek ülke gruplarında" EÇE'i katlanarak (artan

oranda) artığı görülmektedir. "Gelir düzeyi en düşük grubuna dahil ülkelerde" ise EÇE'ne katılım 49 yıldaki artış oranının yavaş olduğu gözlenmiştir.

EÇE erişimin kamu finansmanı ile yüksek oranda ilişkilidir. EÇE'e en fazla kaydının olduğu ülkeler, aynı zamanda EÇE'ye en yüksek kamu finansman desteği tahsis eden ülkeler olduğu birçok araştırmada görülmektedir. Birçok çocuk EÇE'ne erişememektedir çünkü EÇE'i OECD ülkeleri için ortalama hane gelirinin yaklaşık yüzde 15'i gibi nispeten maliyetli bir hizmettir (Hall and Schmautzer, 2023, 31). Küresel olarak, bir çocuğun EÇE'ne katılımının önündeki en yaygın engeller, hane halkının ekonomik durumu ve annenin eğitim düzeyidir.

EÇE'i özellikle, kız ve erkek çocuklara genellikle EÇE programlarına katılma konusunda eşitlik sağlarlar. EÇE'ne erişimin artırılması, okul terki ve okul tekrarı oranlarını azaltarak sistem verimliliğini artırmaya yardımcı olabilmektedir. Kaliteli EÇE'i programları, yoksulluk veya diğer sosyal faktörlerin neden olduğu başarısızlıklarını azaltabilir ve en savunmasız çocukların akranlarına ayak uydurmasına yardımcı olarak, onlara eğitim yolculuklarında daha adil bir şans vermektedir (UNICEF, 2019, 20, 21, 41).

Birleşmiş Milletlerin Sürdürülebilir Kalkınma Hedefleri 17 maddeden oluşmaktadır. Bu maddelerin 4'cüsü eğitimi içermektedir. Özellikle Sürdürülebilir Kalkınma Hedeflerinin 4.2 maddesi 2030 yılına kadar tüm kız ve erkek çocukların ilköğretime hazır olmaları için; kaliteli erken çocukluk gelişimi, bakımı ve EÇE'e erişimini sağlamayı amaçlamaktadır (UNICEF, 2019, 92). Sürdürülebilir Kalkınma Hedeflerinin 10. Maddesi ülkeler içinde ve ülkeler arasında eşitsizliği azaltmaya odaklanmaktadır (Kaga and Sretenov, 2021, 5). Birleşmiş Milletlerin Sürdürülebilir Kalkınma Hedeflerine ulaşmasını dünya ülkeleri arasında gelişmişlik farklarının azaltılmasına yönelik politikaların uygulanabilmesine ve yoksul aile çocukların EÇE'i alabilmelerini sağlamak için kamu, özel sektör ve üçüncü sektörün işbirliği ve finansal desteği gerekmektedir.

### Uzaktan eğitim

Uzaktan eğitim, eğitimci ve öğrencinin zaman, mekân veya her ikisinin de eğitim işleminin çoğu için ayrılmasıyla karakterize edilen, öğrenme içeriğinin sunulması için eğitim teknolojinin aracılık ettiği bir öğretme ve öğrenme sürecidir. Öğrenen-eğitmen ve öğrenen-öğrenen etkileşimi için yüz yüze etkileşim olasılığı olan iki yönlü didaktik iletişimin sağlanmaktadır (UNESCO, 2021a, VIII).

Uzaktan eğitim sistemleri sahip olduğu özellikleri aşağıdaki gibi açıklanabilir (UNESCO, 2021a, 3):

- Öğrenme sürecinde öğretmen ve öğrencinin ayrı fiziksel mekanlarda olmasıdır (aynı fiziksel mekânda bulunmamalarıdır); bu özelliği ile uzaktan eğitim geleneksel yüz-yüze eğitimden ayrılmaktadır,
- Bir öğretim organizasyonunun öğrenme kaynakları ve fırsatlarını planlaması, tasarlanması ve dağıtılmasındaki etkisi (bu özellik bireyin kendi kendine çalışmasından ayrılır),
- Öğrenme içeriğinin iletilmesinde/dağıtılmasında dijital medyanın kullanılması,
- Öğrenci ve öğretmen ile öğrenci ve öğrenciler arasında iki yönlü iletişimin sağlanması,
- Öğrenme gruplarının farkı fiziksel mekanlarda olması; öğretici ve sosyalleşme amaçları için dijital ortamlarda yüz-yüze buluşmalar düzenlemeye imkân sağlamaktadır.

Öğrenme sürecinde öğretmenlerin ve öğrencilerin farklı mekanlarda bulunduğu (yüz yüze olmadığı), basılı ve yazılı ders metinlerinin öğrenciye posta ile dağıtıldığı eğitim sistemine mektupla eğitim denmektedir. 1840-1970 yılları arasında dünya eğitiminde yer almıştır. Mektupla eğitim, demir yollarının kurulmasıyla ülkelerin iç kesimlerine kadar yaygınlaşmış, buharlı gemilerin keşfi ile ders materyalleri kıtalararasında yayılmıştır. Mektupla eğitimin yaygınlaşmasının ana nedenlerinden biri, örgün eğitime göre düşük maliyetli bir eğitim olmasıdır. İlerleyen zaman içinde teknolojik inovasyonlar, mektupla eğitime telefon, eğitsel radyo yayınları, teyp ve eğitsel filmler katkı sağlamıştır (Molenda, 2022; Moore, 2022).

1970'lerde, İngiliz Açık Üniversitesi öğrencilerine basılı ve işitsel materyallerle desteklenen eğitsel radyo ve televizyon yayınlarıyla eğitime başlaması mektupla eğitimde bir paradigma değişikliğine neden oldu. Açık Üniversite eğitimi; sınavlar, ödev hazırlama, yerel merkezlerde danışmanlık büroları ve danışman öğretmenleriyle etkileşimi içermekteydi (Molenda, 2022, 15).

20. yüzyılın son çeyreğinde bilgisayar ve internet teknolojilerinin eğitim alanında kullanılmaya başlanması bir başka paradigma değişikliğiyle uzaktan eğitim modelini gerçekleştirmiştir. Bilişim ve iletişim teknolojilerindeki bilginin dağıtımı ve işlenmesindeki inovasyonlardan eğitim teknolojilerini de etkilemiştir. Teknolojik inovasyonlar, uzaktan eğitim programları giderek daha fazla çevrimiçi dağıtıma doğru kaydıkça uzaktan eğitim daha da büyümüştür.

Teknoloji tabanlı öğretim için dağıtım sistemleri sınıfın içinden yayın ortamı yoluyla iletime, ağa bağlı bilgisayarlarda birleştirme ve World Wide Web yoluyla paylaşıma kaydıkça küresel boyutta yaygınlaşarak daha büyük kitlelere erişilebilmektedir.

İletişim ve bilişim teknolojilerindeki teknolojik inovasyonlar eğitim kurumlarına zengin içerikli ders materyallerini hazırlama olanağı, öğrencilere ise istediği dijital araçla, istediği zamanda, istediği mekânda ve istediği eğitim materyaliyle çalışma fırsatı sunmaktadır. Uzaktan eğitim sistemleri örgün eğitime göre düşük maliyet avantajına sahiptir. Bu avantaj eğitim kurumuna daha düşük maliyetle devasa sayıdaki öğrenciye hizmet verme imkânı sağlamaktadır (Hülsmann, 2016).

21. yüzyılda küresel boyutta yaşanan COVID-19 pandemi salgını, ulusal eğitim sistemlerinin şimdiye kadar karşılaştığı en büyük felakettir. Pek çok hükümet, kurumlara öğrencilerinin çoğu için yüz yüze eğitime ara vermelerini emretti ve çevrimiçi öğretime ve sanal eğitime geçmelerini zorunlu kıldı. COVID-19 pandemi salgını, yüz yüze öğrenme ortamlarının kırılganlığını ortaya çıkardı ve dünya çapında milyonlarca insanın öğrenmeye eşit erişimini kesintiye uğrattı. Yanıt olarak, sayısız öğrenim sistemi hızla "acil uzaktan öğrenimine" geçti. COVID-19 pandemi salgını, "uzaktan eğitimi" ve "acil uzaktan öğrenimi" yükseköğretim ortamının kalıcı bir parçası haline getirmiştir (Fassina, 2023, 3).

## Anne Çocuk Eğitim Vakfının Doğal Afetlerde Uzaktan Eğitim Uygulamaları

### Anne Çocuk Eğitim Vakfı

AÇEV 1993 yılında, Ayşen Özyeğin'in önderliğinde kurulan bir STK'dur. AÇEV'in kurulma ana amacı; "toplumdaki gelişimleri risk altındaki çocukları erken müdahale programları ile desteklemek, çocukların yaşamlarında koruyucu, destekleyici faktörleri çoğaltmak, risk faktörlerini azaltmak" olduğu açıklanmıştır (AÇEV, 2023a).

2021 yılı raporunda faaliyetlerini şu cümlelerle ifade etmişlerdir:

> "AÇEV olarak 1993 yılında itibaren ihtiyaç sahibi çocukları ve anne babalarını eğitim yoluyla destekliyoruz. Ülkemizde, erken yaşlardan itibaren gelişmeleri desteklenen çocukların, onların bakım ve gelişiminde sorumluluk alan babaların, çocuklarını özgüven ve umutla büyüten annelerin sayısının artması için çalışıyoruz. Eğitim programları ve saha çalışmalarının yanı sıra toplumsal farkındalığı artırmak, bilinç ve destek oluşturmak üzere savunu faaliyetleri gerçekleştiriyoruz. Birleşmiş Milletler Küresel Kalkınma Hedefleri Çerçevesinde de özellikle vurgu yapılan, erken çocukluk döneminde nitelikli eğitim, gelecek nesillerin yetiştirilmesinde ailelerin rolü, toplumsal cinsiyet eşitliği ve yaşam boyu öğrenme konularına tüm faaliyetlerimizin içinde yer veriyoruz. Erken yaşlardaki çocukların gelişiminde yakın çevrenin önemine olan inancımızla, anne ve babalar için eğitimler gerçekleştiriyor, çocukların iyiliğine katkı sağlayacak ortamlar yaratmaya çalışıyoruz. Toplumun değişen ihtiyaçları ve yaptığımız sosyal etki araştırmaları doğrultusunda eğitim programlarımızı geliştiriyor, bilgi birikimimizi uluslararası iş birlikleriyle yurtdışına da taşıyoruz" (s. 1).

AÇEV'in erken çocukluk eğitim alanındaki projelerindeki başarılarından dolayı ulusal ve uluslararası ödüllere laik görülmüştür. Uluslararası alanda kabul gören eğitim projeleri 16 ülkede uygulanmaktadır. Örgün ve uzaktan eğitim projelerini; 6 uluslararası ortak, 10 program destekçisi ve 23 farklı işbirliği ile sürdürülmektedir. Ülke içinde 81 ilde faaliyet gösteren, 14.846 gönüllü eğitimci desteği ile çalışan güçlü bir STK'dur (AÇEV, 2022, 16; AÇEV, 2023a).

### AÇEV'in Uzaktan Eğitim Uygulamaları

AÇEV'in uzaktan eğitim uygulamaları üç başlık altında incelenmiştir:

- Eğitsel televizyon yayınları,
- Çevrimiçi eğitim uygulamaları,
- Sosyal medya.

### *AÇEV'in Eğitsel Televizyon Yayınları*

Kuruluşundan beri örgün eğitim hizmeti vermekte olan AÇEV, EÇE'mi daha fazla kişiye eriştirmek ve toplumsal farkındalığı artırmak için 2002-2006 yılları arasında eğitimlerinde eğitsel televizyon yayınlarından yararlanmıştır. TRT, Kanal D ve NTV'de eğitsel yayınlar gerçekleştirilmiştir. TV kanalları vasıtasıyla 10 milyon kişiye erişildiğini açıklanmıştır (AÇEV, 2022, 2023a). AÇEV'in eğitsel televizyon yayınlarının yayın yılları ve yayınlandığı TV kanalları ait bilgiler tablo 1'de yer almaktadır.

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Tablo 1: AÇEV Eğitsel Televizyon Yayınları

| Yılı | TV Programının Adı | TV Kanalları |
|------|--------------------|--------------|
| 2002 | "Benimle Oynar mısın?" | TRT |
| 2005 | "Bizim Sınıf" (65 bölüm) | Kanal D |
| 2006 | "Baba Olmak Güzel Şey" | NTV |
| 10 milyon kişiye TV programlarımızla ulaştık. Erişim tarihi 16.06.2023: https://www.acev.org/?gclid=EAIaIQobChMIvO7C__TH_wIVmedRCh2mLAFTEAAYASAAEgJIFfD_BwE | | |
| Kaynak: AÇEV (2022). 2021 Faaliyet Raporu. s. 9; AÇEV (2023a). Web sayfası. | | |

*AÇEV'in Çevimiçi Uygulamaları*

AÇEV eğitim projelerini daha fazla kişiye ulaştırmak için 2009 yılında uzaktan eğitime başlamıştır. 1993 yılından itibaren yüz yüze sürdürdükleri eğitim programlarını uzaktan eğitim sistemine göre eğitim tasarımları yapılarak ilgili web sayfalarından erişime açmıştır. 2009 yılında "Geleceğe İlk Adım Projesi" ile uzaktan eğitime başlamıştır. 2009 yılından 2023 yılına kadar çeşitli eğitim programları gerçekleştirilmiştir. Uzaktan eğitime ait yayınları çeşitli başlık altında toplamak mümkündür. (1) EÇE'i kapsamında olanlar, (2) Yetişkinlere yönelik uzaktan eğitim programları, (3) Kuruluşlara yönelik kurum içi kapasite güçlendirme programları, (4) Uzaktan eğitimin sürdürülmesine yönelik işbirlikleri, (5) AÇEV'in kendi personeline yönelik hizmetiçi eğitimleri, ve (6) Açık erişimdeki kaynaklar.

Tablo 2'de uzaktan eğitim programlarına ait çevrimiçi uygulamalarına ait ayrıntılı bilgiler yer almaktadır. Tablodaki bilgiler yıllara göre gruplandırılmıştır. Tablo AÇEV'nın web sayfasındaki bilgilere dayalı olarak yazar tarafından hazırlanmıştır.

*AÇEV'in Covid-19 Pandemi Sürecinde Uzaktan Eğitim Uygulamaları*

Yüzyılın felaketi olarak ifade edilen Covid-19 Pandemi salgını 2020 yılının ilk aylarında küresel boyutta tüm insanları etkileyerek ekonomileri yavaşlatmış ve eğitimi kesintiye uğratmıştır. Covid-19 Pandemi salgınında örgün eğitimin kesintiye uğradığı süreçte uzaktan eğitim sistemleri küresel çapta eğitimin sürdürülebilmesine büyük destek olmuşlardır.

Covid-19 Pandemi salgının başlangıcında diğer eğitim kurumlarında olduğu gibi AÇEV'in verdiği eğitimleri durdurmuştur. Covid-19 pandemi salgını sürecinde yüz yüze yapılan eğitim kesintiye uğrayınca AÇEV ihtiyaç sahibi ailelere destek olmak için "Okuyan Bir Gelecek" projesini uzaktan eğitim sistemi için uyarlayarak web sayfasından anne ve babalar için erişime açılmış, aynı zamanda da çocukların oynayarak öğrenmeleri için hazırlanan eğitim paketi (resimli hikâye kitapları, resim defteri, kuru boya vb) çocukların evlerine ulaştırılmıştır.

AÇEV'in Covid-19 pandemi salgını sürecinde diğer uzaktan eğitim faaliyetleri; "Diyarbakır Sur Aile ve Çocuk Merkezinde" hem EÇE'i öğrencilerine ve hem de EÇE'i öğrencilerinin annelerine için ayrı ayrı uzaktan eğitim programları tasarlanıp uygulanmıştır.

"AÇEV Youtube Kanalı" yayına açılmıştır. Vodafone ile işbirliği ücret avantajı olan internet paketi desteği ailelere sağlanmıştır. AÇEV kendi elemanları için hizmetiçi eğitim kapsamında AÇEV Youtube Kanalında üç ayrı oturumda "Uzman Buluşmaları" gerçekleştirilmiştir.

*AÇEV'in Deprem Sonrası Uzaktan Eğitim Uygulamaları*

6 Şubat 2023 tarihinde Kahramanmaraş ve Hatay merkezli 11 ili etkileyen depremler sonrası AÇEV'in deprem bölgesindeki çeşitli yardım faaliyetlerini kurumun web sayfalarındaki broşürde açıklanmıştır (AÇEV, 2023b, 5).

AÇEV depremden direk ya da dolaylı etkilenen çocuklar için bir uzaktan eğitim aracılığıyla yaptıkları psikolojik destek eğitimi de bulunmaktadır. Psikologların yazdıkları çocukları yaşama bağlayan iyileştirici hikayeleri içeren videolar "okuyanbirgelecek.org" sitesinde erişime açıldı. Hikâye kitaplarının çocukların ilgisini çekmesi için ünlü kişiler tarafından seslendirmektedir. Kitapları seslendirerek projeye destek verenler ünlü sanatçılar; Beren Saat, Genco Erkal, Cem Yılmaz, Demet Evgar, Songül Öden ve diğerleri. Ünlü piyanist ve besteci Fazıl Say piyanosuyla, kitapları seslendiren ünlülere eşlik etmektedir.

Tablo 2: AÇEV'in Uzaktan Eğitim Uygulamaları

| Başlama Yılı | Eğitimin Adı |
|---|---|
| 2009 | "Geleceğe İlk Adım Projesi": Türkiye Vodafone Vakfı ve MEB desteklediği eğitim projesidir. https://www.acev.org/tamamlanmis-projeler/turkiye-vodafone-vakfi-isbirliginde-gelecege-ilk-adim-projesi/ |
| 2010 | "Okul Öncesi": Okul öncesi öğretmenleri ve aday öğretmenlere güvenilir kaynak sağlamak amacıyla kurulan dijital platformdur. https://www.acev.org/neler-yapiyoruz/projelerimiz/ilk-6-yil-mobil-uygulama/?gclid=EAIaIQobChMIvZPyhPLH_wIV_55oCR2XmgNXEAAYASAAEgKMOfD_BwE |
| 2011 | *Yetişkin eğitimi*: "Oku Yaz": 1995 yılında MEB ile işbirliği ile yüz yüze başlayan bilgisayar tabanlı okuma yazma program 2011 yılında web ortamına aktarıldı. https://www.acev.org/devam-eden-projeler/bilgisayar-destekli-okuryazarlik-egitimi-www-acevdeokuyaz-org/ |
| 2014 | "İlk 6 Yıl Mobil Uygulaması": Türkiye Vodafone Vakfı işbirliğinde programın mobil uygulaması ana babaların cep telefonlarına taşındı. https://www.acev.org/neler-yapiyoruz/projelerimiz/ilk-6-yil-mobil-uygulama/ |
| 2019 | *Yetişkin eğitimi*: "Eşitliğe Değer": Kadını güçlendirme ve toplumsal cinsiyet eşitliği alanındaki projesidir. Çeşitli özel sektör kurumlarında asenkron olarak uygulanmaktadır. <br><br> "İlk6Yıl Mobil Arapça uygulaması": Suriyeli mülteciler için uyarlanarak yayınlandı. |
| 2020 | **Covid-19 Pandemi süreci** <br><br> "Anne Buluşmaları/Baba buluşmaları ve Evdeki Oyun Kutum": Covid-19 pandemi dönemi için çevrimiçi eğitim program hazırlanarak dijital platformda erişime açıldı. Çocuklar içinde evlerine eğitim paketi gönderildi. <br><br> https://www.acev.org/wp-content/uploads/2022/10/ACEV2021_Faaliyet_Raporu.pdf <br><br> "Diyarbakır Sur Aile ve Çocuk Merkezinde" EÇE öğrencisi 76 çocuğa 2020 ekim ayından 2021 haziran ayına kadar özel olarak tasarlanan uzaktan eğitim desteği verilmiştir. <br><br> "Diyarbakır Uzaktan Eğitim Anne Eğitimi Uygulaması" 30 haftada EÇE'de çocuğu olan 72 anneye eğitim verildi. <br><br> "AÇEV Youtube Kanalı" EÇE'me destek için dijital erişime başladı. https://www.youtube.com/@AnneCocukEgitimVakfi <br><br> *Pandemi Sürecine İşbirlikleri* <br><br> "İnternet desteği": Vodafone ile işbirliği. Vodafone hat sahiplerine "İlk6Yıl" mobil uygulaması için internet desteği sağlanmıştır. <br><br> AÇEV'in daha önceki dijital tecrübesinden dolayı The Human Safety Net (THSN) tarafından sağlanan uluslararası hibe aldı. |

| | |
|---|---|
| | Tümleşik iletişim platformu Zoom ile işbirliği ile AÇEV'in video konferans altyapısı desteklendi. *Kurum içi kapasite güçlendirme*: "Uzman Buluşmaları": Pandemi döneminde iyi halin korunması için AÇEV Youtube kanalında 1500 kişinin katıldığı hizmetiçi eğitim buluşmaları gerçekleştirildi. |
| 2021 | "Uzmanlarla İlk6Yıl": Youtube Spotify dijital kanalında podcast olarak yayınlandı. https://www.acev.org/haber/ilk6yil-mobil-uygulamamizi-indirdiniz-mi/ "Okuyan Bir Gelecek": Çocukların kelime dağarcığını geliştirmeyi amaçlayan proje dijital platforma taşındı. https://okuyanbirgelecek.acev.org/ |
| 2023 | **6 Şubat 2023 tarihinde yaşanan deprem sonrası** "Okuyan Bir Gelecek": 2021 yılında beri açık erişimde olan dijital platforma 6 Şubat 2023 deprem sonrası çocuk psikolojisini iyileştirmeye yönelik hikayeler eklenerek erişime açıldı. |
| 2007'den itibaren | "Açık Erişimdeki Yayınlar": Akademisyenlerin hazırladığı kaynaklar ve AÇEV'nı içeren raporların yer aldığı yayınların arşivi bulunmaktadır. https://www.acev.org/yayinlar/ https://www.acev.org/biz-kimiz/hakkimizda/faaliyet-raporlari/ |
| **Kaynak**: AÇEV 2020, 2021 ve 2022 Faaliyet Raporları ve web sayfasındaki bilgilere dayalı olarak tablo yazar tarafından hazırlanmıştır. Erişim tarihi 16.06.2023 | |

*AÇEV ve Sosyal Medya*

Sosyal medya, bireylerin ağ teknolojileri vasıtasıyla içerik ve bilgi paylaşım sürecini sağlayan araç, hizmet ve uygulamaların bütününü temsil eder (Öztürk ve Talas, 2015, s.108). Yaşam boyu öğrenme sürecinde öğrenenlere "sosyal medya; yaygın, kolay ve ücretsiz kullanım olanakları, sosyal destek ve işbirliğini artırması, akran desteğini sağlaması, daha esnek bir öğrenme ortamı gibi olanakları sunmaktadır" (Sarsar, Başbay, M. ve Başbay, A, 2015, 2). "Sosyal medya, çeşitli uzaktan eğitim uygulamaları ve yaşam boyu öğrenim için öğretenler, öğrenen ve öğrenciler arasında işbirliği ve bilgi paylaşımı fırsatı yaratmaktadır" (Bozkurt, 693; Uça, 2016, 201).

AÇEV'in okulöncesi eğitim ve diğer eğitim projelerinin halk arasında benimsendiğini sosyal medyadaki takipçi sayılarında görülmektedir. Tablo 3'de AÇEV'in sosyal medyada takipçi sayısı 262.794'dür.

Tablo 3: AÇEV'in Sosyal Medya Çalışmaları Takipçi sayısı

| | |
|---|---|
| Facebook | 153.000 |
| Instagram | 52.700 |
| Linkedin | 20.794 |
| Twitter | 19.900 |
| Youtube (Abone sayısı) ve 364 video | 16.400 |
| Toplam | 262.794 |
| **Kaynak**: İlgili web sayfalarına erişim tarihi 17.06.2023 | |

## Sonuç ve Öneriler

Çocuklar için 0-6 yaş, öğrenmenin en yoğun olduğu, temel alışkanlıkların, zihinsel yeteneklerin geliştiği ve biçimlendiği dönemdir. EÇE çocuğun en değerli ilk 6 yılını içermektedir. EÇE çocukları, sosyal-duygusal, bilişsel, dil ve okuryazarlık ve fiziksel gelişim gibi önemli beceriler geliştirmelerine yardımcı olarak okula hazırlamaktadır.

AÇEV, yoksul çocuklar ve ebeveynlerini eğitim yoluyla destekleyen bir STK'dur. AÇEV 1993'ten günümüze kadar EÇE'i alanında başarılı uygulamaları ile ulusal ve uluslararasında kabul gören bir STK'dur. Covid-19 Pandemi salgınında örgün eğitimin kesintiye uğrattığı süreçte uzaktan eğitim sistemi küresel çapta eğitimin sürdürülebilmesine büyük destek olmuştur. Covid-19 Pandemi salgını başlangıcında diğer eğitim kurumlarında olduğu gibi AÇEV'in verdiği eğitimleri de duraklatmıştır. AÇEV daha önceki uzaktan eğitim tecrübesine dayanarak varolan eğitim programlarını uzaktan eğitim ortamına aktararak eğitimlerini sürdürmeye başlamıştır. Günümüzde AÇEV'in 2009 yılından itibaren uzaktan eğitim sisteminin avantajlarında yararlanarak eğitim faaliyetini daha büyük kitlelere ulaştırdığı görülmektedir. Uzaktan eğitim programları; yazılı materyal, ses kayıtları, mobil uygulamalar, kurumun çeşitli eğitimlere ait web sayfaları ve Youtobe kanalındaki videoları içermektedir.

6 Şubat 2023 tarihinde Kahramanmaraş ve Hatay merkezli 11 ili etkileyen depremlerden direk ve dolaylı etkilenen birçok çocuk bulunmaktadır. AÇEV çocuklara deprem sonrası için psikosoyal destek sağlamaya yönelik uzaktan eğitim programı hazırlamıştır. Eğitim programı, depremi yaşamış ve dolaylı etkilenmiş çocuklara yönelik psikologların yazdıkları hikâye kitaplarının seslendirilmesidir. Psikologların yazdıkları çocukları yaşama bağlayan iyileştirici hikayeleri içeren videolar "okuyanbirgelecek.org" sitesinde açık erişimdedir. Hikayelerin çocukların ilgisini çekmesi için ünlü kişiler tarafından seslendirilmiştir.

Bir STK olan AÇEV'nın 30 yıllık eğitim uygulamaları incelendiğinde EÇE'ni sürdürmek için uğrunda harcadığı çaba, gösterilen titizlik ve mücadelenin ulaştığı başarı takdire değerdir. EÇE ait örgün ve uzaktan eğitim faaliyetleriyle yoksul çocuklara ve anne babalarına destek olmaya yıllar içinde daha da güçlenerek devam ettiği gözlenmiştir. AÇEV'in başarılı EÇE uygulamaları ülkemizde, yoksulluğun azalışı, insan sermayesi stokunda, verimlilikte ve insani gelişmedeki artış ve toplumsal barışa katkı sağlamaktadır. Bu çalışmada doğal felaketlerde uzaktan eğitimin önemi bir eğitim sistemi olduğu görülmüştür.

AÇEV uzaktan eğitim sistemlerinin yaygın kullanımına güzel bir örnek oluşturmaktadır. Örgün eğitimdeki EÇE programlarını uzaktan eğitim sistemlerine göre eğitim tasarımları yapılarak çeşitli eğitimlerini büyük kitlelere ulaştırmıştır. Bir STK olarak kuruluş aşamasındaki amaçlarını gerçekleştirerek toplumda çeşitli sosyal değerler yarattığı gözlenmiştir. Uzaktan eğitim sistemi ile eğitim hizmeti sunmakta olan STK'rı ile hem kamu ve özel sektör işbirliği yapılmalı hem finansal olarak destek sağlanmalıdır.

EÇE temel bir insan hakkı olarak kabul edilerek, tüm çocuklar için EÇE'i zorunlu eğitim kapsamına alınmalıdır. EÇE için fon sağlanması, diğer eğitim aşamalardaki fonlardan daha yüksek bir yatırım getirisi sağladığından EÇE için kamu finansman programları yürürlüğe konmalıdır. EÇE tüm aileler için sübvanse edilmelidir. "En düşük ve düşük-orta gelirli grup" içinde yer alan ülkelere Birleşmiş Milletler ve Dünya Bankası gibi uluslararası kuruluşlar tarafından finansal ve bilimsel desteğin verilmesi, eşitsizliklerle mücadele için bir zorunluluktur. EÇE eğitim programları özellikle dezavantajlı gruplar, dışlanmış çocuklar için uygun fiyatlı ve tamamen erişebilir olması sağlanmalıdır. 2030 yılına kadar Sürdürülebilir Kalkınma Hedeflerinin 4.2'ci ve 10'cü maddelerindeki hedeflere ulaşmak için kamu, özel sektör ve STK'ların EÇE programları desteklenmelidir.

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# İşitme Engelli Öğrencilere Yönelik Kapsayıcı Toplum İnşasında Dijital Vatandaşlık Eğitimi – KATİDVE Tübitak 4008 Projesinin Değerlendirilmesi

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## Özet

Bu araştırma; TÜBİTAK 4008 Özel Gereksinimli Bireylere Yönelik Kapsayıcı Toplum Uygulamaları bağlamında yürütülen "Kapsayıcı Toplum İnşasında Dijital Vatandaşlık Eğitimi – KATİDVE" projesinin sonuçlarını içermektedir. Projenin amacı; İzmir ilindeki bir özel eğitim meslek lisesinde öğrenim gören işitme kayıplı 24 öğrenci ile sosyal ve beşeri bilimler alanında, dijital vatandaşlık becerilerinin geliştirilmesi, farkındalıklarının artırılmasıdır. Bu amaç doğrultusunda birebir uygulama ve deneyimleme odaklı interaktif etkinlikler yürütülerek kapsayıcı toplum uygulamaları desteklenmiştir.

Araştırma yöntemi olarak betimsel tarama modeli kullanılmıştır. Araştırmanın veri toplama araçları; 2017 yılında Choi, Glassman ve Cristol tarafından geliştirilmiş, 2019 yılında Erdem ve Koçyiğit tarafından Türkçeye uyarlanarak lisans öğrencilerinde geçerlilik ve güvenilirlik testleri yapılmış, 5 faktörlü, 18 maddeden oluşan "Dijital Vatandaşlık Ölçeği", 12 maddelik "Dijital Ayakizi Anketi"dir. Ayrıca öğrencilerin projedeki içeriklere ilişkin farkındalıklarını ölçmek amacıyla, 8 ayrı başarı testi ön test ve son test olarak uygulanmıştır. Öğrencilerle her uygulamanın gerçekleştiği gün sonunda sözlü ve işaret dili tercümanı yardımıyla görüşmeler yapılmıştır. Uygulanan ölçek ve başarı testlerinin etik kurul onayı ile öğrenciler için katılım izni alınmıştır. Bu çalışmada elde edilen verilerin frekans ve betimsel istatistiklerle analizleri sonucunda, işitme engelli lise öğrencilerinin dijital vatandaşlık becerileri ve farkındalıkları hakkındaki bulgulara yer verilmiştir. Katılımcı öğrencilerle sözlü ve işaret dili tercümanı yardımıyla yapılan görüşmelerde; (a) Dijital Vatandaşlık, (b) Kapsayıcılık, (c) Bilimsel Bilgi, (d)Proje Etkinlikleri Hakkındaki Düşünceler temaları tespit edilerek ayrıntılı irdelenmiştir.

**Anahtar Kelimeler**: İşitme Kayıplı Öğrenci, Bilişim Teknolojileri, Dijital Vatandaşlık, Özel Eğitim, Kapsayıcı Toplum Uygulamaları

## Abstract

This research includes the results of the "Digital Citizenship Education in Building Inclusive Society - KATİDVE" project carried out in the context of TÜBİTAK 4008 Inclusive Society Practices for Individuals with Special Needs. The aim of the project is to develop digital citizenship skills and raise awareness in the field of social and human sciences with 24 students with hearing loss studying at a special education vocational high school in Izmir. In line with this purpose, inclusive society practices were supported by conducting one-to-one practice and experience-oriented interactive activities.

Descriptive survey model was used as the research method. The data collection tools of the research are the "Digital Citizenship Scale" consisting of 18 items with 5 factors, which were developed by Choi, Glassman and Cristol in 2017, adapted to Turkish by Erdem and Koçyiğit in 2019 and tested for validity and reliability in undergraduate students and the "Digital Footprint Questionnaire" with 12 items. In addition, in order to measure the awareness of the students about the contents of the project, 9 separate achievement tests were applied as pre-test and post-test. Interviews were held with the students at the end of each practice day with the help of an oral and sign language interpreter. Ethics committee approval of the applied scale and achievement tests and participation permission for the students were obtained. As a result of the analysis of the data obtained in this study with frequency and descriptive statistics, the findings about the digital citizenship skills and awareness of high school students with hearing loss are included. The themes of "(a) Digital Citizenship, (b) Inclusivity, (c) Scientific Knowledge, (d) Thoughts on Project Activities" were identified and examined in detail during the interviews with the participant students with the help of an oral and sign language interpreter.

**Keywords**: Students with Hearing Loss, Information Technologies, Digital Citizenship, Special Education, Inclusive Society Practices

# Giriş

Gelişen iletişim teknolojileri vatandaşlığın doğasını ve kapsamını değiştirmiştir. Geleneksel bir terim olarak vatandaşlık, bireyle devlet arasındaki ilişkiyi vurgulamakta iken dijital vatandaşlık bilgi edinmek için kitle iletişim araçlarını kullanan, aktif ve demokratik değerlere sahip vatandaşı vurgulamaktadır. (Şimşek, & Şimşek, 2013). Dijital teknolojileri ve interneti doğru kullanabilen, etik kurallara uyan ve insan haklarına saygı duyan ve bu araçları kullanırken başkalarına zarar vermeyen vatandaşlar için "dijital vatandaş" kavramı oluşmuştur. Mossberger (2007) dijital vatandaşlığı "teknoloji kullanım becerilerine sahip bireylerin, bu ortamı sorumluluk sahibi bir şekilde ve kuralların farkında olarak kullanması" şeklinde tanımlamıştır. Ribble'a (2007) göre; Dijital Okuryazarlık, Dijital Sağlık, Dijital Erişim, Dijital İletişim, Dijital Ticaret, Dijital Güvenlik, Dijital Etik, Dijital Hukuk, Dijital Haklar ve Sorumluluklar olmak üzere dijital vatandaşlığın dokuz boyutu bulunmaktadır.

Günümüzdeki teknolojik gelişmeler ve internet kullanımı; bazı yeterlilikleri gerektirmenin yanı sıra bireyleri ve toplumları yakından ilgilendiren sorunları da beraberinde getirmektedir. Birçok internet içeriğinin fiziksel ve psikolojik istismar unsuru barındırdığı şikayetleriyle sıklıkla karşılaşılmaktadır.

Birleşmiş Milletlerin 2018 yılında yayınladığı e-devlet araştırma raporunda kamu hizmetlerinde bilgi ve iletişim teknolojilerinin çeşitli önemli avantajlarına rağmen, vatandaşların e-devlet hizmetlerini kullanmakta hala sorunlar yaşadıkları belirtilmektedir. Bu durum dijital kullanım ile sosyal dışlanma arasında negatif bir ilişki olduğunu göstermektedir. (Sohail & Guangwei, 2022). Yine Birleşmiş Milletlerin Sürdürülebilir Kalkınma Hedefleri kapsamında, Nitelikli Eğitim başlığı altında, çocuklara, engellilere, toplumsal cinsiyet eşitliğine duyarlı eğitim olanaklarının yaratılması, geliştirilmesi ve herkes için güvenli, şiddete dayalı olmayan, kapsayıcı ve etkili öğrenme ortamlarının oluşturulması yer almaktadır. Avrupa Komisyonu Engelli Stratejisi'nde de katılım ve erişilebilirlik kavramları hakkında engelli bireylerin yaşam boyu öğrenme fırsatlarına toplumdaki tüm bireylerle eşit nitelikte erişimi için farklı düzenlemeler üzerinde durulmuştur (European Commission, 2010). Aile ve Sosyal Hizmetler Bakanlığı Engelli Hakları Ulusal Eylem Planı'nda İçermeci ve Erişilebilir Toplum, Hakların Korunması ve Adalet, Kapsayıcı Eğitimin de yer aldığı sekiz politikaya değinilmektedir. Bu politikalar çerçevesinde dijital vatandaşlıkla da bağlantılı birçok eylem alanı belirlenmiş ve faaliyetler koordine edilmiştir (Aile ve Sosyal Hizmetler Bakanlığı, 2023). Dolayısıyla engelli bireylerin de çağımızda bilgi ve iletişim teknolojilerini güvenli bir şekilde kullanması, dijital vatandaşlık becerileriyle donanmış bireyler olması yolunda yapılacak çalışmalar, toplumsal bir gerekliliktir.

## Problem Durum

Engel grupları arasında işitme kayıplı bireyler dijital teknolojileri işiten bireyler gibi yoğun olarak kullanmaktadır. İşitme kayıplı bireylerin iletişimdeki sınırlılıklarının bilgi iletişim teknolojilerini kullanım oranlarını arttırdığı bile söylenebilir. Bilgi iletişim teknolojilerinin görüntülü görüşme, işaret dili ile veya görsellerle zenginleştirilmiş içerikler, video ve sosyal medyaya erişim fırsatları sağlaması, işitme kayıplı bireylerin bilgi iletişim teknolojilerini tercih etmelerinde önemli faktörler arasında yer almaktadır. Ancak işitme kaybı alıcı ve ifade edici dil becerilerinde sınırlılıklara neden olabilmektedir. Bu durum dil gelişimlerini, akademik başarılarını ve sosyal becerilerinin gelişimini de olumsuz yönde etkilemektedir. Öğretmenlerin ise işitme kayıplı öğrencilere eğitim içeriğini uyarlama ve öğrencilerle iletişim kurma yeterlilikleri tartışılmaktadır. Öğretmenler, içerikleri öğrencilerin düzeyine uygun şekilde uyarlamada zorlanmaktadır. Bayraktar ve Çuhadar (2015) yaptığı çalışmada, işitme engelliler okullarında öğretmenlerin, öğretim sürecinde bilişim teknolojilerini içerik erişimi, görsellerin ve videoların paylaşımı, kavramların somutlaştırılması gibi düzenlemeler amacıyla kullandığı durumda, işitme kayıplı öğrencilerin kavramlar hakkında daha fazla ipucu alabildiği, dersin konusunu anlayabildiği ve derse katılım gösterdiğini belirtmiştir. Çok ileri işitme kaybı olan bireyler erken işitsel müdahale ve eğitim imkanlarından yararlanamadıklarında işaret dili kullanmak zorunda kalmaktadır. Çoğunlukla işaret diliyle iletişim kuran öğrenciler, sosyal hayatlarında da sadece kendi aralarında iletişim kurabilmektedir. Tüm bu sınırlılıklarla bağlantılı olarak işitme kayıplı bireyler, bu sınırlılıkları olmayanların bile yanılgıya düştüğü dijital dünyaya adaptasyonda, daha çok tuzaklara açık hale gelmektedir. Bu bireylerin hem bilişim teknolojilerinin bilinçli birer kullanıcısı olmaları, olası risklere karşı kendilerini korumaları, eğitim hayatlarının yanında günlük hayatlarının da kolaylaştırılması ve hem de sorumlu birer vatandaş olmaları yolunda güçlendirilmeleri gerekmektedir.

## Önemi

Alberta'ya (2012) göre dijital vatandaşlığın temeli, vatandaşlığın doğasına dayanır. Vatandaşlık, tanımlanmış bir sosyal, siyasal ve ulusal bir topluma vatandaş olma durumu olup birtakım haklar ve sorumluluklar doğurmaktadır. Bunlar; (a) Vatandaşlık, ahlaki ilkeleri edinmeyi gerekli kılar. (b) Kişilerin güçlendirilmesi ve topluma karşı sorumlulukları arasında denge gerektirir. (c) Vatandaşlık katılım gerektirir. (d) Vatandaşlık eğitim gerektirir. (e) Vatandaşlık sürekli geliştiğinden sürekli iletişim ve tartışmaya ihtiyaç duyar. (f) Vatandaşlık kapsayıcı olmalıdır. (g) Vatandaşlık medyanın gelişimi ile yakından ilintilidir. (h) Vatandaşlık toplumla ilintilidir (Alberta, 2012:8-9)

Projede işitme kayıplı öğrencilerin dijital vatandaşlık ilkeleri çerçevesinde kapsayıcı, toplumla iç içe, toplumda bireysel zorunluluk haline gelen dijital platformların da (e-devlet, mhrs, uyap gibi) kullanıldığı, öncesinde elzem bulunan ihtiyaç ve sorunların ışığında altı günlük bir farkındalık eğitimi gerçekleştirilmiştir.

### Amacı

Bu kapsamda bu eğitim projesinde, İzmir ilinde bir özel eğitim meslek lisesinde eğitim gören işitme kayıplı öğrencilere yönelik olarak;

(a) Öğrenci merkezli ve kapsayıcı içeriklerle dijital vatandaşlık alt boyutlarının anlaşılır bir biçimde aktarılması,
(b) Öğrencilerin içeriklere ilişkin yaratıcı düşünme kabiliyetlerini yaparak-yaşayarak geliştirmesi
(c) Dijital becerileri kazandırarak kapsayıcı-katılımcı süreçlerde özgüvenlerinin geliştirilmesi ve pekiştirilmesi
(d) Etkileşimli uygulamalar ve geziler sayesinde öğrencilerin başkalarının yardımına ihtiyaç duymadan hem dijital becerileri hem de katılımcı vatandaş olma bilincini kazanması amaçlanmıştır.

## Yöntem

### Araştırma Modeli ve Katılımcılar

Tübitak 4008 Özel Gereksinimli Bireylere Yönelik Kapsayıcı Toplum Uygulamaları hibe programı ile gerçekleştirilen bu proje faaliyetleriyle, özellikle bilginin sadece aktarılması değil, uygulayarak, gözlemleyerek, yaparak-yaşayarak öğrenme, sosyal becerilerde ve girişimcilik özelliklerinde değişim ve gelişimin meydana gelebilmesi için saha gezilerinin gerçekleştirilmesi, farklı okul öğrencileriyle birlikte etkinliklerde yer almaları ve farkındalık geliştirmeleri odaklı öğrenme isteklerinin geliştirilmesi hedeflenmiştir.

Öncelikle, işitme kayıplı öğrencilere dijital vatandaşlık becerileri nasıl kazandırılabileceği hakkında İzmir ilindeki 11 lise öğrencisinin ve öğretmenlerinin, düzenlenen bir çalıştayda etkinlik planları tartışılmıştır. Ardından işitme kayıplı öğrencilere yönelik eğitim veren İzmir'deki bir özel eğitim meslek lisesindeki öğretmenlere yöneltilen anketle de öğrencilerin ihtiyaçları tespit edilmiş bunlara göre etkinlikler planlanmıştır.

Bu doğrultuda, örneklemin küçük olması sebebiyle tek grup öntest – sontest sonuçlarının frekans yorumlarından ve birebir öğrenci mülakatlarının yorumlanmasından oluşan *betimsel tarama modeli* seçilmiştir. Betimsel tarama modelinde araştırma katılımcılarının bir durum üzerine fikir, bakış açıları veya bilgi düzeyleri gibi bilişsel veya duyuşsal özellikleri belirlenir (Smith, 1983). Katılımcılar, işitme kayıplı ve aynı zamanda 18 yaş altı grubu da kapsadığı için velilerinden Veli İzin Belgesi, gerekli Araştırma Onayı ve Etik Kurul Onayı alınmıştır.

*8 başarı testi* olarak "Teknik Beceriler, Eleştirel Bakış Açısı, Ağ Etkenliği, Aile ve Sosyal Hizmetler Bakanlığı Ekranı, E-Devlet Ekranı, Uyap ve Hukuk, Sağlık ve MHRS, E-Ticaret ve Bankacılık, İstihdam ve İş Başvurusu" öntest ve sontest şeklinde uygulanmış, frekans aralıkları yorumlanmıştır. *1 ölçek* "Dijital Vatandaşlık Ölçeği" ile *2 anket* "Dijital Ayakizi Anketi, Memnuniyet Anketi" uygulanmıştır. Ayrıca her günün sonunda öğrencilerle görüşmeler yapılmış, *günlük görüşme formları* doldurulmuştur.

Projeye, bilişim teknolojileri, moda ve tasarım, güzellik hizmetleri ile muhasebe ve finansman alanlarında bölgedeki işitme kayıplı öğrencilere pansiyonlu olarak eğitim veren özel eğitim meslek lisesinin toplamda 40 öğrencisinden 24'ü seçilmiştir. Öğrencilerin belirlenmesinde, akıllı telefonları olması, internet ve mobil uygulamalara aşina olması, saha gezileri gibi toplu etkinliklere katılımda psikolojik ve fiziksel kısıtı olmaması, velisinin rızası olan gönüllü öğrencilerden oluşmaktadır. Öğrenciler sözlü iletişim kurabilenler ve sözlü iletişim kuramayanlar olmak üzere iki ayrı sınıfta uygulama gerçekleştirilmiştir. Tüm uygulamalarda her iki grup da işaret dili tercümanları tarafından desteklenmiş, ortak uygulamalara ve saha etkinliklerine katılmışlardır. Katılımcıların cinsiyet ve yaş durumlarına ilişkin veriler aşağıdaki tablolarda sunulmaktadır (Tablo 1, 2).

**Tablo 1:** Katılımcıların Cinsiyete Göre Dağılımı

| Cinsiyet | Katılımcı Sayısı | % |
|---|---|---|
| Kız | 11 | 45,83 |
| Erkek | 13 | 54,16 |

**Tablo 2:** Katılımcıların Yaşa Göre Dağılımı

| Yaş | Katılımcı Sayısı | % |
|---|---|---|
| 15 | 2 | 8 |
| 16 | 9 | 37 |
| 17 | 10 | 42 |
| 18 | 3 | 13 |

### Veri Toplama Araçları ve Verilerin Analizi

Yürütülen çalışmada, öğrencilerle düzenli olarak her günün sonunda öğrenci görüşmeleri yapılmış, Öğrenci Görüşme Formları doldurulmuş ve formlar nitel olarak değerlendirilmiştir. Öğrenci Görüşme Formu'nda 3 soru sorulmuştur. Bunlar; "Bugün neler yaptınız?", "Bugün neler öğrendiniz?", "Bugün hakkında ne düşünüyorsun, neler hissediyorsun?" şeklindedir. Bu sorulara verilen cevaplardan 4 temanın öne çıktığı göze çarpmıştır. Bunlar; "Dijital Vatandaşlık", "Bilimsel Bilgi", "Proje Etkinlikleri Hakkındaki Düşünceler", "Kapsayıcılık"tır. Ayrıca, Glassman ve Critol (2017) tarafından geliştirildikten sonra Erdem ve Koçyiğit (2019) tarafından Türkçeye aynı isimle çevrilmiş Dijital Vatandaşlık Ölçeği kullanılmıştır. Ölçekte ters madde bulunmamaktadır. Ölçeğin her bir alt boyutundan alınan yüksek puan bireyin ilgili alt boyutun değerlendirildiği özelliğe sahip olduğunu göstermektedir. Ölçek ayrıca dijital vatandaşlık puanı vermektedir. Ölçeğin geçerlik ve güvenirlik çalışmaları için iki ayrı araştırma yapılmış olup birincisinde 272 kişiden, ikincisinde ise 220 kişiden psikometrik özelliklerinin yeterli düzeyde olduğu belirtilmiştir. Ölçek 18 maddeden ve 5 faktörden oluşmaktadır. Bu faktörler; internette Politik Aktivizm (6 madde), Teknik Beceriler (4 madde), Yerel/Küresel Farkındalık (2 madde), Eleştirel Bakış Açısı (3 madde), Ağ Etkenliği (3 madde)'dir. Ölçek, bağımsız örneklem t testi ile değerlendirilmesi planlansa da uygunluğu karşılanmadığı için frekans yorumları ile değerlendirilmiştir. Ayrıca öğrencilerin internet ortamındaki davranışlarının 2 seçenekli sorularla ortaya çıkarılması için hazırlanmış 12 maddelik "Dijital Ayak izi Anketi" ile öğrencilerin tüm proje faaliyetleri hakkındaki görüşlerini öğrenmek adına 2 ya da 3 seçenekli sorularla hazırlanmış 13 maddelik "Memnuniyet Anketi" uygulanmıştır. Yine Dijital Vatandaşlık alt boyutları ve vatandaşlık uygulamaları kapsamında sorulardan oluşan çoktan seçmeli 10 maddeden oluşan 8 başarı testi kullanılmıştır. Bunlar; "Teknik Beceriler, Eleştirel Bakış Açısı, Ağ Etkenliği, Aile ve Sosyal Hizmetler Bakanlığı Ekranı, E-Devlet Ekranı, Uyap ve Hukuk, Sağlık ve MHRS, E-Ticaret ve Bankacılık, İstihdam ve İş Başvurusu" testleridir.

**Tablo 3:** "Dijital Vatandaşlık Ölçeği"nin KATİDVE Projesi Katılımcıları için Faktör Analizine Uygunluğuna İlişkin veriler

| Kaiser-Mayer-Olkin (KMO) Örneklem Ölçüm Değer Yeterliliği | | 0,383 |
|---|---|---|
| Bartlett Testi | Ki-Kare | 501,413 |
| | Sd | 153 |
| | Sig | <0,001 |
| Cronbach's Alpha | | 0,949 |
| (p<0,001) | | |

## Bulgular

Dijital Vatandaşlık Ölçeği, Günlük Öğrenci Görüşme Formları, Dijital Ayakizi Anketi ve Başarı Testlerine dair bulgular maddeler halinde aşağıda gösterilmiştir.

*(a) Dijital Vatandaşlık Ölçeğinde Verilerin Faktör Analizi Uygunluğuna dair bulgular tablo 3'te verilmiştir.*

Kaiser Mayer Olkin Testi sonucunda, değerin 0,5'den düşük olması halinde faktör analizine devam edilemeyeceği yorumu yapılır (Çokluk ve ark., 2012:207). Field (2000) de Kaiser-Mayer-Olkin Testi için 0,50 değerinin alt sınır olması gerektiğini ve KMO≤0,50 için veri kümesinin faktörlenemeyeceğini belirtmiştir.

Bu doğrultuda tabloda görüldüğü gibi KMO=0,383 tespit edilmiş olup KMO<0,5'ten küçük olduğu için bu örneklem büyüklüğünün faktör analizi için yetersiz olduğu sonucuna ulaşılmıştır. Faktör analizi, örneklem büyüklüğünün yetersiz olması sebebiyle yapılamayacağından araştırmaya nitel olarak her bir faktörün frekans tablolarında incelenerek devam edilmesine karar verilmiştir. Frekans Değerlendirme verileri tablo 4'de verilmiştir.

**Tablo 4:** "Dijital Vatandaşlık Ölçeği"nin Faktörlerine Ait Frekans Değerlendirme Tablosu

| Faktör1: İnternette Politik Aktivizm | | Faktör2: Teknik Beceriler | | Faktör3: Yerel/ Küresel Farkındalık | | Faktör4: Eleştirel Bakış Açısı | | Faktör5: Ağ Etkenliği | |
|---|---|---|---|---|---|---|---|---|---|
| Madde No | Frekans Top. | Madde No | Frekans Top. | Madde No | Frekans Top. | Madde No | Frekans Top. | Madde No | Frekans Top. |
| 1.Madde | 60 | 7.Madde | 72 | 11.Madde | 85 | 13.Madde | 79 | 16.Madde | 80 |
| 2.Madde | 66 | 8.Madde | 63 | 12.Madde | 76 | 14.Madde | 75 | 17.Madde | 83 |
| 3.Madde | 69 | 9.Madde | 82 | | | 15.Madde | 73 | 18.Madde | 92 |
| 4.Madde | 59 | 10.Madde | 83 | | | | | | |
| 5.Madde | 63 | | | | | | | | |
| 6.Madde | 67 | | | | | | | | |
| Ortalama | 64 | Ortalama | 75 | Ortalama | 80,5 | Ortalama | 75,66 | Ortalama | 85 |

Dijital Vatandaşlık Ölçeğini cevaplayan öğrenci grubunun yukarıda her bir faktöre ait sorulara verdiği cevaplardan ortalama ne kadar puan aldıkları yer almaktadır. En yüksek puanın Ağ Etkenliği hakkındaki sorulardan, en düşük puanın ise İnternette Politik Aktivizm sorularından alındığı görülmüştür. Öğrencilerin politik ve sosyal meselelerle ilgili görüşlerini internette düzenli olarak paylaşmak konusunda girişimci olmadıkları ancak teknolojiyi kullanma konusunda kendilerini geliştirmekte oldukları şeklinde yorumlanabilir. Grubun aldığı tüm puanlar ile hesaplanan Dijital Vatandaşlık Puanı 3,07 olarak bulunmuştur. Grupta en yüksek alınan Dijital Vatandaşlık Puanı ise 126 puan üzerinden 5,27 olduğu görülmüştür. Frekans tabloları incelendiğinde yüksek verilen puanlara göre; öğrenciler en çok düşüncelerini, hislerini, görüşlerini ifade etmek için internette özgün mesaj, ses, görüntü ya da videolar paylaştıklarını belirtmişlerdir. Öğrenciler internet kullanımı ile bilgi edindiklerini belirtmişlerdir. Yine internet aracılığı ile insanlarla işbirliği yapmayı çevrimdışı ortamlara göre daha keyifli bulduklarını belirtmişlerdir.

*(b) Günlük Öğrenci Görüşme Formlarında öne çıkan temalara ait veriler tablo 5'te verilmiştir.*

**Tablo 5:** "Günlük Öğrenci Görüşme Formları"nda Öne Çıkan Temalar

| Dijital Vatandaşlık Teması | | Bilimsel Bilgi Teması | | Proje Etkinlikleri Hakkındaki Düşünceler | | Kapsayıcılık | |
|---|---|---|---|---|---|---|---|
| Kodlar | Frekans | Kodlar | Frekans | Kodlar | Frekans | Kodlar | Frekans |
| Dijital Vatandaşlık | 24 | Bilgisayar | 24 | Eğlenceli | 13 | Birlikte Olmak | 17 |
| Haklar ve Sorumluluklar | 17 | Mobil Uygulama | 13 | Heyecanlı | 14 | Sevgi | 18 |
| MHRS | 24 | İnternet | 23 | Merak | 21 | Dostluk | 21 |
| UYAP | 24 | Veri | 20 | Yeni şeyler Öğrenme | 21 | Arkadaşlık | 22 |
| E-Nabız | 22 | Canva | 24 | Yorucu | 15 | Saygı | 13 |
| KADES | 18 | Kahoot | 24 | Fazla Etkinlik | 17 | Ekip | 12 |
| ASHB | 20 | Word | 20 | Teşekkür | 22 | Engelsiz Sinema | 17 |
| Gizlilik | 13 | Sosyal Medya | 24 | Benzer proje isteği | 17 | | |
| Dijital Okuryazar | 18 | Siber Zorba | 20 | | | | |
| | | Oyun Bağımlısı | 15 | | | | |
| | | Bilgisayar Oyunu | 19 | | | | |

Altı günlük proje faaliyetleri boyunca öğrencilerin farklı alanlarda yeni bilgilerle donandığı, görüşme formlarından anlaşılmaktadır. Özellikle mobil uygulamaları kullanabilmeleri, saha gezilerindeki hayata dair uygulamalar, toplumla iç içe yapılan faaliyetler görüşmelere yansımıştır. Bazı öğrencilerin görüşmelerinde ilgileri, merakları rahatlıkla tespit edilebilmektedir. Dijital Vatandaşlık(f=24), bilgisayarda(f=24) canva(f=24) ve kahoot(f=24) uygulamaları yeni teknolojileri öğrenmeye açık olduklarını düşündürmektedir. Vatandaşlık hizmetlerinden MHRS(f=24), UYAP(f=24), E-Nabız(f=22), KADES(f=18), ASHB(f=20) gibi uygulamalara meraklarını pekiştirmek için yapılan saha gezilerinin onları heyecanlandırdığı, eğlendirdiği, dostluk ve arkadaşlık duygularını hatırlattığı görülmektedir. Ancak etkinliklerin yorucu(f=15) ve fazla(f=17) olduğunu söyleyen öğrencilerin olması, etkinlik planlarının dezavantajlı öğrenciler için daha da hafifletilebileceğini düşündürmüştür. Yine de öğrencilerin ilk defa yaşadıkları böyle bir proje süreci onları yeni şeyler öğrenmeye sevk etmiş, farklı öğrenme biçimlerini deneyimlemiş ve olumlu etkilemiştir. Öğrencilerin proje etkinlikleri hakkındaki düşünceler temasında teşekkür(f=22) etmeleri, bu tür projelere katılma isteklerini(f=17) belirtmeleri, bu proje sürecinin onları mutlu ettiği ve olumlu motivasyon kaynağı olduğu görülmektedir.

*(c) Dijital Ayak İzi Anketi'ndeki sorulara ait frekans tablolarına ait veriler tablo 6'da verilmiştir.*

**Tablo 6:** "Dijital Ayak İzi Anketi"ndeki Sorulara Ait Frekans Tablosu

| | Evet | Hayır | | Evet | Hayır |
|---|---|---|---|---|---|
| Her gün internete girer misin? | 20 (%83) | 4 (%17) | İnternette video paylaşır mısın? | 12 (%50) | 12 (%50) |
| İnternette kaç saat çevrimiçi kalırsın? (2 saatten çok/2 saatten az) | 19 (%79) | 5 (%21) | Forum sayfalarındaki tartışmalara katılır mısın? | 5 (%21) | 19 (%79) |
| Sosyal medya üyeliğin var mı? | 20 (%83) | 4 (%17) | Okuduğun haberler için yorum yapar mısın? | 7 (%29) | 17 (%71) |
| Sosyal medya sitelerinde günde kaç saat geçirir? (2saatten çok/2saatten az) | 17 (%71) | 7 (%29) | Anlık ileti alıp gönderir misin? | 15 (%62) | 9 (%38) |
| İnternete telefondan da bağlanıyor musun? | 20 (%83) | 4 (%17) | Aktif olarak e-posta kullanıyor musun? | 15 (%62) | 9 (%38) |
| İnternette şarkı paylaşır mısın? | 9 (%37) | 15 (%63) | Sohbet eder misin? | 23 (%96) | 1 (%4) |

Dijital Ayakizi Anketinde edinilen bulgulara göre öğrencilerin %83'ü her gün internete girdiğini belirtmiş, %79'u internette 2 saatten çok zaman geçirdiğini söylemiştir. %83'ünün sosyal medya üyeliği olup, %71'inin sosyal medya sitelerinde günde 2 saatten çok zaman geçirdikleri görülmektedir. %83'ü internete telefondan bağlandığını belirtirken internette şarkı, video, tartışma, yorum gibi paylaşımlarda bulunma aktivitelerinde etkin olmadıkları görülmüştür. Öğrencilerin en yüksek frekansa sahip cevabı olan sohbet eder misin (f=23, %96) sorusu, dezavantajlarından kaynaklı en çok görüntülü görüşmesine işaret ettiği ve yine okuduğunu anlama ve dil sınırlılıklarından kaynaklı diğer aktivitelerde etkin olamadıkları şeklinde yorumlanmıştır.

*(d) Başarı testlerindeki sorulara ait frekans tablolarına ait veriler tablo 7'de verilmiştir.*

**Tablo 7:** Başarı Testlerine Ait Frekans Tabloları

| Başarı Testleri | | Grubun Max Aldığı Puan (doğru cevaplayan öğrenci sayısı X soru sayısı (10) | Başarı Oranı (%) | Başarı Testleri | | Grubun Max Aldığı Puan (doğru cevaplayan öğrenci sayısı X soru sayısı (10) | Başarı Oranı (%) |
|---|---|---|---|---|---|---|---|
| Teknik Beceriler | Öntest (24 öğr) | 130 (240'da) | 54,11 | E-devlet Ekranı | Öntest (23 öğr) | 87 (230'da) | 37,82 |
| | Sontest (24 öğr) | 99 (200'de) | 49,5 | | Sontest (12 öğr) | 51 (120'de) | 42,5 |
| Eleştirel Bakış Açısı(15 s) | Öntest (23 öğr) | 126 (345'de) | 82,17 | Uyap Ekranı ve Hukuk | Öntest (24 öğr) | 72 (240'da) | 30 |
| | Sontest (19 öğr) | 103 (285'de) | 81,31 | | Sontest (11 öğr) | 53 (110'da) | 48,18 |
| Ağ Etkenliği | Öntest (12 öğr) | 44 (120'de) | 36,66 | MHRS Ekranı | Öntest (22 öğr) | 90 (220'de) | 42,85 |
| | Sontest (15 öğr) | 41 (150'de) | 27,33 | | Sontest (12 öğr) | 53 (120'de) | 44,16 |
| ASHB Ekranı | Öntest (15 öğr) | 65 (150'de) | 43,33 | E-Ticaret | Öntest (24 öğr) | 84 (240'da) | 35 |
| | Sontest (16 öğr) | 81 (160'da) | 50,625 | | Sontest (20 öğr) | 92 (200'de) | 46 |

Başarı testlerinin verilerine bakıldığında önemli birkaç ipucu saptanmıştır. Bunlar ön test ve son teste katılım sayıları aynı olmadığı gibi ilk etkinliklere tam katılım sağlanmışken son etkinliklere doğru öğrencilerin daha azı katılım göstermiştir. Aynı şekilde ön test puanlarının son test puanlarından yüksek oluşu da düşündürücü olmuştur. Öğrenci görüşme formlarıyla birlikte yorumlandığında öğrencilerin yorulduğu, zorlandığı çıkarımında bulunularak ya teste giriş yapmaktan kaçınmış ya da rastgele cevap vermiş olabilecekleri düşünülmüştür. Aynı zamanda okuma ve anlama güçlüğü çeken bu öğrenciler aldıkları işaret dili tercümesinden ziyade birbirlerinin verdikleri cevaplardan da etkilenmiş olabileceği akla gelmektedir. Daha önce böyle bir soru cevap sistemini kullanmamış olmaları da deneyim yetersizliğinin etkisi olduğunu da düşündürmüştür.

# Tartışma, Sonuç ve Öneriler

Bu çalışmada, Tübitak 4008 proje kapsamında yürütülen KATİDVE Projesi katılımcılarının proje sonundaki görüşleri ve proje faaliyetlerinin etkileri ortaya çıkarılmaya çalışılmıştır.

***Dijital Vatandaşlık Ölçeği*** işitme yetersizliği olan bu 24 kişilik örneklem grubu için uygun olmamıştır. Faktörleşme gerçekleşemediği için değerlendirme nitel olarak yapılmıştır. Nitel değerlendirme sonucunda dijital vatandaşlık faktör frekanslarının oldukça düşük olduğu görülmüştür.

***Başarı Testleri***nin grup frekans değerlendirmeleri sonucu ön test sonuçlarının son test sonuçlarından yüksek olduğu durumlar gözlenmiştir. Bu durumun sebebi olarak, öğrencilerin dil, okuduğunu anlama ve hatırlama becerilerinin de etkili olduğu, işaret dili ile desteklemenin yeterli olmadığı, etkinliklerin bu öğrenciler için yoğun ve gün boyunca devam etmesinden kaynaklı yorduğu gösterilebilir. Ayrıca bu işitme kayıplı öğrencilerde öğrenme veya farkındalık gerçekleştirme sürecinin biraz daha fazla tekrar süreci gerektirdiği söylenebilir. Başarı Testi sorularının daha da basitleştirilmesi düşünülürken, kavram ve içeriklerin teknik olması, basitleştirilmesinin gerçekleştirilmesi için özel uzmanlık ve uzun uğraş gerektiren denemeleri gerektirmesi de sınırlılık olarak söylenebilir. Bu sınırlılığın, ileride yapılacak araştırmalarda göz önüne alınması gerekmektedir.

***Öğrenci Görüşmeleri***, proje etkinliklerinin öğrencilerdeki etki ve izlenimlerine dair önemli veri kaynağı olarak gösterilebilir. Öğrencilerin işitme kayıplı olması sebebiyle en etkili veri kaynağı bu görüşmeler olmuştur denebilir.

İşitme kayıplı bireylerde istenenin anlaşılabilmesi onlar için zor olduğu ve örneklem az sayıda olduğu için ölçek, başarı testi gibi nicel araştırmalardan ziyade öğrenci ile birebir görüşmeler daha işlevsel olmuştur.

Öğrencilerin **daha önce ölçek deneyimi olmayışı** da araştırma çalışmalarını zorlayan sebeplerden biri olmuştur.

Ölçme Değerlendirme etkinlikleri daha aza indirilerek, daha çok **paylaşıma dayalı etkinlikler** tasarlanabilir.

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# Covid-19 Salgını Sürecinde Yükseköğretimde Çevrimiçi Sınav Güvenliği Konusunda Alınan Tedbirler

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## Özet

Yükseköğretimde Covid-19 salgını sürecinde çevrimiçi ölçme ve değerlendirme uygulamalarının güvenliğinin sağlanması dikkat çeken bir konu olarak öne çıkmıştır. Araştırmanın amacı, söz konusu süreçte ülkemizdeki yükseköğretim kurumlarında yürütülen çevrimiçi ölçme ve değerlendirme uygulamalarında alınan sınav güvenlik önlemlerini belirlemektir. Araştırma yöntemi olarak karma yöntem tercih edilmiştir. Araştırma kapsamında üniversitelerin web sayfalarından çevrimiçi sınavlara yönelik resmi duyuru ve belgeler elde edilmiştir. Ayrıca, çevrimiçi sınav süreçlerini koordine eden birim yöneticilerine yönelik "Covid-19 Küresel Salgın Dönemi Yükseköğretim Kurumları Sınav Güvenliği Anketi" geliştirilmiş ve uygulanmıştır. Araştırmanın çalışma grubunu ulusal düzeydeki tüm devlet ve vakıf üniversitelerinden çevrimiçi sınavlara yönelik dokümanları elde edilebilen 133 üniversite ile ankete katılım sağlayan 81 üniversite oluşturmuştur. Çalışma grubundan elde edilen veriler üzerinde uygun nicel ve nitel analizler gerçekleştirilmiştir. Üniversitelerin çevrimiçi sınavlarını genellikle öğrenme yönetim sistemleri üzerinden yürüttükleri ve bazı diğer uygulamaları da kullandıkları görülmüştür. Ayrıca sınırlı sayıda üniversitenin kendi geliştirdikleri öğrenme yönetim sistemini kullandıkları bildirilmiştir. Üniversitelerde öğrencilerin başarı puanlarının hesaplanmasında çoğunlukla çevrimiçi sınavlar, ödevler ve projeler kullanılmıştır. Güvenlik tedbirleri açısından üniversiteler tarafından yüksek oranda önerilen başlıca sınav tedbirleri soruların rastgele gelmesi ve seçeneklerin farklı sıralarda gelmesidir. Çevrimiçi sınavlarda en çok kullanılan soru tipinin çoktan seçmeli olduğu, ayrıca doğru/yanlış, açık uçlu, boşluk doldurma gibi soru tiplerinin genel olarak kullanıldığı görülmüştür. Üniversitelerin yine bu süreçte öğretim elemanlarına ve öğrencilerine yönelik çevrimiçi sınav uygulamaları ve sınav güvenliğine ilişkin eğitimler verdiği belirlenmiştir. Buna ek olarak dezavantajlı veya engelli öğrencilere bu süreçte farklı destekler sağlanmış olup, genellikle sınavlarda ek süre verilmiştir. Araştırma sonuçlarının ilgili döneme ait durumu ortaya çıkararak çevrimiçi sınav güvenliği konusunda yükseköğretim kurumları için yol gösterici olacağı düşünülmektedir.

**Anahtar Kelimeler:** Çevrimiçi sınav, sınav güvenliği, ölçme değerlendirme, uzaktan eğitim, gözetimli sınav

## Abstract

During the Covid-19 pandemic in higher education, ensuring the security of online assessment and evaluation practices has become a notable issue. The aim of this study is to determine the exam security measures taken in online assessment and evaluation practices carried out in higher education institutions in Türkiye during the Covid-19 process. Mixed method was used as the research methodology. Official announcements and documents regarding online exams were obtained from the web pages of universities. In addition, the "Higher Education Institutions' Online Examination Security Questionnaire during Covid-19 Global Pandemic Period" was developed and applied to unit/center managers who coordinate online exam processes. The study group of the research consisted of 81 universities that participated in the survey from all state and foundation universities at the national level. Appropriate quantitative and qualitative analyses were performed on the data obtained from the study group. It was observed that universities generally conduct their online exams through learning management systems and use some other applications. It was also reported that a limited number of universities use their own learning management system. Online exams, assignments and projects were mostly used to calculate students' achievement scores. In terms of security measures, it was observed that the most common exam measures recommended by universities were randomizing questions and using different orders of options. It was observed

that the most commonly used question type in online exams was multiple choice, and question types such as true/false, open-ended, fill-in-the-blank were generally used by universities. It was also determined that universities provide in-service training on online exam security for their lecturers and students in this process. In addition, disadvantaged or disabled students were provided with different supports in this process and were generally given additional time in exams. It is thought that the results of the research will be a guide for higher education institutions for online exam practices by revealing the existing situation of the related period.

**Keywords**: Online exam, exam security, assessment and evaluation, distance education, proctored exam

# Giriş

2019 yılının sonlarına doğru Covid-19 salgınının küresel çapta yayılması sonucunda toplumsal bulaşma riskini de göz önünde bulundurarak neredeyse tüm eğitim kurumları yüz yüze eğitimden uzaktan eğitime geçiş yapmıştır. Ülkemizde de Covid-19 vakalarının başlamasıyla birlikte Yükseköğretim Kurulu (YÖK), Mart 2020'den itibaren yükseköğretim kurumlarında ve diğer tüm eğitim kademelerinde uzaktan eğitim uygulanmasına karar vermiştir. Öğretmenler ve öğrenciler uzaktan eğitimin acil olarak uygulanmasına hazırlıksız yakalanmışlardır. Özellikle, uzaktan eğitimin teknolojik gereksinimlerinin karşılanması ile ilgili bir takım olumsuzluklar yaşanmıştır. Teknolojik cihaz ve internet erişimi eksikliği nedeniyle öğrencilerin evlerinden derslere katılamaması, uzaktan eğitimin uygulanmasının önündeki en önemli engellerden biri olmuştur. Yükseköğretim kurumlarının çoğunun uzaktan eğitim için yeterli olanaklara sahip olmaması ve öğrenme yönetim sistemleri ile canlı ders uygulamaları gibi uzaktan eğitim sistemlerinden yoksun olması, hızlı karar alma ve uygulama zorunluluğunu doğurmuştur. Teknik yetersizlikler, yeterli çevrimiçi araçların bulunmaması, öğretmen ve öğrencilerin deneyimsizliği kurumların bu geçiş sürecinde karşılaştığı başlıca engeller olmuştur (Şenel ve Şenel, 2021). Acil uzaktan eğitim sürecinin hayata geçirilmesi, sisteme teknik destek sağlanması ve uzaktan eğitim sistemine ilişkin eğitimlerin yürütülmesinde, yükseköğretim kurumları bünyesinde üniversitelerin Uzaktan Eğitim Uygulama ve Araştırma Merkezleri (UZEM) birinci derecede rol almıştır. Üniversitelerdeki UZEM'lerin kuruluş süreçleri pandemi sonrası dönemde hızlanmış ve yükseköğretim kurumlarının büyük çoğunluğunda aktif hale gelmiştir.

Acil uzaktan eğitime geçişin bir sonucu olarak eğitim ve öğretim süreci için hayati önem taşıyan ölçme ve değerlendirme uygulamalarının hayata geçirilmesi konusunda endişeler ortaya çıkmıştır. Pandemi öncesinde ölçme ve değerlendirmenin önemli bir kısmını oluşturan yüz yüze sınavların yapılamaması nedeniyle ödevler, projeler ve çevrimiçi ölçme ve değerlendirme daha fazla ön plana çıkmıştır. Bu kapsamda YÖK (2020), dijital ortamlarda uygulanabilecek üniversite sınavlarının temel ilkelerini açıklamıştır. Buna göre, uzaktan eğitim değerlendirme süreçlerinde gözetimli veya gözetimsiz, açık uçlu veya çoktan seçmeli maddeler içeren çevrimiçi sınavlar, ödevler, çevrimiçi kısa sınavlar, projeler, ÖYS etkinlikleri, ÖYS kullanım analitikleri ve benzeri uygulamaların kullanılabileceğini duyurmuştur. Ayrıca, ölçme ve değerlendirme uygulamalarının şeffaf ve denetlenebilir olması, rastgele soru seçimi, tam ekran ve tarayıcı kilidi gibi dijital ortamların izin verdiği güvenlik önlemlerinin uygulanması gerektiğini belirtmiştir.

Bu çalışmada, Covid-19 pandemisi sürecinde yükseköğretimde zorunlu hale gelen acil uzaktan eğitim koşullarında gerçekleştirilen çevrimiçi ölçme ve değerlendirme uygulamalarına yönelik alınan güvenlik önlemleri incelenmiştir. Araştırma sonuçlarının ilgili döneme ait durumu ortaya çıkararak çevrimiçi sınav güvenliği konusunda yükseköğretim kurumları için yol gösterici olacağı düşünülmektedir.

# Yöntem

Bu araştırmada Covid-19 salgını sırasında yükseköğretimde zorunlu olarak geçilen acil uzaktan öğretim koşullarında gerçekleştirilen çevrimiçi ölçme değerlendirme uygulamalarına ilişkin üniversiteler tarafından alınan sınav güvenlik tedbirleri araştırılmıştır. Bu amaca uygun olarak, araştırmada karma araştırma yöntemi kullanılmıştır. Karma yöntemler hem nicel hem de nitel verilerin toplandığı ve bu verilerin birbirleriyle bütünleştirilerek sonuçlar çıkarıldığı bir yöntem olarak tanımlanmaktadır (Creswell, 2019). Karma araştırma desenlerinden verilerin eş zamanlı toplanıp birlikte yorumlandığı paralel desen kullanılmıştır. Araştırmada ilk olarak pandemi sürecinin başından itibaren üniversiteler tarafından çevrimiçi sınav güvenliğine yönelik alınan kararları belirlemek üzere Türkiye'de bulunan tüm üniversitelerin internet sayfalarındaki duyurular, UZEM duyuruları, yayımlanmış senato kararları vb. belgeler incelenerek araştırmaya uygun veriler elde edilmiştir. Elde edilen nitel veriler doküman incelemesi yoluyla analiz edilerek üniversiteler tarafından alınan güvenlik önlemleri içerik analizi ile ortaya konulmuştur. İçerik analizi belirli kodlamalara dayalı kurallarla metinlerin bazı sözcüklerinin daha küçük içerik kategorileri ile özetlendiği sistematik, yinelenebilir bir teknik olarak tanımlanmaktadır (Büyüköztürk, 2015).

Araştırmanın amacı doğrultusunda, üniversite resmi duyuru ve belgelerine ek olarak üniversitelerin çevrimiçi sınav süreçlerini koordine eden birim yöneticilerine uygulanmak üzere "Covid-19 Küresel Salgın Dönemi

Yükseköğretim Kurumları Sınav Güvenliği Anketi" geliştirilmiştir. Anket geliştirme basamakları problemin tanımlanması, maddelerin yazımı, uzman görüşlerinin alınması ve ön uygulamanın gerçekleştirilmesi olarak belirtilmektedir (Büyüköztürk, 2015). Bu aşamalara uygun olarak anket oluşturulmuş ve uygulama gerçekleştirilmiştir. Bu çalışma kapsamında anketten elde edilen üniversite ve birim yöneticilerinin temel bilgileri (üniversite türü, birim vb.) ile üniversitelerde gerçekleştirilen çevrimiçi sınav uygulamalarında kullanılan yöntemler ve alınan güvenlik tedbirlerine yönelik bilgiler ele alınmıştır. Anketten elde edilen nicel verilerin frekans ve yüzde gibi betimsel istatistikleri elde edilmiş, nitel verilerin ise betimsel içerik analizi gerçekleştirilmiştir. Nicel verilerin analiz edilmesinde SPSS paket programından, nitel verilerin analiz edilmesi için ise NVivo nitel analiz programından yararlanılmıştır.

Araştırmanın çalışma grubunu küresel salgın döneminde ulusal düzeydeki tüm devlet ve vakıf üniversitelerinden çevrimiçi sınavlara yönelik dokümanları elde edilebilen 133 üniversite ile ankete katılım sağlayan 81 üniversite oluşturmuştur. Araştırmaya katılım sağlayan üniversitelerin %69,1'i devlet üniversitesi, %30,9'u ise vakıf üniversitesidir. Bu üniversitelerde katılımcıların çoğunluğunun Uzaktan Eğitim Merkezlerinde (%63) ve bir kısmının da Bilgi İşlem Dairesinde (%18,5) çalıştıkları görülmektedir. Bu birimlerin dışında, Öğrenme ve Öğretme Merkezi ile Dijital Dönüşüm Ofisi gibi birimlerden de katılımcılar bulunmaktadır. Çevrimiçi sınavların yürütülmesi ile ilgili bu birimlerde görev yapan personel sayılarının ise çoğunlukla (%84) 10 kişi veya daha az olduğu görülmektedir.

# Bulgular

## Üniversite Belgelerinin İncelenmesine İlişkin Bulgular

Araştırma kapsamında üniversitelerin web sayfalarında yayınlanan duyurular, sınav kuralları, yönergeler vb. resmi evraklar incelenmiştir. Buna göre, üniversitelerden elde edilen belgelerde en çok değinilen sınav güvenlik önlemlerinin sınav esnasında her sayfada tek soru olacak şekilde sınavların gerçekleştirilmesi ve cevaplanan sorulara geri dönmenin engellenmesi olduğu görülmüştür. Bu şekilde, sınav sorularının topluca görüntülerinin alınmasının ve önceki soruların olası bir etik dışı durumda cevaplarının değiştirilmesinin önüne geçilmeye çalışıldığı söylenebilir. Soruların tek tek de olsa görüntülerinin alınması durumuna karşın bazı üniversiteler tarafından soruların karekod ve filigran benzeri tekniklerle koruma altına alındığı da belirtilmiştir.

Üniversiteler tarafından çoğunlukla uygulanması önerilen bir diğer güvenlik önlemi de öğrencilere sınav giriş hakkının tek sefer ile sınırlandırılmasıdır. Böylelikle, öğrenciler sınavlarını tamamladıktan sonra sınava tekrar giriş yapamamaktadır. Ancak bu durum sınavın öğrenci tarafından sonlandırılması durumunda geçerli olmaktadır. Teknik problemlerden dolayı sınav ekranından bağlantısı kesilen öğrencilere çoğu üniversitede sınava tekrar bağlanma hakkı tanındığı görülmektedir. Bu durumda öğrenciye sınav için herhangi bir ek süre verilmemekte, öğrenci kaldığı yerden sınava devam edebilmektedir. Bazı üniversitelerde öğrencinin belirli bir süre içerisinde (örn. 5 dk.) tekrar bağlantısının sağlanması kuralı getirilmiştir. Belirlenen sürede sınava bağlanamayan öğrencilerin haklı ve geçerli mazeretlerini belgelendirmeleri kaydıyla telafi sınavına alınabileceği belirtilmektedir.

Öğrencilerin sınava katıldıkları cihazların kimlik bilgileri, IP adresleri, sınav ekranında kalma süreleri ve soruları cevaplama süreleri, sınav ekranından ayrılma süreleri gibi bilgilerin de üniversiteler tarafından sınav güvenliği bağlamında izlenebileceği belirtilmiştir. Bu log kayıtları ÖYS tarafından tutulmakta ve sınav esnasında veya sonrasında gerçekleşen etik dışı durumların tespitinde kullanılabilmektedir. Bu kayıtlar öğrenci hareketlerinin tespit edilmesinde kullanılmakta ancak öğrenci hareketlerini kısıtlayamamaktadır. Öğrenci hareketlerini sınırlandırma amacıyla bazı üniversitelerde güvenli tarayıcı ve yapay zeka uygulamalarının gerçekleştirildiği görülmüştür. Bu kapsamda yüz tanıma, ekran dışına bakma, boş ekran, telefon ve kişi tespiti, kimlik doğrulama ve konum ile IP bilgilerinin elde edilmesi işlemlerin bu algoritma ile gerçekleştirilebileceği belirtilmektedir.

Üniversitelerde sıklıkla karşılaşılan bir diğer sınav güvenlik uygulaması da soru havuzu oluşturulması ve sınav formlarının bu soru havuzundan öğrencilere farklı sorular gelecek şekilde sistem tarafından oluşturulmasıdır. Üniversitelerde her bir sınav için kullanılması planlanan soru sayısının en az iki katı olacak şekilde soru oluşturulmasına yönelik öğretim elemanlarına bilgilendirmelerde bulunulmuştur. Ayrıca, sınav ayarlarından sınav sorularının yerlerinin ve cevap seçeneklerinin karıştırılması tedbirleri de üniversiteler tarafından sıklıkla önerilen tedbirlerdendir.

Sorulara verilen cevapların orijinalliğinin sorgulanması da üniversiteler tarafından önerilen önemli bir güvenlik önlemi olarak karşımıza çıkmaktadır. Açık uçlu soruların kullanıldığı uygulamalarda veya proje, performans gibi çalışmalarda intihal tespit programları aracılığıyla kontrollerin sağlanması şeklinde önlemler çoğu üniversite tarafından önerilmiştir.

Sınav sürelerinin belirlenmesini üniversiteler çoğunlukla öğretim elemanlarına bırakmış ancak soruların özelliklerine göre uygun süreler verilmesi gerektiğini belirtmişlerdir. Üniversitelerin genelinde yer verilen sınav

bazında süre sınırlamaları ile ilgili önlemlerin yanı sıra bazı üniversitelerde ise soru bazında süre belirlenmesi önlemi de önerilmiştir. Bazı üniversiteler sınav başladıktan belirli bir süre geçtikten sonra öğrencileri sınava kabul etmeme ile ilk 15 dakika veya tüm sınav süresince sınavdan çıkışı yasaklama gibi sınav süresi ve sınava katılım ile ilgili sınav güvenlik önlemleri de belirlemişlerdir.

Üniversiteler tarafından özellikle gözetimli sınavlar bağlamında kamera ve mikrofon kullanımına ilişkin tedbirlere de yer verilmiştir. Üniversitelerin çoğunluğunda sınavlarda kamera kullanılmasına yönelik önlemler alınması ifade edilmekteyken, uygulamada kamera sayısı ve konumlandırılmasıyla ilgili farklı düzenlemeler de bulunmaktadır. Çoğu üniversite tek bir kamera kullanımını benimsemiş ancak bazı üniversitelerde özellikle sınav ekranına bağlanılan cihaz dışında öğrencinin sınav ekranını, kendisini ve masasının üstünü gösterecek şekilde farklı bir kameranın da konumlandırılması istenmiştir. Kamera kullanılan sınavlarda güvenliğin sağlanmasına yönelik kamera aracılığı ile kimlik kartlarının kontrol edilmesi de üniversiteler tarafından önerilen uygulamalar arasında yer almaktadır. Kamera kullanımı kadar yaygın olarak önerilmese de üniversiteler tarafından öğrencilerin mikrofonlarının açık tutulması da alınan sınav güvenlik tedbirlerindendir.

Özellikle pandeminin ilk zamanlarında öğrencilerin çevrimiçi sınav ortamlarına aşina olmamasından dolayı yaşanabilecek sorunların önüne geçilmesi ve sınavların sağlıklı şekilde yürütülebilmesi için sınavlardan önce deneme oturumu uygulaması yapılması da önerilmiştir. Bu uygulamayı öneren çoğu üniversitede, öğrencilerin sınav sistemini tanımaları ve sisteme giriş yapmaları için öğrencilere duyuru yapılmıştır. Bazı üniversitelerde öğretim elemanlarının da sınavlarından önce deneme uygulaması gerçekleştirmeleri önerilmiştir.

## Anket Verilerine İlişkin Bulgular

Çevrimiçi gerçekleştirilen sınav uygulamalarının çoğunlukla Moodle (%38,3), ALMS (%28,4) ve Blackboard (%14,8) üzerinden gerçekleştirildiği görülmüştür. Bunların dışında Zoom, Google Meet, BBB, Adobe Connect vb. konferans uygulamalarıyla da sınavların gerçekleştirildiği belirtilmiştir. Dikkat çekici bir diğer bulgu da yedi üniversite tarafından sınavların kendi geliştirdikleri ÖYS'ler vasıtasıyla gerçekleştirildiğinin belirtilmiş olmasıdır.

### Başarı puanlarının hesaplanması

Üniversitelerde öğrencilerin başarı puanlarının hesaplanmasında kullanılan yöntemlere ilişkin bilgiler incelendiğinde, pandemi döneminde öğrencilerin başarı puanlarının hesaplanmasında üniversitelerde çoğunlukla çevrimiçi sınavların (%98,8), ödevlerin (%93,8) ve projelerin (%75) kullanıldığı görülmüştür. Bunlara ek olarak, canlı yayın/video (%36,3) şeklinde uygulamalar ile tartışmalar (%21,3) da ölçme değerlendirme amacıyla kullanılmıştır.

### Kullanılan soru tipleri

Üniversitelerde gerçekleştirilen çevrimiçi sınav uygulamalarında kullanılan soru tiplerine ilişkin bilgiler incelendiğinde, çevrimiçi sınavlarda en çok kullanılan soru tipinin çoktan seçmeli (%98,8) olduğu görülmüştür. Ayrıca, doğru/yanlış (%81,5), açık uçlu (%77,8), boşluk doldurma (%75,3), dosya yükleme (%74,1) soru tiplerinin genel olarak üniversiteler tarafından kullanıldığı görülmüştür. Ancak eşleştirme sorularının (%48,1) diğerlerine oranla daha az tercih edildiği söylenebilir. Bunların dışında çoklu seçmeli, sıralamalı ve hesaplamalı soru tiplerinin de kullanıldığı üniversiteler tarafından belirtilmiştir.

### Önerilen güvenlik tedbirleri

Üniversiteler tarafından en yüksek oranda önerilen sınav tedbirlerinin soruların rastgele gelmesi (%91,4) ve seçeneklerin farklı sıralarda gelmesi (%91,4) olduğu görülmüştür. Ayrıca gerçekçi ve zorlayıcı sınav süresi (%81,5), ekranda tek soru görünmesi (%79,0), soru bankası oluşturulması (%75,3) gibi tedbirlerin alınması da büyük oranda önerilmiştir. Bunların dışında yanıtlanan soruya geri dönülememesi, gözetmen kullanılması, kamera ile kimlik tespiti ve birden çok doğru cevabı olan sorular kullanılması gibi tedbirler de önerilmiştir.

### İntihal tespit programlarının kullanımı

Çevrimiçi sınavlarda üniversiteler tarafından intihal tespit programlarının kullanılmasına ilişkin bilgiler incelendiğinde, üniversitelerin yarıdan fazlasının (%60,5) intihal tespit programları kullanmadığı görülmüştür.

### Öğretim elemanlarına ve öğrencilere yönelik eğitimler

Üniversitelerin çevrimiçi sınav uygulamaları konusunda öğretim elemanlarına eğitim verip vermediğine ilişkin bilgiler incelendiğinde, üniversitelerin çok büyük bir kısmı tarafından (%92,6) çevrimiçi sınavlar konusunda öğretim elemanlarına eğitim verildiği görülmüştür. Üniversitelerin çevrimiçi sınav uygulamaları konusunda öğrencilere eğitim verip vermediğine ilişkin bilgiler incelendiğinde ise, üniversitelerin büyük çoğunluğunun (%79,0) çevrimiçi sınavlar konusunda öğrencilerine eğitim verdikleri görülmüştür.

### Öğrencilere yapılan/yapılması önerilen bilgilendirmeler

Üniversitelerin çevrimiçi sınav uygulamaları hakkında yaptıkları/yapılmasını önerdikleri bilgilendirmelere ilişkin bilgiler elde edilmiştir. Bu bilgilere göre, üniversitelerin öğrencileri en çok sınav süresi (%97,5), sınav türü (%90,1) ve öğrenci sorumlulukları (%82,7) konularında bilgilendirdikleri görülmüştür. Üniversiteler tarafından öğrencilerin en az bilgilendirildiği konuların ise etik kurallar, gözetim ve KVKK olduğu söylenebilir. Çalışmaya katılan üniversitelerin %2,5'i ise öğrencileri herhangi bir konuda bilgilendirmediğini belirtmiştir.

*Teknik problem yaşayan öğrencilere yönelik prosedürler*

Üniversitelerin çevrimiçi sınavlarda teknik problemler yaşayan öğrencilere ilişkin belirlemiş oldukları prosedürlere ilişkin bilgilerin nitel analizleri sonucunda belirlenen prosedürlere ilişkin "telafi/mazeret sınavı", "sınava tekrar bağlanma", "ödevlendirme" ve "okulda sınava katılım" temaları ortaya çıkarılmıştır. Bu prosedürlere ilişkin elde edilen ilk tema "Telafi/mazeret sınavı" olarak ortaya çıkmıştır. Üniversitelerin çoğunda sınavda teknik problemler yaşayan ve bu problemleri sınav anında çözülemeyen öğrencilerin telafi sınavına alındığı görülmüştür. Belirlenen prosedürlere ilişkin bir diğer tema "sınava tekrar bağlanma" olarak ortaya çıkmıştır. Öğrencinin sınav sırasında problem yaşaması durumunda gerekli mercilerle iletişime geçmesi sağlanarak, sınav süresinin aşılmamış olması durumunda öğrencinin sınava tekrar bağlanmasına izin verildiği görülmüştür. Teknik problemlerin çözümüne ilişkin üniversiteler tarafından belirlenen ve araştırma sonucunda ortaya çıkan diğer temalar da "ödevlendirme" ve "okulda sınava katılım" olarak gözlenmiştir. Çevrimiçi sınav sırasında problem yaşaması durumunda öğrenciye ek ödev hakkı tanınmakla birlikte sürekli sıkıntı yaşayan öğrencilere başvuru yapmaları halinde kampüslerde bilgisayar laboratuarını kullanma imkanı sunulduğu belirtilmiştir.

*Dezavantajlı/engelli öğrencilere yönelik tedbirler*

Dezavantajlı/engelli öğrencilerin sınavlarının dijital ortamlarda sağlıklı bir şekilde yürütülebilmesi için üniversiteler tarafından alınmış olan tedbirlere ait bilgiler incelendiğinde, üniversitelerin %40,7'sinde dezavantajlı/engelli öğrencilere çevrimiçi sınavlarda ek süre verildiği görülmüştür. Ayrıca öğrencilere okuyucu yardımı sunan üniversite oranı %27,2; işaretleyici yardımı sunan üniversite oranı ise %19,8'dir. Buna karşın, üniversitelerin %37'sinde bu öğrencilere ilişkin herhangi bir tedbir alınmadığı belirtilmiştir. Bunlara ek olarak, büyük puntolu sorular oluşturulması, gözetmenin sınav esnasında öğrencinin ihtiyaçları ile ilgilenmesi, üniversite laboratuvarlarının bu öğrencilere yönelik kullandırılması, ölçme değerlendirmenin ödev olarak yürütülmesi, engel durumlarına özel çözümler geliştirilmesi gibi tedbirlerin alındığı da belirtilmiştir.

*Deneme sınavı/Deneme oturumu*

Üniversiteler tarafından öğretim elemanlarına çevrimiçi sınavlar öncesinde öğrencilere yönelik deneme sınavı/deneme oturumu gerçekleştirilmesinin önerilmesine ilişkin bilgiler incelendiğinde, üniversitelerin %76,5'inde öğretim elemanlarına çevrimiçi sınavlar gerçekleştirilmeden önce öğrencilere deneme sınavı/deneme oturumu yapmalarının önerildiği görülmüştür. Bu durum, üniversitelerin çoğunluğunda öğrencilerin çevrimiçi sınavların gerçekleştirildiği ortamlara alışkanlık kazanmalarına önem verildiğini göstermektedir. Buna karşın, deneme sınavı/deneme oturumu gerçekleştirilmesini önermeyen üniversite oranı %23,5'tir.

*Önerilen sınav gözetimi uygulamaları*

Üniversiteler tarafından öğretim elemanlarına çevrimiçi sınavların yürütülmesi sırasında kullanılması önerilen gözetim uygulamalarına ilişkin bilgiler incelendiğinde, üniversitelerin %38,3'ünde çevrimiçi sınavlarda gözetime ilişkin herhangi bir uygulamanın önerilmediği görülmüştür. Gözetim önerilen üniversitelerde ise en fazla önerilen uygulama gözetmen atama olmuştur. Üniversitelerin %35,8'i çevrimiçi sınavlarda gözetmen atanmasını önermiştir. Öğrenci hareketlerinin ÖYS üzerinden izlenmesini öneren üniversitelerin oranı ise %30,9'dur. Ayrıca, tek bir kamera ile gözetim yapılmasını öneren üniversitelerin oranı da %29,6 olarak görülmüştür. Buna karşın, birden fazla kamera ile gözetim yapılmasını öneren üniversitelerin oranı %9,9 olarak gözlenmiştir.

*Alınan/önerilen güvenlik önlemlerine ilişkin görüşler*

Çevrimiçi sınavlara yönelik üniversiteler tarafından alınan/önerilen güvenlik önlemlerinin yeterliliğine ilişkin görüşlere ait bilgiler incelendiğinde, üniversitelerin %25,9'unun uygulanan/önerilen sınav güvenlik önlemlerini yeterli bulduğu, %63'ünün de kısmen yeterli bulduğu görülmüştür. Üniversitelerin yalnızca %11,1'i alınan/önerilen güvenlik önlemlerinin yeterli olmadığını düşünmektedir.

*Gerçekleştirilen farklı uygulamalar*

Üniversitelerin sınav güvenlik önlemleri kapsamında gerçekleştirdikleri farklı uygulamalara ilişkin bilgiler incelendiğinde "kişiye özgü sorular" ve "güvenli sınav ortamı" temaları elde edilmiştir. Kişiye özgü sorular temasında farklı soru tiplerinden yararlanılarak etik ihlallerin önüne geçilmeye çalışıldığı ortaya çıkmıştır. Güvenli sınav ortamı temasında ise katılımcılar tarayıcı güvenliği üzerine çalışmalar gerçekleştirdiklerini belirtmişlerdir.

## Tartışma ve Sonuç

Çalışma bulgularına göre, Türkiye'deki yükseköğretim kurumları acil uzaktan eğitim sürecindeki sınav uygulamaları için öncelikle mevcut Öğrenme Yönetim Sistemlerini ve(ya) senkron videokonferans araçlarını kullanmışlardır. Bununla birlikte, kendi sınav yazılımlarını daha önceden geliştirmiş olan ve bu sistemleri kullanan kurumlar da bulunmaktadır. Pandemi sürecinde öğrenme yönetim sistemlerinin ve videokonferans araçlarının kullanımının dünya genelinde büyük oranda arttığı görülmektedir (OECD, 2021). Bu araçların etkin kullanımı için teknolojik ve finansal olanakların yanı sıra bütünleşik pedagojik yaklaşımlar ve kullanıcıların yetkinliği önem kazanmaktadır. Söz konusu yaklaşımların uygulanması ve yetkinliklerin desteklenmesi noktasında, dünya genelinde Öğrenme ve Öğretme Birimlerinin oldukça etkin bir rol aldığı (Salmi, 2020), acil uzaktan eğitim sürecinde ise Uzaktan Eğitim Merkezlerinin (UZEM) uzaktan eğitim kapasitesini oluşturmada ve yönetmede oldukça önemli bir rol üstlendiği görülmektedir (Karadağ vd, 2021). Bu çalışmanın katılımcılarının büyük çoğunluğu UZEM'lerde görev almakta olup, Bilgi İşlem Merkezlerinde, Öğrenme ve Öğretme Gelişimi Merkezlerinde ve Dijital Dönüşüm Ofislerinde görev alan katılımcılar da bulunmaktadır.

Acil şekilde geçilen uzaktan eğitime öğrencilerin ve öğretim elemanlarının hazırlıksız yakalanması sebebiyle çevrimiçi sınav ortamlarının kullanımına yönelik eğitimlerin verilmesi ihtiyacı doğmuştur. Üniversitelerin büyük kısmında çevrimiçi sınavlar konusunda öğrencilere ve öğretim elemanlarına eğitim verildiği görülmüştür. Böylece sınavların gerçekleştirildiği sistemden kaynaklanabilecek sorunların önüne geçilmeye çalışılmıştır.

Klasik sınavlara yönelik alınan sınav tedbirlerinin çoğunlukla Öğrenme Yönetim Sistemi'nin sunduğu olanaklar çerçevesinde; süre kısıtlaması, soruların karışık sırada gelmesi, soru seçeneklerinin karışık sırada gelmesi, soru havuzlarının kullanılması, ekranda aynı anda tek soru görüntülenmesi ve yanıtlanan sorulara geri dönülememesi, öğrenci ekran hareketlerinin izlenmesi gibi ayarlar olduğu görülmektedir. Öğretim elemanları ve öğrenciler bu sınav özellikleri hakkında bilgilendirilmiş, ayrıca ilgili özellikler sınav tanımlamalarında ön bilgi olarak yer almıştır. Üniversitelerin büyük çoğunluğunda, deneme sınav uygulamalarının yürütülmesi önerilmiştir. Öğrenme Yönetim Sistemi olanaklarına ek olarak senkron araçlardan (Zoom, Teams vb. ortamlardan) yararlanılarak görüntü gözetimi gerçekleştirilmiş; kendi sistemini geliştiren kurumlar da bu özellikleri sistemlerine eklemişlerdir. Bazı üniversitelerde güvenli tarayıcı ve yapay zeka uygulamaları da gerçekleştirilmiştir.

Sınavlarda kayıt alma ve kamera kullanımı konularında KVKK nedeniyle çekinceler oluştuğu anlaşılmaktadır. Üniversitelerin yalnızca üçte biri tek veya birden fazla kamera ile gözetim yaptığını belirtmiştir. Ayrıca üniversitelerin çoğunluğunun gözetim ve KVKK hakkında yeterli bilgilendirme yapmadıkları görülmekte olup bu durumun sebebinin ise özellikle sürecin başında KVKK ile ilgili bilinmezlikler olduğu söylenebilir.

Alınan tedbirlerin, genellikle alanyazında belirtildiği gibi öğrencilerin kopya çekebileceği endişesine (Hiller, 2014; King, Guyette ve Piotrowski, 2009; Lanier, 2006) dayalı olduğu söylenebilir. YÖK'ün 2020 yılının sonlarına doğru üniversitelerle paylaştığı yazıda kopya uygulamalarına dikkat çekerek sınav güvenliği için gerekli tedbirlerin alınmasının talep etmesi bu konudaki yaklaşımları etkilemiş olabilir. Bu durum uluslararası alanyazında da yer bulmaktadır (Newton ve Essex, 2022; Purpura vd, 2021; Sinha vd, 2020; Valizadeh, 2022). Bununla birlikte, uzaktan eğitim sürecinde süreç odaklı ölçme değerlendirme yöntemlerine başvurma gibi seçeneklere de yer verilmesi önemlidir. Bu konuda, YÖK tarafından paylaşılan "Üniversitelerde Dijital Ortamda Gerçekleştirilebilecek Sınavların Temel İlkeleri" dokümanında yer alan ödevlerin, çevrimiçi kısa sınavların, projelerin, Öğrenme Yönetim Sistemi (ÖYS) etkinliklerinin, ÖYS kullanım analitiklerinin ve benzeri uygulamaların kullanılmasına yönelik önerilerin sunulmasının etkili olduğu değerlendirilebilir. Çalışma kapsamında, bazı derslerde ödev gibi uygulamalarla bu konuda çaba harcandığı görülmektedir. Ancak ödev, proje gibi uygulamaların değerlendirilmesi kalabalık sınıflar söz konusu olduğunda oldukça yorucu olabilmektedir (Cabı ve Ersoy, 2022). Bu nedenle çevrimiçi ölçme değerlendirme uygulamalarının seçiminde sınıf mevcudunun belirleyici olduğu söylenebilir. Ödev şeklinde yapılan yazılı sınavlarda, sınav güvenliğini sağlamaya yönelik olarak intihal programlarının kullanılması tedbiri uygulanmıştır. İntihal programlarının kullanımına ilişkin bilgi verilmesi ödev hazırlama aşamasında caydırıcı bir unsur olabilir, buna ek olarak ödev tesliminden sonraki değerlendirmede benzerlik oranının dikkate alınmasının da etkili olduğu/olacağı söylenebilir.

YÖK (2020a) tarafından dezavantajlı/engelli öğrencilerin çevrimiçi sınavlarının sağlıklı şekilde yürütülmesine yönelik olarak gerekli tedbirlerin alınması istenmiştir. Bu bağlamda, bazı üniversitelerin daha fazla süre verme, okuyucu ve işaretleyici yardımı sağlama şeklinde uygulamaları söz konusu olmuştur. Buna karşın, üniversitelerin üçte birinden fazlasında bu öğrencilere yönelik herhangi bir tedbir alınmadığı da belirtilmiştir.

Sınav güvenliğine yönelik olarak kopya çekilmemesine odaklanılan süreçte, sınav güvenliğini tehdit eden durumları tespit etme amacıyla farklı teknolojilerin kullanıldığı çeşitli uygulamaların yürütüldüğü, ancak hiç birinde yüzde yüz sınav güvenliğinden söz edilemediği görülmüştür. Bu durum, öğrencilerin çevrimiçi sınavlarda etik davranışlar sergilemelerinin önemini ortaya çıkarmış olup bunu sağlamaya yönelik çalışmalara öncelik verilmelidir. Bu bağlamda, öğrencilere etik ilkelere yönelik eğitim verilmesi ve üniversiteler tarafından etik

davranış politikaları oluşturularak öğrencilerle paylaşılması önerilebilir. Ayrıca ölçme değerlendirme sisteminin bütünüyle ele alınarak yalnızca sınavlara odaklı bir sistem çözümünün ötesine geçilmesi ihtiyacı bulunmaktadır.

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# Gerçekçi Matematik Eğitimi Temelli Uygulamalarının Ortaokul Öğrencilerinin Başarı ve Duyuşsal Özellikleri Üzerindeki Etkisinin İncelenmesi

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### Özet

Bu araştırmada beşinci sınıf öğrencilerinin GME temelli uygulamanın öğrencilerin başarı yönelimleri ve GME ile işlenen dersin öğrencilerin düşüncelerindeki etkisini incelemek amaçlanmıştır. Bu kapsamda araştırmada gelişmiş karma yöntemlerde müdahale deseni araştırma yöntemi kullanılacaktır. Araştırma Doğu Anadolu Bölgesi'nde yer alan Kars'ın Sarıkamış ilçesine bağlı olan bir devlet ortaokulunda öğrenim gören 15 beşinci sınıf öğrencinin katılımıyla gerçekleşmiştir. Veriler "Gerçekçi Matematik Eğitimi Desteli Öğretim Yöntemi Hakkında Öğrenci Görüşme Formu", "Matematiği Gerçek Yaşamla İlişkilendirme Becerisi Tanılayıcı Form", başarı testi, öğrenci günlükleri, araştırmacı notları ve GME uygun olarak hazırlanan etkinlikler kullanılarak toplanılacaktır. Verilerin analizinde alt problemlerde hedeflenen amaçlar doğrultusunda nicel verileri SPSS 22.0 programı ile yapılmıştır. Öğrencilerin öntest ve sontest başarı puanları arasında anlamlı bir fark olup olmadığı parametrik olmayan testlerden Wilcoxon işaretli sıralar testi ile belirlenmeye çalışılmıştır. Çalışmanın diğer alt problemleri için nitel verileri ise içerik analizi yöntemiyle analiz edilmiştir. Analizler sonucunda GME dayalı öğretimin öğrencilerin akademik başarısını olumlu yönde etkilediği görülmüştür. Beşinci sınıfların uygulanan öğretim yönteminin üç etkinlik sonucunda derste geleneksel öğretim yöntemine göre daha eğlenceli buldukları, yenilik kodu altında ise daha önce hiç böyle bir öğretim yöntemi ile karşılaşmadıkları ortaya çıkmaktadır. Arkadaşları ile fikir alışverişin de bulunarak bir konuyu kendileri öğrenebileceklerinin farkına varılmıştır. Bunların yanında özelikle üçüncü etkinlik sonucun da bazı öğrenciler için bu süreçte zorlandıkları ve öğretim yönteminden korktukları görülmektedir. Öğrencilerin arkadaşları ile daha çok etkileşime girerek sosyallik yönünden geliştiklerine varılmıştır. Grup arkadaşlarının birbirlerine destek vererek konuyu beraber öğrenmeye çalışmışlardır. Bunun aksine bazı öğrencilerin grup arkadaşları ile anlaşamadıkları için ortak bir noktada birleşemedikleri görülmektedir. Beşinci sınıf öğrencileri çoğunluk olarak etkinlikleri yeterli olduğunu belirtmişlerdir. Genel olarak anlatım yöntemine alıştıkları için konunun öğretmen tarafından da anlatılmasını belirttikleri de görülmektedir. Bazı soruların zor olduğunu düşündükleri için soruların seviyesini daha da kolay olmasını ifade etmişlerdir. Etkinlik ve soru sayısında artırılabilir olmasını belirtmişlerdir. Beşinci sınıf öğrencileri matematiği en çok alışverişte hesap yaparken kullandıklarını belirtmişlerdir. Matematiği oyun alanında ve ders alanında kullandıklarını belirtmişlerdir.

**Anahtar Kelimeler**: Gerçekçi Matematik Eğitimi

### Abstract

In this research, it was aimed to examine the effect of the RME-based application of the fifth grade students on the students' success orientation and the students' thoughts of the course taught with RME. In this context, the intervention pattern research method in advanced mixed methods will be used in the research. The research was carried out with the participation of 15 fifth grade students studying in a state secondary school in the Sarıkamış district of Kars, located in the Eastern Anatolia Region. The data will be collected by using the "Student Interview Form About Realistic Mathematics Education Supported Teaching Method", "The Ability to Associate Mathematics with Real Life Diagnostic Form", achievement test, student diaries, researcher notes and activities prepared in accordance with GME. In the analysis of the data, the quantitative data were made with the SPSS 22.0 program in line with the aims targeted in the sub-problems. It was tried to determine whether there was a significant difference between the pretest and posttest achievement scores of the students with the Wilcoxon signed-rank test, which is one of the non-parametric tests. Qualitative data for the other sub-problems of the study were analyzed by content analysis method. As a result of the analyzes, it was seen that the RME-based

teaching had a positive effect on the academic achievement of the students. As a result of three activities, it turns out that the fifth graders found the teaching method more enjoyable than the traditional teaching method in the lesson, and that they had never encountered such a teaching method before under the innovation code. It has been realized that they can learn a subject themselves by exchanging ideas with their friends. In addition to these, it is seen that some students have difficulties in this process and are afraid of the teaching method, especially as a result of the third activity. It was concluded that the students developed in terms of sociability by interacting more with their friends. Groupmates tried to learn the subject together by supporting each other. On the contrary, it is seen that some students cannot agree on a common point because they cannot get along with their groupmates. Fifth grade students mostly stated that their activities were sufficient. It is also seen that they stated that the subject should also be explained by the teacher, as they were accustomed to the lecture method in general. Since they thought that some questions were difficult, they stated that the level of the questions should be even easier. They stated that the number of activities and questions could be increased. Fifth grade students stated that they mostly use mathematics to make calculations while shopping. They stated that they used mathematics in the playground and in the course area.

**Keywords:** Realistic Math Education

# GİRİŞ

Gelişmiş toplumların, bilgi toplumu olarak adlandırılması ve dünya yönetiminin zirvesinde bulunmaları bilgiye nasıl ulaşacaklarına ve nasıl etkili bir şekilde kullanacaklarına yönelik beceri sahibi olmalarından kaynaklanmaktadır. Bir toplumun bireylerine bu beceriyi kazandırmak ise hiç şüphesiz eğitimin en önemli görevleri arasında yer almaktadır. Eğitim sayesinde ihtiyaçları karşılanır ve toplumsal gelişimini gerçekleştirir. Kendi öz düzenlemelerini gerçekleştirirler. Sürekli kendilerini yenileyerek geliştirme serüveninde olurlar. Değişen ve gelişen bu bilgiler neticesinde öğrenme ve öğretme stillerimiz de değişmiştir. Her şeyi yenileme yolunda matematiği öğrenmek de gelişen dünya da yeni düşüncelere yol açmaktadır. Küreselleşen ve değişimi göz açıp kapama sürecinde gerçekleşen dünyada, Türkiye'nin gelişmişlik seviyesinde ve jeopolitik durumu bu denli önemli olan bir ülkenin hiçbir şey üretmeden ezbere yapılan işlemler yerine tam da bahsedilen bu matematiksel düşünme ve uygulama becerilerine ihtiyacı vardır.

Gelişmiş ülkelerde yeni eğitim sistemleri kullanılmaya başlanmaktadır. Ülkemizde de yeni eğitim sistemleri geliştirilmeye çalışılmaktadır. Fakat bazı okullardaki öğretmenler ders müfredatının yetişmesi ve sınav odaklı eğitim sistemi benimsedikleri için konuların anlaşılması ve kavranması için büyük çaba sarf edilmektedir. Öğrencilerin derste daha aktif olabilecekleri kendi sorumluluklarını alabilecekleri uygun ortamları yok etmektedirler. Geleneksel matematik öğretiminde öğrenciler matematiği anlaşılması zor, ezberlenmesi gereken katı bir disiplin olarak görmektedirler. Öğrencilerin matematiğe karşı tutumlarını değiştirecek ve başarılarını arttırmasını sağlayacak öğretim yöntemlerin uygulanması gerekmektedir. Bu yöntemlerden bir tanesi Gerçekçi Matematik Eğitimi Yaklaşımı öğretim yöntemidir. Gerçekçi matematik eğitimi yaklaşımı (GME), bireylerin yaşamları boyunca araştırma ve öğrenmeye meraklı birer bireyler olmalarına olanak sağlar. Geleneksel yaklaşımda öğretmen merkezli öğretim stratejisi, öğrenci merkezli öğretimde ise gerçekçi matematik yaklaşımı vardır. GME, ilk kez Hollandalı matematikçi Hans Freudenthal tarafından geliştirilen bir öğretim programıdır.

İnsan hayatıyla içi içe olan matematiği, her insanın günlük hayatında birçok alanda kullandığını görmek mümkündür. Bilimin ve teknolojinin gelişmesiyle matematiğin hayatın her alanında kullanılması ve matematiğe her alanda ihtiyaç duyulması, sürekli gelişen ve değişen bir bilim dalı olması açısından matematik önemli bir bilim dalıdır (Akyüz, 2010). Çoğu zaman ismini duyduğumuzda bile bizi korkutan, zihindeki soyut bir sistem olan matematik, aslında o kadar günlük hayatla iç içedir ki; her gün aynı anda kalkmak için kurduğumuz alarmdan giyindiğimiz kıyafetlerin büyüklüğüne, yaptığımız market alışverişinden aldığımız yiyeceklerin verdiği enerjiye kadar her şeyde vardır. Bu her yerde olan matematiği yapılandırmacı anlayışla daha kalıcı hale getirmek daha da önemli hale gelmektedir.

Her çocuk öğrenme için gerekli şartların sağlanması ve gerekli ortam oluşturulması durumunda matematiği öğrenebilir (MEB, 2006). Bu aslında matematiğin herkes üstesinden gelebildiği ve zorluklarını rahat bir şekilde aşılabileceğini göstermektedir. Yeter ki öğrenmek için uygun koşullar ve yöntemler bulunabilsin. GME de bu yöntemlerin başında gelmektedir. Matematik konuları günlük yaşama entegre edildiği sürece insanların karşılaştıkları durumda yaşanmışlık ile kalıcı hale getirmektedir. Matematiği kendileri oluşturarak aslında bir

insan aktivitesi olarak görmektedirler. Matematik eğitimindeki öğrenme kuramlarının öğrenci merkezli olarak uygulanması; öğrenme şeklinin, öğrenme sürecine etki eden faktörlerin sorgulanmasına ve bu kuramları etkili hale getirecek araştırmaların yapılmasına zemin hazırlamıştır.

GME üzerine yapılan araştırmaların sonuçları da bu yöndedir. Yapılan araştırmalarda GME öğretimin öğrencilerin matematik başarısını artırdığı görülmüştür (Karataş, Aksoy ve Çakmak, 2021; Tarım ve Kütküt, 2021; Uysal ve Sönmez, 2021; Yonucuoğlu ve Bindak, 2021; Okuyucu ve Bilgin, 2019; Tabak, 2019; Altıparmak ve Çiftçi, 2018; Işıtan ve Doğan, 2018; Özçelik ve Tutan, 2017; Altıner ve Artut, 2017; Kokrmaz ve Korkmaz, 2017; Çilingir ve Artut, 2016; Demirdöğen ve Kaçar, 2010). Araştırmalarda GME öğretimin öğrencilerin tutum üzerinde olumlu etkiye sahip olduğunu belirtilmiştir (Tabak,2019; Özçelik ve Tutan, 2017). Elde edilen çalışmalarda GME öğretimin öğrencilerin motivasyonu artırıcı etki sağladığı belirtilmiştir (Yonucuoğlu ve Bindak, 2021; Yaren ve Berkant, 2020). Uskun, Kuzu ve Çil (2020) çalışmasında öğrencilerin genel başarı düzeylerinin hem problem çözme hem de problem kurma açısından orta düzeyde olduğu belirlenmiştir. Matematik dersinin eğlenceli, günlük yaşamdan örneklerin yer aldığı ve kolay anlaşılabilir bir yapısı olmalıdır (Yorulmaz ve Doğan, 2019).GME yaklaşımını kullanarak problem çözmenin öğretiminde kalıcı öğrenmeyi sağladıkları ortaya çıkmıştır (Karataş, Aksoy ve Çakmak, 2021; Altıparmak ve Çiftçi, 2018; Işıtan ve Doğan, 2018; Altıner ve Artut, 2017; Çilingir ve Artut, 2016). Birçok öğrenciye göre GME' ye dayalı etkinliklerle işlenen derslerin daha zevkli, eğlenceli, kolay ve hızlı anlaşılabilir olduğunu göstermiştir (Karataş, Aksoy ve Çakmak, 2021; Korkmaz ve Tutak, 2017; Korkmaz ve Korkmaz, 2017). Yorulmaz ve Doğan (2019) çalışmasında GME ilkokulda ölçme ve geometri öğrenme alanlarında daha fazla kullanılması gerektiği sonucuna ulaşılmıştır. Çilingir ve Artut (2016) çalışmasında öğrencilerin görsel matematik okuryazarlığında ilerlemenin diğer gruplara göre daha fazla olduğu görülmüştür. Artut ve Bal (2016) çalışmasında GME uygulamaları öncesinde sınıf öğretmenlerinin gerçekçi matematik eğitimi hakkında oldukça sınırlı bilgiye sahip olduklarını sonucuna ulaşılmıştır. Uygulama sonrasında ise öğretmenlerin gerçekçi matematik eğitimi hakkında gerekli kuramsal bilgilere sahip oldukları, GME için olumlu düşüncelere sahip oldukları ve kendi sınıflarında matematik öğretirken yararlanabilecekleri bir yöntem olarak ifade ettikleri görülmüştür. Tabak (2019) çalışmasında GME'ye ilişkin çalışmaların genel olarak öğrenciler üzerinde yürütüldüğü, öğretmenler ve öğretmen adaylarına yönelik sınırlı sayıda araştırma yapıldığı belirlenmiştir. Araştırma yürütecek olan araştırmacıların bu örneklem üzerine yoğunlaşılabileceğini belirtmektedir. Uysal ve Sönmez (2021) çalışmasında GME'nin öğrencilerin hem bilişsel hem de duyuşsal becerilerine pozitif yönde katkı sağladığı belirlenmiştir. Okuyucu ve Bilgin (2019) GME yaklaşımına dayalı öğretim yöntemi ile konuyu daha iyi öğrendiklerini, üst düzey düşünme becerilerinin geliştiğini ve matematiğe yönelik düşüncelerinde olumlu yönde değişim olduğunu belirtmişlerdir.

Beşinci sınıf öğrencilerinin GME ile hazırlanmış öğretim etkinliklerinin öğrencilerin "Veri İşleme" öğrenme alanındaki başarılarını ve duyuşsal özellikleri üzerindeki etkisinin incelenmesi amaçlandığı bu çalışmada;

1) GME'nin öğrencilerin veri işleme öğrenme alanı kapsamı konusunda akademik başarılarına etkisi var mıdır?

2) Öğrencilerin GME dair düşünceleri nedir?

3) GME ile uygulanan etkinlikler esnasında çocuğa katkıları nelerdir?

4) GME ile uygulanan etkinlikler için önerileriniz nelerdir?

5) Çocukların matematiği gerçek yaşamla ilişkilendirme becerileri nasıldır?

sorularına cevap aranmıştır.

## YÖNTEM

Bu bölümde; araştırmanın modeline, çalışma grubuna, veri toplama araçlarına, verilerin toplanmasına ve analizine ilişkin açıklamalar yer almaktadır

**Araştırmanın Modeli**

Bu araştırmanın amacı; beşinci sınıf öğrencilerinin GME ile hazırlanmış öğretim etkinliklerinin öğrencilerin "Veri İşleme" öğrenme alanındaki başarılarını ve duyuşsal özellikleri üzerindeki etkisi incelenmesidir. Bu doğrultuda araştırma gelişmiş karma yöntemlerden müdahale deseni kullanılmaktadır. Bu desenlerde araştırmacılar birleştirme (çeşitleme) desenini, açıklayıcı deseni veya keşfedici deseni geniş bir deneysel yapı içinde kullanırlar. Kısacası, araştırmacı deneysel uygulamanın öncesinde uygulama sırasında veya uygulamadan sonraki aşamalardan birinde nitel veriler toplar. Bu durumda bütünleştirme nitel verileri deneysel uygulama içine dahil etmeyi kapsamaktadır (Creswell, 2021). Deneysel nitelikte olup veriler deneysel işlemin tek bir grup üzerinde etkisinin ön-test ve son-test kullanılarak incelendiği zayıf deneysel desenler kapsamında ele alınan tek grup ön-test son-test desen (Büyüköztürk, Çakmak, Akgün, Karadeniz ve Demirel, 2010) kullanılmıştır. Bu çalışmada kontrol grubu bulunmadığından tek gruplu olduğu, ayrıca çalışma grubu araştırmacının çalıştığı kurumda olduğu ve temelde seçkisizlik ilkesi uygulanmadığı için zayıf deneysel desen olarak belirlenmiştir. Nitel kısmında durum çalışması yöntemi kullanılacaktır. Durum çalışması, araştırmacının zaman içerisinde sınırlandırılmış bir veya birkaç durumu çoklu kaynakları içeren veri toplama araçları ile derinlemesine incelediği araştırma modelidir (Creswell, 2007).

**Araştırmanın Çalışma Grubu**

Araştırmanın örneklemi 2022-2023 eğitim öğretim yılında Kars'ın Sarıkamış ilçesine bağlı bir devlet ortaokulunda bulunan 5. sınıf öğrencileri (n=15) oluşturmaktadır. Örneklemin belirlenmesinde araştırmacının görev yaptığı okul ve kurum belirlendiği için amaçlı örnekleme yöntemlerinden uygun örnekleme yöntemi kullanılmıştır. Uygun örnekleme yöntemi zaman, para ve işgücü açısından var olan sınırlılıklar nedeni ile örneklemin kolay ulaşılabilir ve uygulama yapılabilir birimlerden seçilmesidir (Sözbilir, 2009).

**Veri Toplama Araçları**

Araştırma için gerekli verileri toplamak amacıyla başarı testleri, etkinlik kağıtları, formlar, öğrenci ve araştırmacı günlükleri ile elde edilmiştir.

Başarı Testleri

GME yaklaşımının matematik öğretiminde öğrenci başarısını nasıl etkilediğinin araştırıldığı bu çalışma için, araştırmacı tarafından ön test, son test olmak üzere geliştirmek amacıyla öncelikle matematik dersi ortaokul programı incelenmiş ve "Veri İşleme" öğrenme alanına ait kazanımlar belirlenmiştir. TIMSS, PISA, PYBS ve MEB'in yayınladığı kazanım kavrama testi soruları incelenerek 5. Sınıf "Veri İşleme" öğrenme alanına ait ve öğrenme alanında bulunan üç kazanıma uygun 20'şer sorudan oluşan başarı testi hazırlanmıştır. Ölçme aracında yer alan maddeler, kazanımların tamamını kapsayacak şekilde seçilmiştir. Soru maddeleri, ortaokul öğrencilerinin gelişim özellikleri göz önünde bulundurularak çoktan seçmeli oluşturulmuştur. Bir ders saatinde (40 dk.) cevaplandırılabilecek şekilde hazırlanmıştır. Öğrencilerin problemleri anlamlandırdıkları ölçüde doğru sonuca ulaşmaları beklenmektedir.

Etkinlik Kağıtları

Araştırmada, GME modeline uygun olduğunu düşünülen problem durumları dikkate alınarak, beşinci sınıflarda veri işleme konusu öğretimine yönelik 3 etkinlik araştırmacı tarafından geliştirilmiştir. Uzman görüşleri alınarak, ünite kazanımları, zaman kullanımı, sınıf organizasyonu, öğrenci ön bilgileri, öğrenci ve öğretmen rolleri de düşünülerek gerekli düzenlemeler yapılarak süreçte kullanılması uygun bulunarak hazırlanmıştır. Etkinlikler tasarlanmadan önce literatür taranmış GME'ye uygun ders tasarımı ve GME'ye uygun olarak tasarlanmış etkinlikler dikkatlice incelenmiş olup kazanımlarına göre aşağıdaki Tablo da ayrıntılı olarak verilmiştir.

| Sınıf Düzeyi | Etkinlik | Kazanım |
|---|---|---|
| 5. Sınıf | Etkinlik 1 | M.5.3.1.1. Veri toplamayı gerektiren araştırma soruları oluşturur. M.5.3.1.2. Araştırma sorularına ilişkin verileri toplar, sıklık tablosu ve sütun grafiğiyle gösterir. |
| | Etkinlik 2 | M.5.3.1.2. Araştırma sorularına ilişkin verileri toplar, sıklık tablosu ve sütun grafiğiyle gösterir. |

| Etkinlik 3 | M.5.3.1.2. Araştırma sorularına ilişkin verileri toplar, sıklık tablosu ve sütun grafiğiyle gösterir. |
| | M.5.3.1.3. Sıklık tablosu veya sütun grafiği ile gösterilmiş verileri yorumlamaya yönelik problemleri çözer. |

Belirtilen Tablo 'ye göre beşinci sınıf da bulunan veri işleme öğrenme alanına ait tüm kazanımlar etkinlikler de yer almaktadır.

Günlükler

Araştırma sürecini öğrencilerin ve araştırmacının gözünden analiz edebilmek, bireysel gözlemlere, duygulara, tepkilere ve yorumlara ulaşmak amacıyla araştırmacı günlüğü ve yapılandırılmış öğrenci günlükleri kullanılmıştır. Bu doğrultuda her uygulama günü sonunda araştırmacı, günlüğüne notlar almış, öğrencilere ise yaşları dolayısıyla hazırlanan günlük yaprakları dağıtılmıştır. Öğrencilere bu yapraklar düzenli olarak her uygulamadan sonra doldurtularak toplanmıştır.

Formlar

Öğrencilere GME hakkında görüşlerini almak amacıyla etkinlikler sonrası 5 açık uçlu sorudan oluşan Gerçekçi Matematik Eğitimi (GME) Destekli Öğretim Yöntemi Hakkında Öğrenci Görüşme Formu ve 2 açık uçlu sorudan oluşan Matematiği Gerçek Yaşamla İlişkilendirme Becerisi Tanılayıcı Form uygulanmıştır.

**Veri Toplanması**

Verilerin toplanması sürecinde 2022-2023 eğitim öğretim yılında Kars İl Milli Eğitim Müdürlüğünden ve velilerden resmi izin alınarak başlanılmıştır. Uygulama haftasına başlamadan önce beşinci sınıflarda başarı ön testi uygulanmıştır. Uygulama ve testler arasında uygun zaman diliminin geçilmesi beklenmiştir. GME'ye yönelik tasarlanan derslerde matematiksel anlayışları ve araçları inşa etmek için öğrencilerin ihtiyacı olan ortamlar kendileri tarafından düzenlenmelidir. Bu doğrultuda, öğrencilere önceden grup çalışması yapılacağı söylenmiştir. Grup çalışması yapacaklarını bildikleri için sınıf ortamını ders öncesinde öğretmen işbirliği ile düzenlemişlerdir. Sınıf mevcutlarına göre 5. sınıflarda 5 grup oluşturulmuştur. Oluşturulan bu grupların heterojen olmasına dikkat edilmiştir. Derse başlamadan önce GME eğitimi araştırmacı tarafından kısaca bahsedilmiştir. GME modeline uygun geliştirilen etkinlikler öğretim süresince öğrenci gruplarına etkinlik kâğıtları olarak sunulmuştur. Etkinliğe öğrencilere etkinlikte verilen problem durumunun genel özelliklerinden bahsedilerek başlanmıştır. Öğrencilerin sorulara öncelikle incelenip problem durumundan bahsederek sorular yönlendirilip düşünmeleri ve etkinlikle ilgili merak duygularının oluşması sağlanmaya çalışılmıştır. Sonrasında problemi okuyup kendi aralarında fikir alışverişinde bulunmaları istenmiştir. Etkinlik uygulanırken öğrencilere hiçbir sınırlamada bulunulmamış sadece gerekli durumlarda öğrencilerin soruları yanıtlanmış. Öğrenciler çalışmalarını bitirdikten sonra, kendi aralarından bir kişi seçerek isterlerse tahtanın önünde isterlerse gruplarının olduğu yerde probleme getirdikleri çözümü sınıf arkadaşları ile paylaşmışlardır. Tüm etkinliklere yönelik grup çalışmalarını yansıtan çalışma kâğıtları etkinlik bitiminde araştırmacı tarafından toplanmıştır. Diğer veri toplama aracı olan ders günlükleri öğrencilerin bireysel olarak tutulması sağlanılmıştır. Araştırmacı tarafından da ders gözlemleri not edilmiştir. Uygun zaman diliminden sonra başarı son testleri uygulanmıştır. Diğer veri toplama aracı olan öğrencilerin uygulama görüşleri hakkında formlar tutulmuştur.

**Veri Analizi**

Veri analizinde, veri türüne bağlı olarak nicel ve nitel veri analizi teknikleri kullanılmıştır. Nicel veri analizi, verilerden uygun istatistiksel teknikler kullanarak bilimsel geçerliğe sahip sonuçlar çıkartma süreci olarak tanımlanabilir (Büyüköztürk, 2014, s.7). Birinci alt problem için GME başarı testleri öğrencilere öntest ve sontest olarak uygulanmış ve elde edilen veriler nicel yöntemlerle analiz edilerek iki test arasında anlamlı farklılık olup olmadığı incelenmiştir. Araştırmanın verileri ve örneklem sayısı parametrik olmayan özellikler taşımaktadır. Sınıflardaki öğrenci sayılarının 30'dan az oluşundan parametrik olmayan testler çalışmada kullanılmıştır. Nitekim literatürde de çalışma grubunun niceliğinin az olduğu durumlarda istatistiklerin örnekleme dağılımının normal dağılıma yaklaşmadığını ve bu durumda nonparametrik bir tekniğe ihtiyaç duyulduğu belirtilmektedir (Kartal, 2006; Yılmaz ve Yılmaz, 2005; Kalaycı, 2006). Araştırmada verilerin analizi

SPSS 22.0 programı ile yapılmıştır. Öğrencilerin öntest ve sontest başarı puanları arasında anlamlı bir fark olup olmadığı parametrik olmayan testlerden Wilcoxon işaretli sıralar testi ile belirlenmeye çalışılmıştır.

Çalışmanın diğer alt problemleri için nitel verileri ise içerik analizi yöntemiyle analiz edilmiştir. İçerik analizi, belirli kurallara dayalı kodlamaların yapıldığı ve metnin içindeki bazı sözcüklerin daha küçük içerik kategorileri ile özetlendiği sistematik bir tekniktir (Büyüköztürk ve ark., 2016).

• Öğrencilerin GME dair düşünceleri nedir? alt problemine ilişkin veri analizi sürecinde etkinlikler uygulandıktan sonra öğrenciler tarafından doldurulan günlüklerden kodlar elde edilmiş ve frekansları verilmiştir. Beşinci sınıflar da birinci etkinlik sonucunda oluşturulan kodlar eğlence, güzel, yenilik, yardımlaşma, sevgi, oyun, iyi performans, beğenme paylaşım, tartışma, mutlu, karmaşık, korku ve heyecandır. İkinci etkinlik sonucu oluşturulan kodlar eğlence, yardımlaşma, heyecan, güzel beğenme, kolay, yenilik, oyun, pekiştirme, kasılma, mutlu, sevgi, paylaşım, merak ve korkudur. Üçüncü etkinlik sonucu oluşturulan kodlar güzel, zor, eğlence, kolay, heyecan beğenme, yardımlaşma, memnuniyetsizlik, tartışma ve başarmadır.

• GME ile uygulanan etkinlikler esnasında çocuğa katkıları nelerdir? alt problemine ilişkin veri analizi sürecinde araştırmacı tarafından oluşturulan form öğrenciler tarafından doldurulduktan sonra kodlar elde edilmiş ve frekansları verilmiştir. Beşinci sınıflardan oluşturulan kodlar sosyallik, destek, tartışma, paylaşım, uyum, iletişim, başarı, öğrenme, uzmanlaşamama ve bakış açısıdır.

• GME ile uygulanan etkinlikler için önerileriniz nelerdir? alt problemine ilişkin veri analizi sürecinde araştırmacı tarafından oluşturulan form öğrenciler tarafından doldurulduktan sonra kodlar elde edilmiş ve frekansları verilmiştir. Beşinci sınıflardan oluşturulan kodlar yeterli, öğretim, soru güçlüğü, soru çeşitliliği, soru sayısı, etkinlik sayısı ve soru köküdür.

• Çocukların matematiği gerçek yaşamla ilişkilendirme becerileri nasıldır? alt problemine ilişkin veri analizi sürecinde araştırmacı tarafından oluşturulan form öğrenciler tarafından doldurulduktan sonra kodlar elde edilmiş ve frekansları verilmiştir. Beşinci sınıflardan oluşturulan kodlar alışveriş, hesap, oyun, ders, sağlık, zaman, teknoloji ve eğlencedir.

## BULGULAR

Bu bölümde araştırmanın beş alt problemi için elde edilen bulgular paylaşılmıştır.

***GME'nin beşinci sınıf öğrencilerinin veri işleme öğrenme alanı kapsamı konusunda akademik başarılarına etkisi var mıdır?* Alt Probleme Ait Bulgular**

Aşağıda beşinci sınıf öğrencilerin GME ile uygulanan dersin veri işleme öğrenme alanına ait akademik başarılarına etkisi ele alınmıştır.

GME öncesi başarı ile GME sonrası arasında fark olup olmadığını belirlemek için Wilcoxon İşaret Sıraları Testi kullanılmıştır. Betimsel sonuçları Tablo 1'de verilmiştir.

**Tablo 1:** Betimsel İstatistikler

|  | n | Ortalama | Standart sapma | Minimum | Maximum | 25th | Yüzdelikler 50th (Medyan) | 75th |
|---|---|---|---|---|---|---|---|---|
| Öntest | 15 | 34,33 | 16,889 | 15 | 70 | 20,00 | 35,00 | 40,00 |
| Sontest | 15 | 52,00 | 22,184 | 15 | 95 | 30,00 | 55,00 | 70,00 |

Tablo 1'e göre sontest puanlarının (mdn=55) öntest puanlarından (mdn=35) daha yüksek olduğu görülmektedir. Wilcoxon İşaret Sıraları Testi sonuçları Tablo 2'de verilmiştir.

**Tablo 2:** Öntest-Sontest Puanlarına İlişkin Wilcoxon İşaretli Sıralar Testi Sonuçları

|  |  | n | Sıra ortalaması | Sıra Toplamı | z | p |
|---|---|---|---|---|---|---|
| Sontest - Öntest | Negatif sıra | 1[a] | 4,50 | 4,50 | | |
| | Pozitif sıra | 13[b] | 7,73 | 100,50 | -3,019 | .003 |
| | Eşit | 1[c] | | | | |
| | Total | 15 | | | | |

Tablo 2'ye göre elde edilen bulgulara göre 1 kişinin sontest puanının öntest puanından küçük olduğu, 13 kişinin sontest puanının öntest puanından büyük olduğu, 1 kişinin ise sontest ve öntest puanına eşit olduğu görülmektedir. Sontest puanı yüksek olan 13 kişinin puanlarına ilişkin sıralarının ortalaması 7.73'tür. Ortalamalar arasında 7.73 puanlık bir fark bulunmuştur ve bu fark istatistiksel açıdan anlamlıdır (z=-3,019; p=.003<.05).

### *Beşinci sınıf öğrencilerinin GME dair düşünceleri nedir?* **Alt Probleme Ait Bulgular**

Aşağıda beşinci sınıf öğrencilerin GME ile ilgili düşünceleri ele alınmıştır.

Aşağıda verilen tablolarda 5. Sınıfların 3 etkinlik sonucunda GME ile ilgili düşüncelerinin kodları ve frekansları verilmektedir.

**Tablo 3**: 5. Sınıf Etkinlik 1

| Kod | Frekans | Kod | Frekans |
|---|---|---|---|
| Eğlence | 8 | Beğenme | 1 |
| Güzel | 5 | Paylaşım | 1 |
| Yenilik | 5 | Tartışma | 1 |
| Yardımlaşma | 4 | Mutlu | 1 |
| Sevgi | 3 | Karmaşık | 1 |
| Oyun | 2 | Korku | 1 |
| İyi performans | 1 | Heyecan | 1 |

Tablo 3 de 5. sınıflar da 1. etkinlik sonucunda eğlence, güzel, yenilik, yardımlaşma, sevgi, oyun, iyi performans, beğenme, paylaşım, tartışma, mutlu, karmaşık, korku ve heyecan olmak üzere 14 kod oluşturulmuştur. En fazla kodun eğlence (f=8) kodundan elde edilmiştir. Bunu takip eden güzel ve yenilik (f=5) kodları oluşturmaktadır.

**Tablo 4**: 5. Sınıf Etkinlik 2

| Kod | Frekans | Kod | Frekans |
|---|---|---|---|
| Eğlence | 6 | Pekiştirme | 1 |
| Yardımlaşma | 3 | Kasılma | 1 |
| Heyecan | 3 | Mutlu | 1 |
| Güzel | 3 | Sevgi | 1 |
| Beğenme | 2 | Paylaşım | 1 |
| Kolay | 2 | Merak | 1 |
| Yenilik | 2 | Korku | 1 |
| Oyun | 1 | | |

Tablo 4 de 5. sınıflar da 2. etkinlik sonucunda eğlence, yardımlaşma, heyecan, güzel, beğenme, kolay, yenilik, oyun, pekiştirme, kasılma, mutlu, sevgi, paylaşım, merak, korku olmak üzere 15 kod oluşturulmuştur. En fazla

kodun eğlence (f=6) kodundan elde edilmiştir. Bunu takip eden yardımlaşma, heyecan, güzel (f=3) kodları oluşturmaktadır.

**Tablo 5**: 5. Sınıf Etkinlik 3

| Kod | Frekans | Kod | Frekans |
|-----|---------|-----|---------|
| Güzel | 5 | Beğenme | 2 |
| Zor | 5 | Memnuniyetsizlik | 1 |
| Eğlence | 4 | Tartışma | 1 |
| Kolay | 4 | Başarma | 1 |
| Heyecan | 3 | Yardımlaşma | 1 |

Tablo 5 de 5. sınıflar da 3. etkinlik sonucunda güzel, zor, eğlence, kolay, heyecan, beğenme, yardımlaşma, memnuniyetsizlik, tartışma, başarma ve anlaşılamayan cevaplar için diğer olmak üzere 11 kod oluşturulmuştur. En fazla kodun güzel ve zor (f=5) kodundan elde edilmiştir. Bunu takip eden eğlence ve kolay (f=4) kodları oluşturmaktadır.

***GME ile uygulanan etkinlikler esnasında çocuğa katkıları nelerdir?*** **Alt Probleme Ait Bulgular**

Aşağıda beşinci sınıf öğrencilerinin GME ile uygulanan etkinlikler esnasında çocuğa katkılarının ne yönde olduğu ele alınmıştır.

Aşağıdaki tabloda 5. sınıfların GME ile uygulanan etkinlikler esnasında çocuğa katkılarının ne yönde olduğunun kodları ve frekansları verilmektedir.

**Tablo 6:** 5. Sınıfların GME ile Uygulanan Etkinlik Sonucu Çocuğa Katkıları

| Kod | Frekans | Kod | Frekans |
|-----|---------|-----|---------|
| Sosyallik | 4 | Başarı | 1 |
| Destek | 3 | Öğrenme | 1 |
| Tartışma | 3 | Uzmanlaşamama | 1 |
| Paylaşım | 2 | Bakış açısı | 1 |
| Uyum | 1 | İletişim | 1 |

Tablo 6 da 5. sınıflar da etkinlikler sonucunda çocuğa katkılarına ne yönde olduğuna dair sosyallik, destek, tartışma, paylaşım, uyum, iletişim, başarı, öğrenme, uzmanlaşamama, bakış açısı ve anlaşılamayan cevaplar için diğer olmak üzere 11 kod oluşturulmuştur. En fazla kodun sosyallik (f=4) kodundan elde edilmiştir. Bunu takip eden destek ve tartışma (f=3) kodları oluşturmaktadır.

***GME ile uygulanan etkinlikler için önerileriniz nelerdir?*** **Alt Probleme Ait Bulgular**

Aşağıda beşinci sınıf öğrencilerinin GME ile ilgili yapılan etkinlikler için önerileri ele alınmıştır.

**Tablo 7:** 5. Sınıflar Düzeyinde GME ile İlgili Yapılan Etkinlik İçin Öneriler

| Kod | Frekans | Kod | Frekans |
|-----|---------|-----|---------|
| Yeterli | 5 | Soru sayısı | 1 |
| Öğretim | 2 | Etkinlik sayısı | 1 |

| Soru güçlüğü | 2 | Soru kökü | 1 |
| Soru çeşitliliği | 2 | | |

Tablo 7 de 5. sınıflar da etkinlikler sonucunda önerilerinin ne yönde olduğuna dair yeterli, öğretim, soru güçlüğü, soru çeşitliliği, soru sayısı, etkinlik sayısı, soru kökü ve anlaşılamayan cevaplar için diğer olmak üzere 8 kod oluşturulmuştur. En fazla kodun yeterli (f=5) kodundan elde edilmiştir. Bunu takip eden öğretim, soru güçlüğü ve soru çeşitliliği (f=2) kodları oluşturmaktadır.

### *Çocukların matematiği gerçek yaşamla ilişkilendirme becerileri nasıldır?* Alt Probleme Ait Bulgular

Aşağıda beşinci sınıf öğrencilerinin matematiği gerçek yaşamla ilişkilendirme becerilerinin ne yönde olduğuna dair bulgular ele alınmıştır.

Aşağıdaki tabloda 5. sınıfların matematiği gerçek yaşamla ilişkilendirme becerilerinin ne yönde olduğuna dair kodları ve frekansları verilmektedir.

**Tablo 8:** 5. Sınıfların Matematiği Gerçek Yaşamla İlişkilendirme Becerileri

| Kod | Frekans | Kod | Frekans |
| --- | --- | --- | --- |
| Alışveriş | 14 | Sağlık | 3 |
| Hesap | 12 | Zaman | 2 |
| Oyun | 9 | Teknoloji | 1 |
| Ders | 7 | Eğlence | 1 |

Tablo 8 de 5. sınıflar da matematiği gerçek yaşamla ilişkilendirme becerilerinin ne yönde olduğuna dair alışveriş, hesap, oyun, ders, sağlık, zaman, teknoloji, eğlence ve anlaşılamayan cevaplar için diğer olmak üzere 9 kod oluşturulmuştur. En fazla kodun alışveriş (f=14) ve hesap (f=12) kodundan elde edilmiştir. Bunu takip eden oyun (f=9) ve ders (f=7) kodları oluşturmaktadır.

## SONUÇ VE TARTIŞMA

Bu bölümde, gerçekleştirilen çalışmadan elde edilen bulguların yorumlanmasıyla ortaya çıkan sonuçlar sunulacak ve ilgili literatür ile birlikte tartışılacaktır. Bu kapsamda, araştırmanın sonuçları sırasıyla araştırmanın alt problemlerine göre ele alınacaktır.

### *GME'nin ortaokul öğrencilerinin veri işleme öğrenme alanı kapsamı konusunda akademik başarılarına etkisi var mıdır?* Alt Problemine İlişkin Sonuçlar

Beşinci sınıf öğrencilerinin başarılarını ölçmek amacıyla ön test ve son test uygulanmıştır. GME'nin öğrencilerin akademik başarısını olumlu yönde etkilediği görülmüştür. Elde edilen sonuçlar ilgili literatürde de yapılan araştırmalarda GME öğretimin öğrencilerin matematik başarısını artırdığı görülerek çalışma ile paralellik göstermektedir (Sari ve Cahyono, 2022; Karataş, Aksoy ve Çakmak, 2021; Tarım ve Kütküt, 2021; Uysal ve Sönmez, 2021; Yonucuoğlu ve Bindak, 2021; Okuyucu ve Bilgin, 2019; Tabak, 2019; Rohman, Susanto, Hobri, Saiful ve Sahnawi 2019; Altıparmak ve Çiftçi, 2018; Yuanita, Zulnaidi, Zakaria, 2018; Işıtan ve Doğan, 2018; Özçelik ve Tutan, 2017; Altıner ve Artut, 2017; Kokrmaz ve Korkmaz, 2017; Çilingir ve Artut, 2016; Palinussa, 2013; Demirdöğen ve Kaçar, 2010). Bunula birlikte Ünal, (2008) yaptığı çalışmanın bölme ile ilgili kısmında deney ve kontrol grubunun başarıları arasında anlamlı bir fark

bulamamıştır. Bu çalışmadaki sonucun genel nedeni olarak ise öğrencilerin geçmiş yıllarda okudukları okul ve yaşadıkları öğrenme deneyimlerini göstermiştir.

### *Öğrencilerin GME dair düşünceleri nedir?* **Alt Problemine İlişkin Sonuçlar**

Beşinci sınıf öğrencilerinin GME dair düşünceleri etkinlik sonucunda yazdıkları günlüklerden kodlar elde edilerek ulaşılmıştır. Beşinci sınıfların uygulanan öğretim yönteminin üç etkinlik sonucunda derste geleneksel öğretim yöntemine göre daha eğlenceli buldukları, yenilik kodu altında ise daha önce hiç böyle bir öğretim yöntemi ile karşılaşmadıkları ortaya çıkmaktadır. Arkadaşları ile fikir alışverişin de bulunarak bir konuyu kendileri öğrenebileceklerinin farkına varılmıştır. Bunların yanında özelikle beşinci sınıflar da üçüncü etkinlik sonucun da bazı öğrenciler için bu süreçte zorlandıkları ve öğretim yönteminden korktukları görülmektedir. Elde edilen sonuçlar ilgili literatürde de yapılan araştırmalarda GME ile işlenen dersin daha eğlenceli, anlaşılır, ilgi artırıcı olduğu ve öğrenciler tarafından tercih edilen bir ders olduğu ifade edilmiştir (Korkmaz, 2017; Çolak, 2020; Yorulmaz ve Doğan, 2019; Bush, Webb, Kress, Yang ve Perkins, 2018). Birçok öğrenciye göre GME' ye dayalı etkinliklerle işlenen derslerin daha zevkli, kolay ve hızlı anlaşılabilir olduğunu göstermiştir (Karataş, Aksoy ve Çakmak, 2021; Korkmaz ve Tutak, 2017; Korkmaz ve Korkmaz, 2017). GME destekli öğretim yöntemine yönelik görüşlerinin olumlu olduğu sonucuna ulaşılmıştır.(Kurt ve Doğan, 2019; Akış, 2022; Işık, 2019; Okuyucu, 2019; Özdemir, 2008). GME yaklaşımını kullanarak problem çözmenin öğretiminde kalıcı öğrenmeyi sağladıkları ortaya çıkmıştır (Karataş, Aksoy ve Çakmak, 2021; Altıparmak ve Çiftçi, 2018; Işıtan ve Doğan, 2018; Altıner ve Artut, 2017; Çilingir ve Artut, 2016).

### *GME ile uygulanan etkinlikler esnasında çocuğa katkıları nelerdir?* **Alt Problemine İlişkin Sonuçlar**

Beşinci sınıf öğrencilerinin uygulanan etkinlikler sonucunda çocuğa ne yönde katkıları olduğuna dair sonuçlara formlardan oluşturulan kodlardan elde edilmiştir. Beşinci sınıfların arkadaşları ile daha çok etkileşime girerek sosyallik yönünden geliştiklerine varılmıştır. Grup arkadaşlarının birbirlerine destek vererek konuyu beraber öğrenmeye çalışmışlardır. Bunun aksine bazı öğrencilerin grup arkadaşları ile anlaşamadıkları için ortak bir noktada birleşemedikleri görülmektedir. Elde edilen sonuçlar ilgili literatürde de yapılan araştırmalarda GME ile öğretimin öğrencilerin motivasyonu artırıcı etki sağladığı belirtilmiştir (Yonucuoğlu ve Bindak, 2021; Yaren ve Berkant, 2020). Öğrencilerin görselleştirme ve anlamlandırma süreçlerinde meydan gelen olumlu izlenimlerin öğrencilerin matematik cümlesi yazabilmesine olanak tanımakla birlikte matematiksel çıkarımlar yaparak çıktıları yorumlayabilmelerine de neden olduğu sonucuna ulaşılmıştır (Alan, 2021). Öğrenciler bulmacaları matematiksel bilgiyi uygulayarak, tartışarak ve işbirliği yaparak çözebilmişlerdir (Fessakis, Karta ve Kozas, 2018). Öğrencilerin çoğunun, tahtaya pek kalkmayan, derse pek katılmayan arkadaşlarının bile derse katıldığını belirtmesi, tekrar yapılmamasına rağmen öğrencilerin öğrendikleri bilgileri muhafaza etmeleri GME yönteminin etkili olduğunu göstermektedir (Özçelik ve Tutan, 2017). GME uygulanan sınıflarda yapılan gözlem ve görüşmeler sonucunda GME'nin öğrenmeyi kolaylaştırdığı, bilgileri kalıcı hale getirdiği, aktif katılımı sağladığı, öğrenmeyi zevkli hale getirdiğine yönelik faydalarının olduğu belirtilmiştir (Topçu, 2021).

### *GME ile uygulanan etkinlikler için önerileriniz nelerdir?* **Alt Problemine İlişkin Sonuçlar**

Beşinci sınıf öğrencilerinin uygulanan etkinlikler sonucunda etkinlikler için ek olarak neler eklemek istediklerine dair sonuçlar formlardan oluşturulan kodlardan elde edilmiştir. Beşinci sınıf öğrencileri çoğunluk olarak etkinlikleri yeterli olduğunu belirtmişlerdir. Genel olarak anlatım yöntemine alıştıkları için konunun öğretmen tarafından da anlatılmasını belirttikleri de görülmektedir. Bazı soruların zor olduğunu düşündükleri için soruların seviyesini daha da kolay olmasını ifade etmişlerdir. Etkinlik ve soru sayısında artırılabilir olmasını belirtmişlerdir.

### *Çocukların matematiği gerçek yaşamla ilişkilendirme becerileri nasıldır?* **Alt Problemine İlişkin Sonuçlar**

Beşinci sınıf öğrencilerinin matematiği günlük yaşamlarında sık olarak nerelerde kullandıklarına dair sonuçlar formlardan oluşturulan kodlardan elde edilmiştir. Beşinci sınıf öğrencileri matematiği en çok alışverişte hesap yaparken kullandıklarını belirtmişlerdir. Matematiği oyun alanında ve ders alanında kullandıklarını belirtmişlerdir. Elde edilen sonuçlar ilgili literatürde de yapılan araştırmalarda GME

çerçevesinde günlük hayat materyalleri kullanmanın, günlük hayatta matematiğin kullanma, kolay öğrenme ve eğlenceli bir ortam oluşmasını sağladığı ortaya çıkmıştır (Yorulmaz ve Doğan, 2019).

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# Ortaokul Öğrencilerinin Rutin Olmayan Problem Çözme Sürecindeki Üstbilişsel Davranışları

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## Özet

Matematik eğitimi ve öğretiminin temel amaçları; bireylerin günlük yaşamlarında kullandığı ve gerekli olan matematiksel bilgi ve becerileri, problem çözebilmesi için ihtiyaç duyduğu düşünme becerilerini kapsayan ve problem çözebilme yaklaşımını barındıran bir düşünme sistemi kazandırabilmektedir. Problem çözebilme başarısını etkileyen birçok değişken bulunmaktadır. Bu değişkenlerden birisi de üstbilişsel düşünebilme yeteneğidir. Üstbiliş, bireylerin problem çözerken düşünme süreçlerini kontrol edebilmesi ve farkında olması olarak tanımlanmaktadır. Bu nedenle problem çözme sürecindeki üstbilişsel davranışların incelenmesi önem arz etmektedir. Bu çalışmanın amacı ortaokul öğrencilerinin rutin olmayan problemlerin çözümünde kullanmış oldukları üstbilişsel davranışları ve davranış dizilimlerinde olan benzerlikleri incelemektir. Çalışmada nitel araştırma yöntemlerinden eylem araştırması yöntemi temel alınmıştır. Çalışma grubunu 11 ortaokul öğrencisi oluşturmaktadır. Çalışmanın verileri öğrencilerle gerçekleştirilen bireysel görüşmeler ile yapılandırılmıştır. Görüşme kapsamında rutin olmayan problemler ve Wilson (2001) üstbiliş kartları ile veriler toplanmış, elde edilen veriler içerik analizi yöntemi ile analiz edilmiştir. Analizler sonucunda öğrencilerin genellikle problem çözme sürecine farkındalık boyutuna ait davranış ile başladığı, düzenleme boyutuna ait davranışlarla devam ettikleri, daha sonra bilişsel boyutta davranışları kullandıkları ve değerlendirme boyutuna ait davranışlarla süreci tamamladıkları gözlemlenmiştir. Öğrencilerin süreç boyunca en fazla farkındalık en az da değerlendirme boyutuna ait davranışları kullandıkları gözlemlenmiştir.

**Anahtar Kelimeler**: Rutin olmayan problemler, problem çözme, üstbiliş

## Abstract

The main objectives of mathematics education and training are to provide individuals with mathematical knowledge and skills that are necessary and used in their daily lives, a thinking system that includes the thinking skills they need to solve problems, and a thinking system that includes a problem-solving approach. There are many variables that affect problem solving success. One of these variables is metacognitive thinking ability. Metacognition is defined as the ability of individuals to control and be aware of their thinking processes while solving problems. Therefore, it is important to examine metacognitive behaviors in the problem solving process. The aim of this study is to examine the metacognitive behaviors used by middle school students in solving non-routine problems and the similarities in their behavior sequences. The study was based on action research method, one of the qualitative research methods. The study group consisted of 11 middle school students. The data of the study were structured through individual interviews with the students. Within the scope of the interview, data were collected with non-routine problems and Wilson (2001) metacognition cards, and the data obtained were analyzed by content analysis method. As a result of the analysis, it was observed that students generally started the problem solving process with behaviors belonging to the awareness dimension, continued with behaviors belonging to the regulation dimension, then used behaviors in the cognitive dimension and completed the process with behaviors belonging to the evaluation dimension. It was observed that students used the behaviors belonging to the awareness dimension the most and the behaviors belonging to the evaluation dimension the least during the process.

**Keywords**: Non-routine problems, problem solving, metacognition

## Giriş

Bilim ve teknoloji alanında meydana gelen gelişim ve yeniliklerle birlikte bireylerden beklenen görevler de değişim göstermiştir. Bu değişim şüphesiz eğitim alanındaki değişimleri de beraberinde getirmiştir. Artık, bilgiyi oluşturan ve hayatına entegre edebilen, problem çözebilen, eleştirel ve yansıtıcı düşünebilen, girişimci, iletişim yeteneklerine sahip, toplumsal ve kültürel durumlara katkı sağlayabilen bireylere gereksinim duyulmaktadır (MEB, 2018). Bu gereksinimler matematik eğitimi alanında da ihtiyaçları beraberinde getirmiştir. Bireylerden işlem becerisine sahip ve bu becerileri formüllere uygulamalarından ziyade mevcut bilgi birikimlerini günlük hayatında kullanabilen, analitik ve eleştirel düşünebilen ve problem çözebilme becerisine sahip bireylerin yetiştirilebilmesi hedeflenmektedir (Gür ve Korkmaz, 2013). Ülkemizde matematik öğretim programı içeriğinde

bulunan kazanımların yaklaşık % 14'ünü problem çözme oluşturmaktadır. Bu sonuç problem çözmenin matematik öğretimindeki önemini göstermektedir.

Problem çözme karşılaşılan bir sorun karşısında çözümün belli olmadığı durumlarda hedefe ulaşmak için yapılan bilişsel süreçlerdir. Bu sürece etki eden birçok değişken bulunmaktadır. Bu değişkenlerden biri de üstbiliştir (Kanadlı ve Sağlam, 2013; Kaplan, Duran ve Baş, 2016; Karakelle, 2012; Kişkir, 2011; Tüysüz, 2013). Mayer (1998), üstbiliş üzerine yaptığı çalışmasında bireylerin üstbiliş yeteneğinin problem çözme sürecinde önemli bir rol oynadığı, matematik ve matematiksel problem çözme başarısını etkilediği sonucuna ulaşmıştır. Yine benzer çalışmalarda üstbilişsel yeteneğin problem çözme becerisi ve matematik başarısı arasında pozitif yönde bir ilişki olduğu görülmüştür (Artzt ve Armour-Thomas, 1997; Aydemir ve Kubanç, 2014; Aydın, Dinç ve Memnun, 2020; Hollingworth ve McLoughlin, 2001; Sevgi ve Çağlıköse, 2020). Bu anlamda bireylerin problem çözme sürecinde göstermiş oldukları üstbilişsel davranışlar önemli görülmektedir. Bu çalışmanın amacı öğrencilerin rutin olmayan problemlerin çözümünde kullanmış oldukları üstbilişsel davranışları incelemek ve problemlerin çözümünde kullanmış olduğu üstbilişsel davranış dizilimlerin incelenmesi amaçlanmaktadır.

Bu amaç doğrultusunda aşağıdaki soruya cevap aranmaktadır.

- Ortaokul öğrencilerinin rutin olmayan problemlerin çözümünde göstermiş oldukları üstbilişsel davranışlar nelerdir?
- Ortaokul öğrencilerinin rutin olmayan problemlerin çözümünde göstermiş oldukları üstbilişsel davranış dizilimlerinde bulunan benzer ve farklı özellikler nelerdir?

## Yöntem

Bu bölümde; araştırma modeli, çalışma grubu, veri toplama araçları, verilerin toplanması ve analizi ile ilgili bilgiler açıklanmaktadır.

### Araştırma Modeli

Bu araştırma nitel bir çalışma olup; ortaokul öğrencilerinin rutin olmayan problem çözme sürecinde kullandıkları üstbilişsel davranışları incelemeyi amaçlayan bir çalışmadır. Nitel araştırmalar; mevcut bir durumun ayrıntılı incelenmesi ve yorumlanması olarak açıklanmaktadır. Bu çalışmada nitel araştırma yöntemlerimden eylem araştırması yöntemi kullanılmıştır. Eylem araştırması süreç odaklı bir yöntem olmakla beraber, bu süreç içinde uzun bir çalışma ve odaklanılan bir soruna ilişkin gelişmeler, değişimler ve katılımcılarla etkileşim sağlayarak derinlemesine inceleme imkânı verir (Yıldırım ve Şimşek, 2008).

### Araştırmanın Çalışma Grubu

Araştırmanın çalışma grubunu Gümüşhane ilinde yer alan bir devlet okulunda öğrenim gören 11 ortaokul öğrencisi oluşturmaktadır. Çalışma grubu, seçkisiz olmayan örnekleme yöntemlerinden uygun örneklem yöntemi ile oluşturulmuştur. Sürecin daha hızlı gerçekleştiği uygun örnekleme yönteminde araştırmacı birçok faktörden tasarruf sağlamaktadır (Büyüköztürk vd., 2013). Uygun örnekleme yönteminin seçilme nedeni katılımcılara kolay bir şekilde ulaşılması ve katılımcıların kendini rahat ifade edebilmeleri amacıyla tercih edilmiştir.

### Veri Toplama Araçları

Çalışmanın veri toplama araçlarını Wilson (2001) tarafından oluşturulan üstbiliş davranış kartları ve rutin olmayan problemler oluşturmaktadır. Bu bağlamda öncelikle öğrencilere yöneltilecek olan rutin olmayan problemler belirlenmiştir. Rutin olmayan problemler, rutin problemlere göre daha fazla bilişsel süreç gerektiren, çözüm için tek bir yolun olmadığı ve yöntemin açıkça görünmeyen problem türüdür (Altun, 2010).

Seçilen rutin olmayan problemin çözüm sürecinin incelenmesinde etkili olan ve Wilson (2001) tarafından geliştirilen üstbilişsel davranış kartları kullanılmıştır. Wilson (2001) tarafından geliştirilen kartlarda üstbilişsel davranışlar farkındalık, düzenleme ve değerlendirme boyutları altında incelenmektedir. Süreç içerisinde farkındalık boyutu A, değerlendirme boyutu E, düzenleme boyutu R, bilişsel boyut C ile kodlanmıştır. 14 farklı bileşenden oluşan davranış kartlarının kullanılmasındaki amaç öğrencilerin kendi üstbilişsel süreçlerini ifade edebilmeleri ve belirleyebilmeleridir. Eylem kartları ve sahip oldukları bileşenler tabloda verilmiştir.

Tablo 1. Wilson (2001) üstbiliş davranış kartları

| | |
|---|---|
| | Problem hakkında ne bildiğimi düşündüm. |
| | Benzer bir problemi daha önce çözüp çözmediğimi düşündüm. |
| | Daha önceden çözdüğüm bir problemde bana yardımcı olan bir durumu düşündüm. |
| **Farkındalık** | Ne yapmam gerektiğini bildiğimi düşündüm. |
| | Bu çeşit bir problemi bildiğimi düşündüm. |

| | |
|---|---|
| **Değerlendirme** | Çözüm sürecinde yaptığım uygulamaların çalışıp çalışmadığını düşündüm. |
| | Çözüm sürecinde nasıl gidiyor olduğumu düşündüm. |
| | İşlemlerimin doğru olup olmadığını düşündüm. |
| | Bu problemi çözemeyeceğimi düşündüm. |
| | Ulaştığım sonucun doğruluğunu kontrol ettim. |
| **Düzenleme** | Uyguladığım çözüm yolunu değiştirdim. |
| | Daha sonra ne yapacağımı düşündüm. |
| | Problemi çözmek için bir plan yaptım. |
| | Problemi çözecek farklı bir yol düşündüm |

**Verilerin Toplanması**

Çalışmanın veri toplama süreci öğrencilerle gerçekleştirilen bireysel görüşmelerle yapılandırılmıştır. Süreçte ilk olarak öğrencilere rutin olmayan problem sunulmuş ve sesli olarak çözmeleri istenmiştir. Daha sonra problemin çözümünde kullandıkları üstbilişsel davranış kartlarını sıralamaları istenmiştir. Bu süreçte öğrencilere sunulan Wilson (2001) üstbiliş davranış kartları yanında problem çözüm sürecinde kullandıkları bilişsel süreçleri de ifade edebilecekleri çeşitli kartlar sunulmuştur. Öğrencilerin sesli olarak problem çözme süreci video kamera ile kayıt altına alınmıştır. Kaydedilen görüşmenin sonunda katılımcılara bu süreç izlettirilmiştir. Öğrencilere oluşturdukları sıralamada değişiklik yapabilecekleri ifade edilmiştir. Bu doğrultuda öğrencilerin değişiklik istekleri dikkate alınmıştır.

**Verilerin Analizi**

Elde edilen verilerin analizi nitel veri analizi türlerinden biri olan içerik analiz yöntemi ile gerçekleşmiştir. İçerik analizi elde edilen verileri detaylı bir şekilde analiz edilmesini sağlar ve bu analizler sonucunda farklı tema ve boyutların oluşturulmasını sağlar. Görüşmelerin gerçekleştirildiği her bir öğrenci için örneğin Ö1, Ö2 gibi kodlar oluşturulmuştur. İlk olarak katılımcılarla gerçekleştirilen görüşmeler sonucunda elde edilen video/ses kayıt görüntüleri yazılı metne dönüştürülmüştür. Daha sonra öğrencilerin kullandığı farklı alt boyutlara sahip olan üstbilişsel davranış kartların sıralaması analiz edilmiştir.

# Bulgular

Bu bölümde ortaokul öğrencilerinin rutin olmayan problemlerin çözümüne sergilemiş oldukları bilişsel ve üstbilişsel davranış dizilimlerinde olan benzerlik ve farklılıklara ait bulgulara yer verilmiştir.

*Problem*: Evinde tadilat yaptırmak isteyen Âdem Bey'in, çalıştırdığı kişilere ilişkin bilgiler aşağıda verilmiştir.
- Ustalar ve çıraklarından oluşan toplam 5 kişiyi çalıştırır.
- Her ustanın en az bir çırağı vardır.
- Ustalar ve çıraklarına bir gün için toplam 548 TL öder.
- Bir usta, bir günde 145 TL alır.
Yukarıdaki bilgilere göre 1 çırak, bir günde kaç TL alır?

**Ö.1 kodlu öğrencinin problem çözme süreci**

Ö.1 kodlu öğrenci problemin çözümü için 1 dakika 56 saniye uğraşmış ve bir çırağın günlük 86 TL aldığı sonucuna ulaşmıştır. Bu kişinin çözüm sürecindeki davranışları ve süreçte kullandığı eylem kartlarına ilişkin sıralama aşağıda sunulmuştur.

Tablo 2. Ö.11 kodlu öğrencinin problem çözme süreci

| Zaman | Gözlenen Davranış |
|---|---|
| 0:00-0:25 | Öğrenci soruyu sesli olarak okudu. |
| 0:26-0:43 | Öğrenci bir süre soruyu düşündü. Daha sonra "Yani ya 2 tane usta olacak ya da 3 tane çırak olacak. Diyelim 2 tane usta olsun 3 tane çırak olsun" dedi. |
| 0:44-0:56 | "Bir usta 145 TL alıyorsa 2 ile çarparım. 290 TL yapar" dedi. Öğrenci sorunun bir kısmını tekrar okudu. |
| 0:57-1:14 | Daha sonra "Yani 548'den de 290'ı çıkarırsam çırakların parasını bulurum" dedi. Bir süre sessiz kalarak işlem yaptı. |
| 1:15-1:44 | "258 TL yaptı. Sonra 3 çırak olduğu için 3'e bölerim ve 1 çırağa kaç TL düştüğünü bulurum. 3'e bölersem bir çırağa 86 TL olduğunu düşünüyorum" dedi. |
| 1:45-1:56 | Öğrenci bulduğu sonucu bir kere daha kontrol etmek istediğini söyledi. Cevabının bulduğu sonuç olduğunu söyleyerek çözüm sürecini tamamladı. |

Tablo 2. Ö.1 kodlu katılımcının düşünce kartları

| A | Benzer bir problemi daha önce çözüp çözmediğimi düşündüm. |
|---|---|
| A | Problem hakkında ne bildiğimi düşündüm. |
| R | Problemi çözmek için bir plan yaptım. |
| A | Ne yapmam gerektiğini bildiğimi düşündüm. |
| C | Usta ve çırak sayısının belirledim. |
| C | Çarpma ve çıkarma işlemi yaptım. |
| E | Çözüm sürecinde nasıl gidiyor olduğumu düşündüm. |
| C | Kalan parayı 3'e böldüm. |
| E | Ulaştığım sonucun doğruluğunu kontrol ettim. |

Ö.1 kodlu öğrenci benzer bir problemi çözüp çözmediğini ve problem hakkında ne bildiğini düşünerek çözüm sürecine başladı. Sonrasında problemin çözümü için plan yaptı. Daha sonrasında ne yapması gerektiğini bildiğini, süreçte nasıl gidiyor olduğu düşündü. Elde ettiği sonucun doğruluğunu kontrol ederek çözüm sürecini tamamladı. Bu süreçte farkındalık boyutuna ait 3, düzenleme boyuna ait 1 ve değerlendirme boyutuna ait 2 davranış olmak üzere toplam 10 davranış sergilemiştir.

**Ö.5 kodlu katılımcının problem çözme süreci**

Ö.5 kodlu katılımcı problemin çözümü için 6 dakika 8 saniye uğraşmış ve bir çırağın günlük 86 TL aldığı sonucuna ulaşmıştır. Bu kişinin çözüm sürecindeki davranışları ve süreçte kullandığı eylem kartlarına ilişkin sıralama aşağıda sunulmuştur.

Tablo 3. Ö.11 kodlu öğrencinin problem çözme süreci

| Zaman | Gözlenen Davranış |
|---|---|
| 0:00-0:27 | Öğrenci soruyu sesli olarak okudu. |
| 0:28-1:17 | Öğrenci soruda verilen bazı bilgileri kâğıda not aldı. "Şimdi hocam şöyle yapsam. 4 tane uta ola 1 tane de çırak olsa 5 oluyor. Ama en az dediği için 2 de olabilir" dedi. |
| 1:18-2:30 | Öğrenci bir süre sessizce kâğıda usta ve çırak ayısının olabileceği durumları yazdı. Sorunun belirli bölümlerini sesli bir şekilde tekrar okudu. |
| 2:31-4:48 | Daha sonra "Hocam 1 tane usta yapar, 4 çırak olsa en az bir dediği için 1 de olabilir 2 de olabilir. Olmaz ama o zaman 8 oluyor. 2 usta olsa 4 tane çırak olur. Pardon şurası 3 olduğu zaman oluyor. O zaman ustanın yanına 4 tane çırak düşüyor. Böyle osla 5 geliyor. Ustaya 2 demiştim. Çırağa da 5 pardon 3 demiştim. 548 TL yapıyormuş" dedi. |
| 4:49-6:08 | Bir kere daha soruda verilen bilgileri sesli bir şekilde okudu. "Hocam şimdi ilk önce ustayı bulurum. 548'i 2'ye bölersem" dedi bir süre sessizce bekledi ve soru için bir sonucunun olmadığı söyleyerek çözüm sürecini tamamladı. |

Tablo 4. Ö.5 kodlu katılımcının düşünce kartları

| A | Benzer bir problemi daha önce çözüp çözmediğimi düşündüm. |
|---|---|
| R | Problemi çözmek için bir plan yaptım. |
| C | Usta ve çırak sayısının belirledim. |
| R | Uyguladığım çözüm yolunu değiştirdim. |
| C | 548'i 2'ye böldüm. |
| E | Bu problemi çözemeyeceğimi düşündüm. |

Ö.5 kodlu öğrenci öncelikle benzer bir problemi çözüp çözmediği düşünmüş, daha sonra bir plan yapmış, çözüm yolunda değişiklikler yapmış ve son olarak çözemeyeceğini düşünmüştür. Bu süreçte farkındalık boyutundan 1, düzenleme boyutundan 2 ve değerlendirme boyutundan 1 bileşene ait davranış olmak üzere toplamda 6 davranış kullanıldığı görülmektedir.

**Ö.7 kodlu katılımcının problem çözme süreci**

Ö.7 kodlu katılımcı problemin çözümü için 4 dakika 10 saniye uğraşmış 86 sonucuna ulaşmıştır. Bu kişinin çözüm sürecindeki davranışları ve süreçte kullandığı eylem kartlarına ilişkin sıralama aşağıda sunulmuştur.

Tablo 7. Ö.11 kodlu öğrencinin problem çözme süreci

| Zaman | Gözlenen Davranış |
|---|---|
| 0:00-0:23 | Öğrenci soruyu sesli olarak okudu. |

| 0:24-1:55 | Öğrenci sorunun bir kısmını sesli bir şekilde tekrar etti. Sonra "Hocam ne kadar olduğunu bilmiyorum. Mesela 3 usta var desek 2 çırak var. Ama en az 1 tane vardı o zaman 6 oluyor o zaman olmuyor. 2 tane usta 3 tane çırak kalıyor. Her usta da 145 alıyor desek, 290 yapar" dedi. |
| 1:56-4:10 | Daha sonra "290 bu alıyorsa 548'den 290'ı çıkarırım. Tamam, şimdi geriye kalan çıraklar da 258 TL alıyor. O zaman hocam 258'i 3'e böleceğiz. Bir dakika hocam" dedi ve işlem yaptı. Sonra "Bir çırak bir günde 86 lira alır" diyerek çözüm sürecini tamamladı. |

Tablo 15. Ö.7 kodlu katılımcının düşünce kartları

| A | Bu çeşit bir problemi bildiğimi düşündüm. |
| A | Ne yapmam gerektiğini bildiğimi düşündüm. |
| R | Problemi çözmek için bir plan yaptım. |
| C | Verilenleri kâğıda not aldım. |
| C | Bölme işlemi yaptım. |
| E | İşlemlerimin doğru olup olmadığını düşündüm. |

Ö.7 kodlu öğrenci öncelikle böyle bir problemi bildiğini ve ne yapması gerektiğini bildiğini düşünmüş, bir plan yapmış ve işlemlerinin doğruluğunu düşünerek süreci tamamlamıştır. Bu süreçte farkındalık boyutundan 2, düzenleme boyutundan 1, değerlendirme boyutundan 1 bileşene ait olmak üzere toplamda 6 davranışın kullanıldığı görülmektedir.

**Ö.10 kodlu katılımcının problem çözme süreci**

Ö.10 kodlu katılımcı problemin çözümü için 3 dakika 31 saniye uğraşmış 86 sonucuna ulaşmıştır. Bu kişinin çözüm sürecindeki davranışları ve süreçte kullandığı eylem kartlarına ilişkin sıralama aşağıda sunulmuştur.

Tablo 20. Ö.11 kodlu öğrencinin problem çözme süreci

| Zaman | Gözlenen Davranış |
|---|---|
| 0:00-0:30 | Öğrenci soruyu sesli olarak okudu. |
| 0:31-0:59 | Öğrenci verilen bilgileri kağıda not alarak soru çözümüne başladı. Daha sonra "Şimdi 3 tane çırak olamaz. Çünkü 3 tane olursa 2 tane usta olması lazım. Bu yüzden 2 tane usta olur" dedi. |
| 1:00-3:31 | Sorunun belirli kısımlarını tekrar etti. "Bir tanesinin iki tane çırağı var. Bir usta 145 alıyordu. 145'i 2 ile çarparım 290 lira eder. Geriye kalan çırak parasını bulmak için gerekli işlemleri yaptı. "Ondan 548 liramız var. 548'den 290 lirayı çıkarırım. 258 lira yapar. 258 lirayı 3'e böleceğiz. Ellerimle sayayım ki hata yapmayayım. Şimdi her çırağa günde 86 lira düşüyormuş. Bir çırak bir günde 86 TL alır" diyerek çözüm sürecini tamamladı. |

Tablo 21. Ö.10 kodlu katılımcının düşünce kartları

| A | Bu çeşit bir problemi bildiğimi düşündüm. |
| A | Problem hakkında ne bildiğimi düşündüm. |
| A | Ne yapmam gerektiğini bildiğimi düşündüm. |
| R | Problemi çözmek için bir plan yaptım. |
| C | Usta ve çırak sayısının belirledim. |
| C | Çarpma ve çıkarma işlemi yaptım. |
| E | İşlemlerimin doğru olup olmadığını düşündüm. |
| E | Ulaştığım sonucun doğruluğunu kontrol ettim. |

Ö.10 kodlu öğrenci öncelikle bu çeşit bir problemi bildiğini, ne bildiğini ve ne yapması gerektiğini bildiğini düşünmüştür. Daha sonra bir plan yapmış, işlemlerinin doğru olup olmadığını düşünmüş ve ulaştığı sonucun doğruluğunu kontrol ederek süreci tamamlamıştır. Bu süreçte farkındalık boyutundan 3, düzenleme boyutundan 1 ve değerlendirme boyutundan 2 bileşene ait olmak üzere toplamda 10 davranışın kullanıldığı görülmektedir.

Veri toplama süreci sonunda 143 çözüm elde edilmiştir. Bu çözümlerin 53'ünü doğru çözümler, 90'ını yanlış çözümler oluşturmaktadır. Elde edilen verilerin incelenmesi sonucunda öğrencilerin süreçte toplam 765 davranış kartı kullandığı görülmüştür. Bu davranışların yaklaşık %75'ini üstbilişsel davranış kartları oluşturmuştur. Öğrencilerin kullandıkları kartların üstbilişsel davranış boyutlarına göre incelendiğinde en fazla farkındalık boyutuna ait davranışların kullanıldığı en az ise düzenleme boyutuna ait davranışların kullanıldığı tespit edilmiştir. Öğrencilerin süreç içerisinde oluşturdukları davranış dizilimleri incelendiğinde öncelikle farkındalık boyutuna ait

davranış kartı ile sürece başladıklarını daha sonra düzenleme boyutuna ait davranış ile devam ettikleri değerlendirme boyutuna ait davranış ile de süreci tamamaladıkları gözlemlenmiştir. Öğrencilerin problem çözme sürecinde en fazla kullandıkları davranış kartı ise "Problemi çözmek için bir plan yaptım" davranışı olmuştur. Öğrencilerin bilişsel boyuta ait en fazla kullandıkları davranışların ise genel olarak "İşlem yaptım" davranışı olduğu görülmüştür.

## Sonuç

Tüm öğrencilerin süreç içerinde göstermiş oldukları davranışların incelenmesi sonucunda en fazla farkındalık, en az düzenleme boyutuna ait davranışların kullanıldığı görülmüştür. Kullanılan farkındalık boyutuna ait davranış sayısı ile değerlendirme boyutuna ait davranış sayılarının birbirine çok yakın bir yüzdeye sahip olduğu tespit edilmiştir. Caner (2007), çalışmasında öğrencilerin ortalama 30 farkındalık boyutuna ait davranışı kullandığını, en fazla kullanılan boyutun farkındalık olduğunu ifade etmiş ve benzer bir sonuç ortaya koymuştur. Desoete (2001) çalışmasında, 3.sınıf öğrencilerinin en az düzenleme boyutuna ait davranışları bildirdikleri tespit edilmiştir. Bu çalışmanın sonuçlarından farklı olarak Wilson ve Clarke (2004), Kuzle (2018) ve Akşan Selçuk (2022) çalışmalarında en az farkındalık boyutuna ait davranışların kullanıldığı görülmüştür.

Öğrencilerin problem çözme süreçlerindeki davranış dizilimleri incelendiğinde en çok bildirilen davranış dizilimlerinde önce farkındalık boyutuna ait davranışları kullandıkları, daha sonra düzenleme boyutuna ait davranışlara geçiş yaptıkları ve son olarak değerlendirme boyutuna ait davranışlar ile süreci bitirdikleri gözlemlenmiştir. Bu sonuç Akşan Selçuk (2022), Beydili (2019), Kuzle (2018), Wilson ve Clarke (2004) çalışmalarıyla benzerlik göstermektedir. Caner (2007) çalışmasında öğrencilerde öncelikle farkındalık oluştuğunu, düzenleme ve değerlendirme boyutlarının ise daha sonra oluştuğunu ifade etmiştir.

Elde edilen sonuçlardan bir diğeri ise öğrencilerin süreçte kullandıkları davranış kart sayısı ile başarı arasında bir ilişkinin olmamasıdır. Bu sonuçlarla paralellik gösteren Wilson ve Clarke (2004) ve Akşan Selçuk (2022) çalışmalarında böyle bir ilişkinin olmadığını belirtmişlerdir. Fakat Beydili (2019) ve Caner (2007) çalışmalarında başarılı öğrencilerin kullanmış oldukları üstbilişsel davranış kartı sayısının fazla olduğunu ifade etmiştir.

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# Matematiksel Görev Türlerinin Karşılaştırılması: Sullivan vd. (2013) ile Liljedahl (2020) Örneği

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## Özet

Betimsel tarama modelindeki bu araştırma, Sullivan vd. (2013) ve Liljedahl (2020) tarafından ortaya konulan matematiksel görev türlerine ilişkin görev örnekleri karşılaştırmalı olarak incelemeyi amaçlamıştır. Bu bağlamda her bir görev türüne ilişkin birer örnek olmak üzere toplam altı görev örneği incelenmiştir. Veriler anlamsal içerik analiziyle analiz edilmiştir. Bu kapsamda, Sullivan vd. (2013)'nin Modele Dayalı Görevler türü ile Liljedahl (2020)'ın Kart Hileleri türünün; Sullivan vd. (2013)'nin Bağlama Dayalı Görevler türü ile Liljedahl (2020)'ın Aritmetik Görevler türünün; Sullivan vd. (2013)'nin Açık Uçlu Görevler türü ile Liljedahl (2020)'ın Son Derece İlgi Çekici Görevler türünün paralellik gösterdiği belirlenmiştir.

**Anahtar Kelimeler**: Matematiksel görev, matematiksel görev türü, matematiksel görev örneği.

# Comparing Types of Mathematical Tasks: The Example of Sullivan et al. (2013) vs. Liljedahl (2020)

## Abstract

This research in the descriptive survey model was conducted by Sullivan et al. (2013) and Liljedahl (2020) aimed to comparatively examine the task examples related to the types of mathematical tasks. In this context, a total of six sample tasks, one for each task type, were examined. The data were analyzed by semantic content analysis. In this context, Sullivan et al. (2013)'s Purposeful Representationsal Tasks type and Liljedahl's (2020)'s Card Tricks type; Sullivan et al. (2013)'s Mathematical Tasks Arising from Context and Liljedahl's (2020)'s Numeracy Tasks type; Sullivan et al. (2013)'s Content-Specific Open-Ended Tasks type and Liljedahl's (2020)'s Extremely Interesting Tasks type were found to be parallel.

**Keywords**: Mathematical task, mathematical task type, mathematical task example.

## Giriş

Görev kavramı üzerinde uzlaşılmış bir tanım bulunmamasına karşın "Önceden bilinen bir algoritmayı uygulamayı gerektiren ve basit belirsizlik/belirsizlikler içeren durum/durumlardan ziyade gerçekten sorunlu ve karmaşık durum/durumlar içeren problemler" ifadesi görevin genel bir tanımı olarak belirtilebilir (Polat & Dede, 2020, s. 212). Bununla birlikte; literatürde matematiksel görev türlerine ilişkin farklı sınıflandırmalar mevcuttur. Bu sınıflandırmalardan ikisi Sullivan vd. (2013) ile Liljedahl (2020)'a aittir.

Sullivan vd. (2013) etkili matematik öğretiminin altta yatan en temel argümanın, öğrencilerin matematiksel öğrenme deneyimlerinin matematiksel görevlere dayanması olduğunu ileri sürmektedir. Bir diğer deyişle, matematiksel görevlerin öğretmenler tarafından seçilmesi ve uygulanış biçimi kritik bir role sahiptir. Sullivan vd. (2013)'ye göre matematiksel görevler anlam oluşturma ve matematiğin diğer yönleriyle bağlantıları teşvik etme niteliği taşımaktadır. Bununla birlikte öğrencilerin bir konu hakkında düşünmelerine ve karar vermelerine ortam hazırlamaktadır. Bu anlamda matematiksel görevlerin öğrencilerin matematiksel kavramları derinlemesine anlamaları noktasında önem taşıdığı belirtilebilir. Bu bağlamda Sullivan vd. (2013) matematiksel görev türlerini üç başlık altında toplayarak modele dayalı görevler, bağlama dayalı görevler ve açık uçlu görevler olarak ifade etmiştir.

Modele dayalı görevler; etkili matematik öğretiminin önemli bir bileşeni olan araç ve temsillerin kullanıldığı görev türüdür. Buna göre matematik sınıflarında öğretmenlerin önemli bir matematiksel fikirle başlayarak araç ya da temsil içeren görevler kullanması esastır. Sullivan vd. (2013) modele dayalı görevlerin matematiği pratiğe dökme uygulamaları içermeme özelliği taşıdığını vurgulamaktadır. Bu bağlamda matematiksel bir kavramın temeline

ilişkin somut/soyut araçların modellerin kullanımını içeren görev çeşidi olduğu söylenebilir (Polat & Dede, 2020). İkinci görev türü olan bağlama dayalı görevler ise pratik/gerçek durumlar etrafında oluşturulmaya dayalı olan görev türüdür. Sullivan vd. (2013) bağlama dayalı görevlerde öğretmenlerin ilgili matematiksel terimi bir bağlam içinde ortaya koyduktan sonra öğrencilere neyi nasıl yapacaklarını söylememeleri gerektiğine işaret etmektedir. Sullivan vd. (2013) bağlama dayalı görevlerin aynı zamanda öğrencilerin motivasyonunu arttırma rolüne sahip olduğunu belirtmektedir. Bir diğer görev türü olan açık uçlu görevler, öğrencilerin matematiksel bir kavrama ilişkin çalışırken, birden fazla doğru cevabı birbirinden farklı yollarla bulmaya çalıştıkları görevlerdir. Öğrencileri ezberlenmiş bir prosedürü takip etmek yerine kendi çözüm yollarını araştırmaya teşvik etmeleri, açık uçlu görevlerin en önemli özelliklerindendir (Sullivan vd., 2013). Dolayısıyla öğrencilerin kendi karar mekanizmalarını aktifleştirerek işe koşmalarını gerektirdiği söylenebilir.

Liljedahl (2020)'a göre öğrencilerin matematik sınıflarındaki atmosfere dâhil olabilmeleri için en fazla gerek duyulan eylem, düşünmedir. Nitekim düşünmenin; bir şey/birisi hakkında belirli bir fikre veya görüşe sahip olmak, bir şeye inanmak olarak tanımlandığı görülmektedir (Oxford Learner's Dictionaries, 2023). Bu anlamda öğrencilerin matematiksel düşünce üretmek amacıyla zihinsel yetiler oluşturması için düşünmelerinin gerektiği söylenebilir. Öğrencilerin matematiksel olarak düşünmeye başlayıp bu düşünme eylemlerini sürdürebilmeleri amacıyla onlara üzerinde çalışmaları için matematiksel görevler verilmelidir (Liljedahl, 2020). Matematiksel bir görev hem öğrencilerin düşünmesini gerektirme hem de öğrencileri düşünmeye teşvik etme özelliklerine sahiptir. Bununla birlikte âtıl durumda olan matematiksel görevlerin etkin duruma geçebilmeleri için bir öğrenenler topluluğuna ihtiyaç bulunmaktadır (Liljedahl, 2020). Bir diğer deyişle, öğrenciler üzerinde çalışarak matematiksel görevleri etkinleştirirken matematiksel görevler de öğrencilerin düşünmelerini sağlamaktadır. Bu bağlamda Liljedahl (2020) öğrencileri düşünmeye motive etmekten daha da öteye taşıyarak düşünmeye zorlayacak görevler koleksiyonu ortaya koymuş ve matematiksel görevleri üç tür altında ele almıştır: Kart hileleri, aritmetik görevler ve son derece ilgi çekici düşünme görevleri.

Kart hileleri; düşünmeye karşı koyulamama, çok çeşitli sınıf düzeylerinde kullanılabilme gibi niteliklerine sahip olan ve iskambil kâğıtlarından yararlanılan görev türüdür. Liljedahl (2020) hem matematik üzerine kurulu hem de matematikle açıklanabilecek birçok kart hilesi olduğunu belirtmiş ve buna ilişkin olarak öğrencilerin ellerin büyüsü yerine matematiğin büyüsüyle meşgul olmaları gerektiğine dikkat çekmiştir. Bir diğer görev türü olan aritmetik görevler; gerçek olmasıyla birlikte günlük hayata dayanan ve öğrencilerin matematik sınıflarında birbirinden farklı birçok gerçek yaşam durumu ile bir araya getirilmesiyle onlar üzerinde deneyim kazanmaları esasını temel almaktadır. Görev türlerinden bir diğeri olan son derece ilgi çekici düşünme görevleri ise kart hileleriyle aynı nitelikleri taşıyan fakat iskambil kâğıtları kullanılmayan görev türüdür. Liljedahl (2020) son derece ilgi çekici görevlerin geniş bir etki alanı olduğunu ve ifade etmiştir.

Her iki yaklaşımda bulunan görev türlerinin niteliklerinden yola çıkılarak, görev türlerinin şu şekliyle birbirini karşıladığı söylenebilir: Sullivan vd. (2013)'nin Modele Dayalı Görevler türüne karşılık Liljedahl (2020)'ın Kart Hileleri türü; Sullivan vd. (2013)'nin Bağlama Dayalı Görevler türüne karşılık Liljedahl (2020)'ın Aritmetik Görevler türü; Sullivan vd. (2013)'nin Açık Uçlu Görevler türüne karşılık Liljedahl (2020)'ın Son Derece İlgi Çekici Görevler türü. Buradan yola çıkılarak birbirine karşılık geldiği düşünülen görev türlerine ilişkin görev örneklerinin karşılaştırılmalı olarak incelenmesi merak konusu olmuştur. Bu bağlamda şimdiki araştırmada aşağıdaki probleme cevap aranmıştır:

Sullivan vd. (2013) ve Liljedahl (2020) tarafından ortaya konulan matematiksel görev türlerine ilişkin görev örneklerinin karşılaştırmalı incelemesi nasıldır?

## Yöntem

### Araştırma Deseni

Bu betimsel tarama modelindeki çalışmada, Sullivan vd. (2013) ile Liljedahl (2020) tarafından ortaya konulan matematiksel görev türleri ve bu görev türlerine ilişkin görev örnekleri incelenmiştir. Tarama modelinin türlerinden biri olan betimsel tarama modeli, bir olgunun neden oluştuğunu sormak yerine özelliklerini açıklamaya odaklanan bir modeldir (Karakaya, 2012).

### Veri Toplama Aracı ve Süreci

Araştırma verileri, Sullivan vd. (2013) ve Liljedahl (2020) tarafından ortaya konulan matematiksel görev türlerinin niteliklerinden yola çıkılarak birbirine karşılık geldiği düşünülen görev türlerine ilişkin görev örneklerinin karşılaştırılmalı olarak incelenmesi ile toplanmıştır. Tablo 1'de görüldüğü üzere

- Sullivan vd. (2013)'nin modele dayalı görevlere örnek verdiği Para Kartları görevi ile Liljedahl (2020)'ın kart hileleri görevlerine örnek verdiği 16. Kart Hilesi görevi;

●Sullivan vd. (2013)'nin bağlama dayalı görevlere örnek verdiği Çap Bandı görevi ile Liljedahl (2020)'ın aritmetik görevlere örnek verdiği Kayak Gezisi görevi;

●Sullivan vd. (2013)'nin açık uçlu görevlere örnek verdiği Üçgen Çizme görevi ile Liljedahl (2020)'ın son derece ilgi çekici görevlere örnek verdiği Kum Saati görevi

karşılaştırmalı olarak incelenmiştir.

Tablo 1. Karşılaştırılan Matematiksel Görev Bilgileri

| Sullivan vd.'nin Görev Türleri (2013) | Görev Örneği | Liljedahl'ın Görev Türleri (2020) | Görev Örneği |
| --- | --- | --- | --- |
| Modele Dayalı Görevler | Para Kartları (Money Cards) (2013, s. 27) | Kart Hileleri | 16. Kart Hilesi (2017, s. 175-176) |
| Bağlama Dayalı Görevler | Çap Bandı (Diameter Band) (2013, s. 48) | Aritmetik Görevler | Kayak Gezisi (2020, s. 26) |
| Açık Uçlu Görevler | Üçgen Çizme (2013, s. 65) | Son Derece İlgi Çekici Görevler | Kum Saati (2020, s. 25) |

## Veri Analizi

Sullivan vd. (2013) ile Liljedahl (2020) tarafından ortaya konulan matematiksel görev türleri ve bu görev türlerine ilişkin görev örnekleri, nitelikleri bağlamında karşılaştırmalı bir incelemeye tabi tutulmuştur. Bu kapsamda anlamsal içerik analizinden yararlanılmıştır.

## Çalışmanın Güvenirliği

Bu çalışmada güvenirlik için akran değerlendirmesinden (bkz. Lincoln & Guba) yararlanılmıştır. Bu bağlamda, Sullivan vd. (2013) ile Liljedahl (2020) tarafından ortaya konulan matematiksel görev türleri ve bu görev türlerine ilişkin görev örnekleri, araştırmacılar tarafından bağımsız olarak incelenmiştir. Ardından, bağımsız incelemeler gözden geçirilerek mevcut farklılıklara ilişkin fikir birliği aranmıştır. Bu doğrultuda araştırmacılar arasındaki uyum-korelasyon katsayısı 0,88 olarak hesaplanmıştır.

# Bulgular

Araştırmanın bulguları her bir görev türüne ilişkin olacak şekilde ayrı başlıklar altında aşağıda sunulmuştur.

## Modele Dayalı Görevler ile Kart Hilelerinin Karşılaştırılmasına İlişkin Bulgular

Sullivan vd. (2013)'nin modele dayalı görev türüne örnek verdiği Para Kartları görevinde (2013, s. 27), öğrencilerden üzerinde miktarları belirtilen kartların arasına, üzerinde yüzdelik artış ya da azalma miktarı bulunan okları doğru bir şekilde yerleştirmeleri istenmektedir (Şekil 1.). Örneğin öğrencilerden %20'lik artış okunu, okun ucu 120 dolarlık para kartını gösterecek şekilde, 100 dolarlık para kartı ile 120 dolarlık para kartının arasına yerleştirmesi beklenmektedir. Benzer şekilde, öğrencilerin %25'lik azalış okunu, okun ucu 150 dolarlık para kartını gösterecek şekilde, 150 dolarlık para kartı ile 200 dolarlık para kartının arasına yerleştirmesi beklenmektedir. Ardından, üzerinde artış ya da azalma miktarlarının ondalık kesir gösteriminde bulunduğu oklar verilerek öğrencilerin buradaki işlemleri tekrar etmeleri istenmektedir. Burada verilen araçlar aracılığıyla öğrencilerin keşfetmesi beklenen durumun, yüzde ve ondalık kesir değeri arasında ilişkilendirme yapmalarını sağlamak olduğu söylenebilir.

Şekil 1. Sullivan vd. (2013)'nin Para Kartları Görevi.

Liljedahl (2020)'ın kart hileleri görev türüne örnek verdiği 16. Kart Hilesi görevinde (2017, s. 175-176), Şekil 2'de görüldüğü gibi sol taraftaki dizilime sahip olan beş iskambil kartı bulunmaktadır. Öğrencilerden, en üstteki kartı alıp yüzü yukarıya bakacak şekilde masanın üstüne (bir öncekinin sağına) koymaları ve ardından bir sonraki kartı alarak destenin en altına koymaları istenmektedir. Bu işlemi tüm kartlar için tekrarlayarak en sonunda kartların tamamının Şekil 2'nin sağ tarafındaki dizilimde görüldüğü gibi, masada artan sırada dizilmiş olması beklenmektedir. Ardından, sırasıyla altıncı, yedinci vb. karlar eklenerek öğrencilerden yine aynı işlemi tekrar etmeleri istenmektedir. Burada öğrencilerin verilen araçlar aracılığıyla keşfetmesi beklenen durumun, sıralama için nasıl bir tekrarlama olduğuna ilişkin bir desen ortaya koyabilmeleri olduğu söylenebilir.



Şekil 2. Liljedahl (2020)'ın 16. Kart Hilesi Görevi.

Her iki görev türüne örnek verilen görevlerin; hem modele dayalı görevlerde hem de kart hileleri görevlerinde araç ve temsillerin kullanılması bağlamında birbiri ile örtüştüğü söylenebilir.
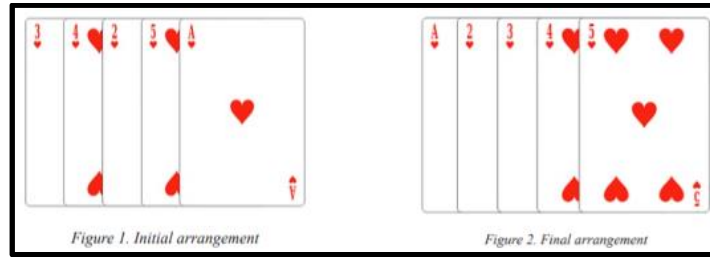
## Bağlama Dayalı Görevler ile Aritmetik Görevlerin Karşılaştırılmasına İlişkin Bulgular

Sullivan vd. (2013)'nin bağlama dayalı görev türüne örnek verdiği Çap Bandı görevinde (2013, s. 48), öğrencilere bir ağacın çapını ölçmek için ağacın etrafına göğüs hizasında sarılarak ağacın çevresini ağacın çapına dönüştüren çap bandının kullanıldığı bilgisi verildikten sonra, öğrencilerden bir şerit, cetvel ve hesap makinesi kullanarak kendi çap bantlarını yapmaları ve çapı 40 cm ile 50 cm arasında olan bir ağacın çapını okumak için kullanmaları istenmektedir (Şekil 3). Buna göre öğrencilerin, bir gerçek yaşam durumundan hareketle bir bağlam içerisinde nasıl yapacakları söylenmeden sunulan görevde verilen bilgiden bir çıkarımda bulunup deneyim elde ederek bir ürün ortaya koymalarının istendiği söylenebilir.

*Diameter Tape*
A diameter tape (D tape) is used by foresters to measure the diameter of a tree. The D tape is wrapped around a tree at around breast height and converts the tree circumference to tree diameter
Using a streamer, ruler, and calculator, make your own D-tape. You will be asked to use it to read off the diameter of a "tree" with a diameter between 40 and 50 cm
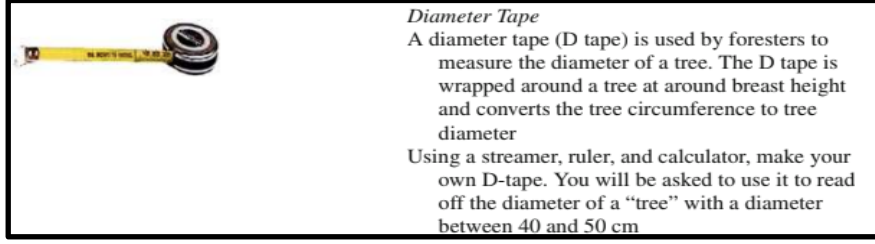
Şekil 3. Sullivan vd. (2013)'nin Çap Bandı Görevi.

Liljedahl (2020)'ın aritmetik görev türüne örnek verdiği Kayak Gezisi görevinde (2020, s. 26), öğrencilerden kayak gezisi katılımcılarının her birine ilişkin kiralama ücreti, telesiyej ücreti ve ders ücretlerini hesaplayarak biriktirilen tutarın yeterli olup olmadığını belirlemeleri istenmektedir. Buna göre öğrencilerin, bir gerçek yaşam durumuna dayandırılarak deneyim elde etmelerinin istendiği belirtilebilir.



Şekil 4. Liljedahl (2020)'ın Kayak Gezisi Görevi.

Bu anlamda, her iki görev türüne örnek verilen görevlerin; hem bağlama dayalı görevlerde hem de aritmetik görevlerde gerçek yaşam durumuna dayandırılması bağlamında birbiri ile benzerlik gösterdiği söylenebilir.

**Açık Uçlu Görevler ile Son Derece İlgi Çekici Görevlerin Karşılaştırılmasına İlişkin Bulgular**

Sullivan vd. (2013)'nin açık uçlu görev türüne örnek verdiği Üçgen Çizme görevinde (2013, s. 65), öğrencilerden kare şeklindeki altı birimkarelik bir kâğıt üzerinde olabildiğince çok farklı üçgen çizmeleri istenmektedir. Burada öğrencilerin birbirinden farklı yollarla denemeler yaparak olabildiğince farklı üçgeni nasıl çizebileceklerine ilişkin bir çıkarımda bulunmalarının beklendiği belirtilebilir.



Draw (on squared paper) as many different triangles as you can with an area of six square units

Şekil 5. Sullivan vd. (2013)'nin Üçgen Çizme Görevi.

Liljedahl (2020)'ın son derece ilgi çekici görev türüne örnek verdiği Kum Saati görevinde (2020, s. 25), öğrencilerden dört dakikada ve yedi dakikada tamamlanan iki farklı kum saatini, dokuz dakikalık bir sürenin ölçümünde kullanılıp kullanılamayacağını ve eğer kullanılabilirse bunun nasıl yapılacağını belirlemeleri istenmektedir. Burada öğrencilerin, farklı tamamlanma sürelerine sahip kum saatleri üzerinde sürelere ilişkin birbirinden farklı yollarla denemeler yapıp ilişkilendirmede bulunmalarının beklendiği ifade edilebilir.
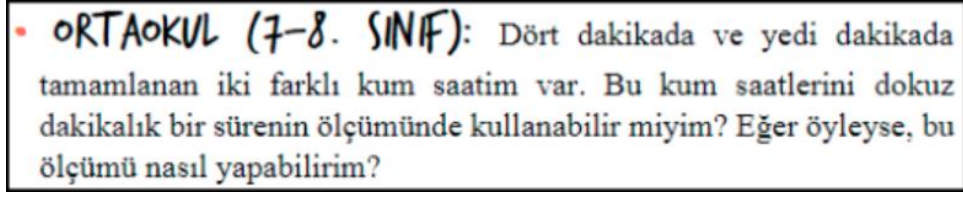
Şekil 6. Liljedahl (2020)'ın Kum Saati Görevi.

Buradan yola çıkılarak, her iki görev türüne örnek verilen görevlerin; hem açık uçlu görevlerde hem de son derece ilgi çekici görevlerde birden fazla çözüm yolunu içeren durumlara dayandırılması noktasında birbiri ile örtüştüğü söylenebilir.

## Sonuçlar

Bu betimsel tarama modelindeki çalışmada, Sullivan vd. (2013) ve Liljedahl (2020) tarafından ortaya konulan matematiksel görev türlerine ilişkin görev örneklerinin karşılaştırmalı incelemesinin yapılması amaçlanmıştır. Bu bağlamda ulaşılan sonuçlara aşağıda yer verilmiştir:

1.Her ne kadar farklı araştırmacılar tarafından farklı zamanlarda ortaya koyulmuş olsa da, Sullivan vd. (2013) ve Liljedahl (2020) tarafından ortaya konulan matematiksel görev türlerinin birbirine karşılık geldiği görülmüştür.

2.Sullivan vd. (2013)'nin Modele Dayalı Görevler türü ile Liljedahl (2020)'ın Kart Hileleri türünün paralellik gösterdiği belirlenmiştir.

3.Sullivan vd. (2013)'nin Bağlama Dayalı Görevler türü ile Liljedahl (2020)'ın Aritmetik Görevler türünün paralellik gösterdiği belirlenmiştir.

4.Sullivan vd. (2013)'nin Açık Uçlu Görevler türü ile Liljedahl (2020)'ın Son Derece İlgi Çekici Görevler türünün paralellik gösterdiği belirlenmiştir.

## Acknowledgements

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# Sanal Müzelerin Matematik Öğretiminde Kullanımına Yönelik Öğrenci Görüşlerinin Matematik Günlükleri ile İncelenmesi

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## Özet

Bu çalışmada, sanal müzeler temel alınarak gerçekleştirilen, ortaokul 5. Sınıf matematik dersi öğretimine yönelik öğrenci görüşlerinin, öğrenci matematik günlükleri ile toplanıp incelenmesi amaçlanmıştır. Bu amaçla Gaziantep Mozaik Sanal Müzesi ve Şanlıurfa Göbeklitepe Sanal Müzesi uygulama için seçilerek, araştırmacı tarafından bu müzeleri kullanacak şekilde iki farklı ders planı hazırlanmıştır. 2022-2023 eğitim ve öğretim yılında Malatya ili Battalgazi ilçesi bölgesinde bulunan bir ortaokulun 5. sınıfına devam etmekte olan 7 kız ve 8 erkek toplam 15 öğrenci ile birlikte uygulamalar gerçekleştirilmiştir. Uygulamalar sonucunda öğrencilerin tuttukları öğrenci matematik günlükleri incelenmiştir. İçerik analizi ile günlüklerden elde edilen bulgulara göre sanal müzelerde yapılan matematik öğretiminin öğrencilerin derse aktif katılımına, dersi sevmesine, dersi günlük hayatla ilişkilendirmesine ve dersin konusunun anlaşılmasına olumlu yönde katkı sağladığı görülmüştür. Öğrencilerin cevaplarında sanal müze ve müzelerden bahsetmeleri de öğrencilerde, müzelere ve sanal müzelere yönelik ilgi ve merak uyandırdığı tespit edilmiştir.

**Anahtar Sözcükler**: Sanal Müze, Müzede öğrenme, Matematik Öğretimi, Öğrenci Matematik Günlükleri

## Abstract

In this study, it was aimed to collect and examine the students' opinions about the 5th grade mathematics lesson teaching based on virtual museums through student mathematics diaries. For this purpose, Gaziantep Mosaic Virtual Museum and Şanlıurfa Göbeklitepe Virtual Museum were selected for the application and two different lesson plans were prepared by the researcher to use these museums. In the 2022-2023 academic year, the applications were carried out with a total of 15 students, 7 girls and 8 boys, attending the 5th grade of a secondary school in Battalgazi district of Malatya province. As a result of the applications, the student mathematics diaries kept by the students were analyzed. According to the findings obtained from the diaries through content analysis, it was seen that mathematics teaching in virtual museums contributed positively to students' active participation in the lesson, liking the lesson, associating the lesson with daily life and understanding the subject of the lesson. The fact that the students mentioned virtual museums and museums in their answers was interpreted as the application aroused interest and curiosity in students towards museums and virtual museums.

**Keywords:** Virtual Museum, Learning in Museum, Mathematics Teaching, Mathematics Diaries

## Giriş

19. ve 20. yüzyılda meydana gelen toplumsal değişiklere eğitim sistemleri hızlı bir şekilde cevap vermeye çalışmıştır. Günümüz 21. yüzyıl dünyasının birçok sektörde oluşan dijital dönüşüm ihtiyacı sonucunda da eğitimin hedeflerinin ve öğrencilerden beklenen yeterliliklerin yeniden düşünülmesini gerektirmiştir. Özellikle dijitalleşme, iklim değişikliği ve yapay zekâ gibi ilerlemeler uluslararası çapta, eğitimin sistemleri için olan zorunlu değişimi giderek artan bir aciliyet haline getirmiştir (OECD, 2019). UNESCO araştırmacıları söz konusu hedefler ve yeterlilikler için ayrıntılı çalışmalar gerçekleştirmişlerdir. Bu çalışmalar potansiyel gelecek için asıl olanın bilgi öğrenmesi olmadığını; problem çözme, eleştirel düşünme ve işbirliğini içeren öğrenme olduğunu ortaya koymaktadır. Bunların yanında inisiyatif, dayanıklılık, sorumluluk, risk alma ve yaratıcılık gibi kişisel becerilerin gelecekte bir işte çalışabilmek için gerekliliğinin altını çizmektedir (Scott, 2015). Bu doğrultuda OECD Eğitim Politikası Komitesi eğitim sisteminin yüz yüze kaldığı sorunları araştırmak ve müfredat tasarımları oluşturma sürecine katıda bulunmak üzere OECD Eğitim ve Becerilerin Geleceği 2030 projesini başlatmıştır (OECD, 2015). Projenin ilk aşaması yeterliliklerin tespitine yönelikken ikinci aşaması ise belirlenen yeterliliklerin hangi öğrenme ortamlarında nasıl tasarlanacağına, diğer bir ifade ile müfredatın etkili ve verimli bir şekilde nasıl uygulanacağına odaklanmaktadır. İkinci aşamadan hareketle öğretim ortamlarının nasıl tasarlanacağı, müfredatın etkili ve verimli bir şekilde nasıl uygulanacağına yönelik çalışmalarda okul dışı öğrenme ortamları üzerine yoğunlaştığı görülmektedir.

MEB (2019), yapmış olduğu çalışmasında okul dışı öğrenme ortamlarını; devlet kurumlarına ait tüm müzeler ile tescilli özel müzeler, kamu kurumlarına ait bilim ve sanat merkezleri, Kültür ve Turizm Bakanlığı tarafından belirlenmiş tarihi ve kültürel alanlar, kamu kurumlarına ait kütüphaneler ile edebiyat müze kütüphaneleri, doğal sit alanları ve ören yerleri, teknoparklar, ziyarete açık endüstriyel kuruluşlar, üniversiteler, millî, tematik park ve

bahçeler olarak sıralamaktadır. Bunlardan en çok öne çıkanlardan bir de müzeler olarak karşımıza çıkmaktadır. Çünkü müzelerin en temel işlevi her zaman eğitim olmuştur (San, 2021). Hein (2001), müzelerin eğitim teorisi yapılandırmacılık için en faydalı ve en güçlü olanı sağladığına inanmaktadır. Çünkü müzeler ziyaretçilerle etkileşim kurma yolundan yararlanarak eleştirel düşünceyi desteklemekte ve çeşitliliğe değer veren bir toplum geliştirmek için farklı olana saygı duymayı öğretmektedir. Üstelik müze ve müze koleksiyonları, eğitimde öğrencilerin zihinlerini harekete geçirerek her birine farklı hikayeler anlatan, böylelikle yaratıcı düşünmeyi destekleyen yüksek uyaranlar arasında da yerini almaktadır (Gartenhaus, 2000).

21.yüzyılda yaşanan dijital değişim ve dönüşümde müzelerin, eğitim işlevini yürütmelerinin yanında kişisel deneyime olanak sağlayan etkileşimli dijital ortam tasarımlarına doğru evrildiği görülmektedir (Bostancı, 2019). Müzeler, teknoloji sayesinde müzeye gelmeden internet aracılığıyla her yerde ziyaret edilmek üzere sanal ortamlara taşınmışlardır. Böylelikle ulaşımının zorluğu, öğretmenler ve öğrenciler için gerekli izin işlemleri, zaman ve maddiyat gibi nedenlerle erişim sıkıntısı çeken ziyaretçiler için kullanışlı bir ortam oluşturulmuştur (Buyurgan, 2019). Duvarları ve zaman kısıtlarını ortadan kaldıran sanal müzeler; ziyaretçilerin uygun olduğu her an ulaşabileceği mekânlara dönüştürülmektedir (Erbay, 2013). Bu anlamda okul dışı öğrenme ortamlarından biri olarak adlandırılabilmektedir.

Gerçekleştirilen çalışmalar incelendiğinde sanal müzelerle ilgili matematik dersiyle ilişkilendirilen çalışmaların oldukça kısıtlı kaldığı görülmektedir (Bahadır ve Hırdıç, 2018; Kır, Kalfaoğlu ve Aksu, 2021; Arık Karamık ve Özyıldırım Gümüş, 2022; Aydoğdu, Aydoğdu ve Aktaş, 2022). Bu çalışmalardan Aydoğdu, Aydoğdu ve Aktaş (2022), 7. sınıf öğrencileri ile müzelerin sanal uygulamalarını kullanarak geçmiş yıllarda kullanılan matematiği incelemişlerdir. Çalışma sonucunda yapılan uygulamanın matematik dersine olumlu katkıda bulunduğunu ve katılımcıların matematik-müze ilişkisi içeren etkinliklerden hoşlandıkları ortaya çıkmıştır. Ancak sanal müzelerin ortaokul öğrencilerinin MEB kazanımları için tasarlanmış müze temelli ders planları ile birlikte yapılan matematik öğretimini araştıran bir çalışmaya rastlanmamıştır. Bu bağlamda yapılan bu çalışmanın alana katkı sağlayacağı ve matematik öğretimine farklı bakış açıları katacağı düşünülmektedir. Bunun yanı sıra çalışmada öğrenci görüşlerinin öğrenci günlükleri ile toplanmasının, katılımcıların matematiksel yeterliliğinin arttırılmasında yazısal ve sözel iletişim kurabilme yeteneğinin geliştirilmesine katkı sağlayacağı düşünülmektedir (NCTM, 2006). Çünkü öğrencilerin o gün öğrendiklerini kendi başlarına değerlendirebilmeleri ve ifade etmeleri konuyu ne kadar anlamış olduğunun bir göstergesidir. Öğrenmenin kalıcılığını arttıran günlük yazma çalışması için ne yazacağını düşünmek, sonrasında da öğrenilenlerin hepsini beyinde yapılandırmak gerekmektedir (Demirci, 2016). Dolayısıyla öğrencilerin matematiksel öğrenme becerilerinin de gelişimini destekleyici nitelikte olan bu çalışma alanda yapılmış diğer çalışmalardan da farklılaştırmaktadır. Bu noktadan hareketle gerçekleştirilen bu çalışmanın amacı, sanal müzede gerçekleştirilen matematik öğretimine dair öğrenci görüşlerini öğrenci günlükleri aracılığıyla toplayıp incelemektir.

## Yöntem

Sanal müzelerde gerçekleştirilen, ortaokul 5. Sınıf matematik dersine yönelik öğrenci görüşlerinin öğrenci matematik günlükleri ile toplanıp incelenmesinin amaçlandığı bu çalışmada, nitel araştırma yöntemlerinden içerik analizi yöntemi kullanılmıştır. Öğrenci Matematik Günlükleri, gözlem ve yazılı dokümanlar aracılığıyla elde edilen veriler kodlanmış ve temalar belirlenmiştir (Ültay, Akyurt ve Ültay, 2021). Gerekli düzenlemeler yapılarak bulgular tablolar halinde sunulmuş, açıklanarak yorumlanmıştır. Ayrıca öğrenci görüşlerinden doğrudan alıntılara yer verilmiştir. Araştırmanın geçerlik ve güvenirliğini arttırmak üzere; uygulama öncesi öğrenci, veli, okul yönetimi ve Milli Eğitim Müdürlüğünden gerekli izinlerin alınmış, görüşme kayıtlarının gizli kalacağı ve bilimsel amaçla kullanımı konusunda bilgilendirmeler yapılmış, gözlem ve görüşme sırasında yönlendirici olunmamış ve öğrenci görüşlerinden doğrudan alıntılar yapılmıştır.

### Çalışma Grubu

Araştırmanın çalışma grubunu 2022-2023 eğitim ve öğretim yılında Malatya ili Battalgazi ilçesi bölgesinde bulunan bir ortaokulun 5. sınıfına devam etmekte olan 7 kız ve 8 erkek toplam 15 öğrenci oluşturmaktadır. Çalışma grubunun seçiminde kolay ulaşılabilir durum örneklemesinden yararlanılmıştır (Yıldırım ve Şimşek, 2008). Bu nedenle araştırmacının çalıştığı kurumdaki öğrenciler katılımcı olarak yer almıştır. Gönüllülük esasına bağlı olarak çalışmaya katılan öğrencilerden gerekli veli onay belgeleri alınmıştır.

### Veri Toplama Araçları

Araştırmada veri toplamak için araştırmacı tarafından hazırlanmış öğrenci matematik günlükleri kullanılmıştır. Öğrenci Matematik Günlüklerinin geçerliğini belirlemek üzere 3 İlköğretim Matematik Öğretmeni ve 1 Türkçe Öğretmeninin görüşüne başvurulmuştur. Ardından alınan öneri dahilinde gerekli düzeltmeler yapılarak son hali katılımcılara uygulanmıştır. Öğrenci Matematik Günlüklerinde öğrencilerin Sanal müzelerde yapılan matematik öğretimine ilişkin görüşlerini belirlemek üzere aşağıdaki sorulara yer verilmiştir:

1. **Soru:** Bugün matematik dersinde işlediğiniz konu ile ilgili kendini nasıl hissettin? Bir önceki matematik derslerine göre bugün kendini nasıl buldun? Neler düşündün merak ediyorum, bana düşüncelerini anlatır mısın?

2. **Soru:** Bugün matematik dersinde sana ilginç gelen bir bilgi öğrendin mi? Eğer öğrendiysen sana ilginç gelen bu bilgiyi bana da söyler misin?

3. **Soru:** Ben bugün derse gelemedim. Bugün neler öğrendiğinizi kaçırdım. Öğrendiklerini benim anlayacağım bir şekilde bana anlatır mısın?

4. **Soru:** Bugünün konusu ile günlük hayatta nerelerde ve ne şekilde karşılaşırız? Aklındakileri bana da söyler misin?

5. **Soru:** Bugünkü matematik dersinde kafana takılan, anlamadığın bir nokta varsa bana burada açıklar mısın?

## Uygulama Süreci

Araştırmacı tarafından ortaokul 5. sınıf dersi matematik dersi kapsamında çalışmanın kazanımlarına uygun sanal müzelerde yapılacak matematik öğretimi üzerine iki farklı ders planı hazırlanmıştır. Kazanımlara da hizmet edecek şekilde Gaziantep Zeugma Mozaik Sanal Müzesi ve Şanlıurfa Göbeklitepe Sanal Müzesi uygulamalarda kullanılmak üzere belirlenmiştir. Kültür ve Turizm Müdürlüğü ile Milli Eğitim Müdürlüğünden gerekli izinler alındıktan sonra, okul yönetimi ve öğrenci grubunun velileri ile çalışma hakkında görüşülmüş, velilerinden gerekli izinler alınmıştır. Öğrenciler; sanal müzelerde görülecek bölümler ve eserler, sanal müzelerde yapılacak etkinlikler hakkında bilgilendirilmiştir. Belirlenen gün ve saatlerde müze temelli eğitim (müze öncesi-müzede-müze sonrası) sürecine göre hazırlanmış ders planları doğrultusunda uygulamalar gerçekleştirilmiştir. Uygulama sonrası öğrencilerin sanal müzelerde yapılan matematik öğretimine ilişkin görüşlerini belirlemek üzere her öğrenciye öğrenci matematik günlükleri uygulamanın son 15 dakikası geri alınmak üzere dağıtılmıştır.

## Bulgular

Bu bölümde öğrenci matematik günlüklerinden elde edilen öğrenci görüşlerine ilişkin bulgular tablolar halinde sunulmuştur. Ayrıca öğrenci görüşlerinden doğrudan alıntılar yapılmıştır.

Öğrencilerin matematik günlüklerinde birinci soruya vermiş oldukları cevaba ilişkin frekans ve yüzde dağılımları Tablo 1'de gösterilmiştir.

**Tablo 1:** *Öğrencinin derse yönelik duyguları*

| 1.Uygulama (Gaziantep Zeugma Mozaik Sanal Müzesi) | | | 2.Uygulama (Şanlıurfa Göbeklitepe Örenyeri Sanal Müzesi) | | |
|---|---|---|---|---|---|
| *Öğrenci ifadeleri* | *f* | *%* | *Öğrenci ifadeleri* | *f* | *%* |
| Çok güzeldi/ Çok beğendim. | 7 | 46,66 | Kendimi çok iyi hissettim/Çalışkan hissettim | 9 | 60 |
| Çok eğlendim. | 5 | 33,33 | Çok eğlendim/ Derse katıldım | 3 | 20 |
| Kendimi çok iyi hissettim | 3 | 20 | Çok iyi hissettim/ Aktiftim | 2 | 13,33 |
| Toplam | 15 | 100 | Çok güzeldi. | 1 | 6,66 |
| | | | Toplam | 15 | 100 |

Tablo 1' de 1. uygulama için öğrencilerin 5'i çok eğlendiğini, 7'si dersin çok güzel olduğunu, 3'si kendisini çok iyi hissettiğini belirtmiştir. Öğrencilerin matematik günlüklerinde birinci maddeye vermiş oldukları örnek ifadeler aşağıda verilmiştir:

"Bugün oyun oynayıp sanal müzede gezdik, güzeldi. Çok beğendim. Önceki dersten iyiydi." (Ö1)

"Hem öğrendim hem de en sevdiğim oyunu oynadık." (Ö4)

Tablo 1'de 2. uygulama için öğrencilerin 9'i kendilerini çok iyi hissettiklerini ve derse katılarak çalışkan hissettiklerini belirtmiştir. 3 öğrenci çok güzel hissettiklerini ve eğlendiklerini, 1 öğrenci dersin güzel geçtiğini belirtmiştir. Öğrencilerin matematik günlüklerinde birinci maddeye vermiş oldukları örnek ifadeler aşağıda verilmiştir:

"Güzel hissettim. Neden çünkü oyun hamuru oynadık. Dışarı çıktık güzel geçti. Bir öncekinden daha güzeldi." (Ö7)

"İyi hissettim. Bugün oyun oynadık. Çalışkan hissettim. Kendimi çok mutlu hissettim. Derse katıldım." (Ö14)

Öğrencilerin matematik günlüklerinde ikinci maddeye vermiş oldukları cevaba ilişkin frekans ve yüzde dağılımları Tablo 2'de gösterilmiştir.

**Tablo 2:** *Öğrenciye ilginç gelen yönleri*

| 1.Uygulama (Gaziantep Zeugma Mozaik Sanal Müzesi) | | | 2.Uygulama (Şanlıurfa Göbeklitepe Örenyeri Sanal Müzesi) | | |
|---|---|---|---|---|---|
| *Öğrenci ifadeleri* | *f* | *%* | *Öğrenciye ilginç gelen yönler* | *f* | *%* |
| Oyunun içinde örüntü bulmak | 5 | 20,83 | Müzedeki alan/ sanal müzede alan bulmak | 7 | 33,33 |
| Çingene Kız | 5 | 20,83 | Köşe kapmaca oyunu/ Dersi oyun ile yapmak | 7 | 33,33 |
| Mozaik eserlerde örüntü bulmak | 5 | 20,83 | Alan bulmayı öğrenmek | 4 | 19,04 |
| Sanal müze/Sanal müzede gezmek | 4 | 16,66 | Müzenin Şekilleri | 3 | 14,28 |
| Müzede farklı şeyler görmek/keşfetmek | 4 | 16,66 | Toplam | 21 | 100 |
| Zor örüntülerin olması | 1 | 4,16 | | | |
| Toplam | 24 | 100 | | | |

Tablo 2'de 1. uygulama için frekans değerinin (f) 15 yerine 24 olarak hesaplanması, öğrencilerin bazılarının birden fazla görüş belirtmesinden kaynaklanmaktadır. 5 ifadede oyunun içinde örüntü bulmak, 5 ifadede Çingene Kız eseri, 5 ifadede mozaik eserlerde örüntü bulmak, 4 ifadede sanal müze ve sanal müzelerde gezinmek, 4 ifadede müzelerde farklı şeyler keşfetmek, bir ifadede de zor örüntülerin olması öğrencilere ilginç gelmiştir. Öğrencilerin matematik günlüklerinde ikinci maddeye vermiş oldukları örnek ifadeler aşağıda verilmiştir:

"Tabloların içinde örüntü bulduk ve ben onu ilk defa gördüm." (Ö5)

"Çingene Kız'ı gördük taşlardan yapılmıştı. Bir sürü örüntüsü vardı. Oynadığımız oyunda da vardı." (Ö2)

Tablo 2'de 2. uygulama için frekans değerinin (f) 15 yerine 21 olarak hesaplanması, öğrencilerin bazılarının birden fazla görüş belirtmesinden kaynaklanmaktadır. Öğrencilerden 7 'si müzelerdeki/sanal müzelerdeki alanı bulmayı, 7'sı köşe kapmaca oyununu, 4 'ü alan bulmayı ve 3'ü müze ilginç bulmuştur. Öğrencilerin matematik günlüklerinde birinci maddeye vermiş oldukları örnek ifadeler aşağıda verilmiştir:

Öğrencilerin örnek ifadeleri:

"Müzedeki alan, şekiller ve yaptığımız şekli sevdim. 3, 4 ve 5'li köşe kapmaca" (Ö4)

"Köşe kapmaca oyunu bana çok iyi geldi. Yani konuyu daha iyi anladım." (Ö12)

Öğrencilerin matematik günlüklerinde üçüncü maddeye vermiş oldukları cevaba ilişkin frekans ve yüzde dağılımları Tablo 3.1 ve Tablo 3.2'de gösterilmiştir.

**Tablo 3.1:** *Öğrencilerin kendi ifadeleri konu anlatımları (1. Uygulama Gaziantep Zeugma Mozaik Sanal Müzesi)*

| *Öğrenci ifadeleri* | *f* | *%* |
|---|---|---|
| Kuralı var. | 8 | 53,33 |
| Semboller var. | 1 | 6,66 |
| Sayı, şekil ve renklerle ilgili sıralaması var | 1 | 6,66 |
| Sırayla giden bir konu | 1 | 6,66 |
| Diğer | 4 | 26,66 |
| Toplam | 15 | 100 |

Tablo 3.1'de 1. uygulama için öğrencilerin 8'i kuralının olduğunu belirtmiştir. Öğrencilerin 1'i sembolleri olduğundan bir diğeri sayı şekil ve renklerle ilgili olduğundan, bir diğeri de sırayla giden bir konu olduğundan bahsetmiştir. Öğrencilerden 4'i ise ders sırasında yaşananlardan değinmişlerdir. Öğrencilerin matematik günlüklerinde üçüncü maddeye vermiş oldukları örnek ifadeler aşağıda verilmiştir:

"Örüntüde kural var. Çünkü sayılar sıra sıra artıyor." (Ö10)

"Kuralı sırasıyla bazen 2'şer bazen 3'er. Sadece onları bulup diğerini o kadar ekleyeceğiz." (Ö2)

**Tablo 3.2:** *Öğrencilerin kendi ifadeleri ile konu anlatımları (2. Uygulama Şanlıurfa Göbeklitepe Sanal Müzesi)*

| Öğrencilerin kendi ifadeleri ile konu anlatımları | *ƒ* | *%* |
|---|---|---|
| Alanı konusu anlatımları | 8 | 20,83 |
| Diğer ifadeler | 7 | 20,83 |
| Toplam | 15 | 100 |

Tablo 3.2'de 2. uygulama için öğrencilerin 8'i alan konusunu örnekler ile anlatırken diğer 7'si o gün derste hangi konuyu işleyip neler yaptıklarını anlatmıştır. Yanlış anlatım yapan öğrenciye rastlanmamıştır.

Öğrencilerin matematik günlüklerinde dördüncü maddeye vermiş oldukları cevaba ilişkin frekans ve yüzde dağılımları Tablo 4'de gösterilmiştir.

**Tablo 4:** *Öğrencilerin örüntü konusuyla günlük hayatta karşılaştıkları yerler*

| 1.Uygulama (Gaziantep Zeugma Mozaik Sanal Müzesi) | | | 2.Uygulama (Şanlıurfa Göbeklitepe Örenyeri Sanal Müzesi) | | |
|---|---|---|---|---|---|
| Öğrenci ifadeleri | *ƒ* | *%* | Öğrenci ifadeleri | *ƒ* | *%* |
| Matematikte/ Kalemlerde/ Silgilerde | 10 | 33,33 | Müzelerde/Sanal Müzede | 12 | 25,53 |
| Çiçeklerde/ Halılarda/ Tabelalarda | 10 | 33,33 | Matematikte/sınıfta/testlerde | 11 | 23,40 |
| Müzelerde/Sanal Müzede | 5 | 16,66 | Oyunlarda | 9 | 19,14 |
| Oyunlarda | 3 | 10 | Akıllı tahtada/Telefon/Tablet | 7 | 14,89 |
| Videolarda | 1 | 3.33 | Her yerde/Dışarıda | 5 | 10,63 |
| Ben Örüntü ile Karşılaşmıyorum | 1 | 3,33 | Halıda/Evde/Tablolarda | 3 | 6,38 |
| Toplam | 30 | 100 | Toplam | 47 | 100 |

Tablo 4'de 1. uygulama için frekans değerinin (f) 15 yerine 30 olarak hesaplanması, öğrencilerin bazılarının birden fazla görüş belirtmesinden kaynaklanmaktadır. Öğrenciler örüntüleri karşılaştıkları yerler olarak matematikte 6, müzelerde/sanal müzelerde 5, çiçeklerde 5, halılarda 4, oyunlarda 3, kalemlerde 2, silgilerde 2 ve videolarda 1 kez olarak belirtmişlerdir. Öğrencilerin matematik günlüklerinde dördüncü maddeye vermiş oldukları örnek ifadeler aşağıda verilmiştir:

"Okula gelince karşılaşıyorum. Müzede, evde videolarda çıkıyor." (Ö12)

"Sanal müzenin desenleri, taşların şekilleri" (Ö2)

Tablo 4'de 2. uygulama için frekans değerinin (f) 15 yerine 47 olarak hesaplanması, öğrencilerin birden fazla görüş belirtmesinden kaynaklanmaktadır. Öğrencilerin 12'si alan konusunu müzelerde/sanal müzelerde görebileceğini belirtmiştir. 9 öğrenci oyunlarda, 11 öğrenci matematik/sınıfta/testlerde, 7 öğrenci akıllı tahta/telefon/tablette, 5 öğrenci her yerde/dışarıda, 3 öğrenci halıda/ tablolarda/evde alan konusuyla karşılaşabileceklerini belirtmiştir.

Öğrencilerin matematik günlüklerinde beşinci maddeye vermiş oldukları cevaba ilişkin frekans ve yüzde dağılımları Tablo 5'de gösterilmiştir.

**Tablo 5:** *Öğrencilerin örüntü konusunda anlamadığı noktalar*

| Gaziantep Zeugma Mozaik Sanal Müzesi | | | Şanlıurfa Göbeklitepe Örenyeri Sanal Müzesi | | |
|---|---|---|---|---|---|
| Öğrenci ifadeleri | *ƒ* | *%* | Öğrenci ifadeleri | *ƒ* | *%* |
| Yok | 6 | 40 | Yok | 9 | 60/ |
| Görüş belirtmeyen | 9 | 60 | Görüş belirtmeyen | 6 | 40 |
| Toplam | 15 | 100 | Toplam | 15 | 100 |

Tablo 5'de 1. uygulama için öğrencilerin 6'sı anlamadıkları bir noktanın olmadığını belirtirken, 9 öğrenci hiçbir şey yazmadan boş bırakmıştır. Tablo 5'de 2. uygulama için öğrencilerin 9'i anlamadıkları bir noktanın olmadığını belirtmiştir. 6 öğrenci ise hiçbir şey yazmadan boş bırakmıştır. Görüş belirtmeyen öğrencilerin anlamadıkları herhangi bir durum olmadığı için boş bıraktığı şeklinde yorumlanmıştır.

## Sonuçlar

21. yüzyıl becerilerin tanımlandığı zamandan, 21. Yüzyıl becerilerini hangi müfredatla ve hangi ortamlarda kazandırırız sorularına evrilen eğitim için çalışmalar tüm hızıyla devam etmektedir. Bu çalışmaların eğitim ortamı arayışına müzeler alternatif bir seçenek değerlendirilmektedir. Ancak müzelerin ulaşılabilirliği, maddi kaynak yetersizliği, öğretmen ve öğrenciler için gerekli izin prosedürleri gibi sorunlar sanal müzeleri iyi bir alternatif olarak karşımıza çıkarmaktadır. Çağın gereklerine kısa zamanda ayak uyduran sanal müzelerin, kullandığı teknolojik alt yapı sayesinde eğitimdeki küreselleşme ve dijitalleşme ihtiyacını desteklemeye yardımcı olmaktadır. Müze öncesi, müzede ve müze sonrası etkinliklerle kurgulanmış müzeleri temeline alan eğitimin kalıcı öğrenmeleri de desteklediği bilinmektedir (Buyurgan, 2019). Araştırma kapsamında ortaokul 5. sınıf öğrencileri ile birlikte iki farklı sanal müze temel alınarak matematik öğretimi gerçekleştirilmiştir. Uygulamaların sonrasında öğrencilerden, dağıtılan matematik günlükleri ile süreç hakkındaki öğrenci görüşleri toplanmıştır. Beş maddeden oluşan sorulara verilen cevaplar sonrasında ayrıntılı bir şekilde analiz edilerek incelenmiştir.

Yapılan çalışmanın iki uygulamasına yönelik öğrencilerin matematik günlüklerinin birinci maddesine "çok eğlendim, çok güzeldi, kendimi çok iyi hissettim, çok beğendim," gibi ifadeler ile öğrencilerin derse karşı olumlu duyguları hissettikleri görülmüştür. Ayrıca "derse katıldım, aktiftim, çalışkan hissettim" gibi kullandıkları ifadeleri ile ders sürecinde aktif bir şekilde rol alarak başarma duygusunu yaşadıklarını sonucuna varılmıştır. Öğrenci matematik günlüklerinin ikinci maddesine göre çalışmanın her iki aşamasında da öğrencilerin süreç hakkında vermiş oldukları cevaplardan yola çıkarak, sanal müze temelli yapılan matematik öğretiminde; müze öncesi, müzede ve müze sonrası olan oyunla harmanlanmış, öğrencilerin aktif bir şekilde yer aldığı, tüm aşamalarının öğrencilerin ilgisini çektiği söylenebilir. Günlüklerin üçüncü maddesinden çıkarılan sonuca göre her iki uygulamada da dersin konusunun anlaşıldığı ve anlaşılan konunun ifade edilebildiği görülmüştür. Her iki uygulamanın üçüncü maddesine verilen cevaplara göre öğrencilerin konuyu günlük hayatla ilişkilendirdikleri tespit edilmiştir. İlk uygulamada günlük hayat ilişkilendirmesi yapamayan öğrencinin ikinci uygulamada dersi günlük hayatla ilişkilendirebildiği fark edilmiştir. Çalışmanın beşinci ve son maddesinde her iki uygulamada için öğrencilerin çoğu konunun anlaşılmayan bir tarafının olmadığını belirtmişlerdir. İlgili maddeyi boş bırakan öğrencilerin ise anlaşılmayan bir noktanın olmadığı için boş bıraktıkları şeklinde yorumlanmıştır.

Sonuç olarak bu çalışmada öğrencilerin matematik günlüklerine yazmış oldukları cevaplardan hareketle, sanal müzelerde yapılan matematik öğretiminin öğrencilerin derse katılımına, dersi sevmesine, dersi günlük hayatla ilişkilendirmesine ve dersin konusunu anlamasına olumlu yönde katkı sağladığı söylenebilir. Öğrencilerin cevaplarında sanal müze ve müzelerden bahsetmeleri de öğrencilerin müzelere ve sanal müzelere yönelik ilgi ve merak uyandırdığı yönünde çıkarımı da yapılabilir. Ayrıca çalışmanın bulgularının matematikle ilişkilendirilen; Arık Karamık ve Özyıldırım Gümüş (2022) ve Aydoğdu, Aydoğdu ve Aktaş (2022) tarafından yapılan çalışmaların sonuçları ile de örtüşmektedir.

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# COVID-19 Pandemisi Öncesi ve Sonrası Ortaokul Öğrencilerinin Dijital Oyun Oynama Alışkanlıklarının Öğrenci Bakış Açısından İncelenmesi

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## Özet

Çalışmanın amacı, COVID-19 pandemisi öncesinde (2018) ve pandemi sürecinde yaşanan değişim ve gelişmelerin sonrasında (2023) ortaokul öğrencilerinin dijital oyun oynama alışkanlıklarının öğrencilerin bakış açısından değerlendirilmesidir. Çalışmada, pandemi öncesi ve sonrasında aynı örneklem alanında bulunan aynı özelliğe sahip (yaş, cinsiyet, sınıf düzeyi) öğrencilerin; oyun oynarken kullandıkları platformlar, oyunlarla tanışma şekilleri, oynadıkları oyun türleri, oyunlara ayırdıkları zaman ve oyunlara yaptıkları harcamalar, oyunların ders durumlarına, aile ve arkadaşlık ilişkilerine etkileri hakkındaki görüşleri yapılandırılmış görüşme formu kullanılarak elde edilmiştir. Yapılan görüşmeler sonucunda pandemi öncesi ve sonrası örneklem grubundaki öğrencilerden elde edilen yanıtlar hem kendi içlerinde hem de birbirleri arasında değerlendirilmiştir. Çalışmaya Anadolu'da farklı sosyo-ekonomik düzeye sahip öğrencilerin bulunduğu bir ortaokulda 2018 yılında öğrenim gören 30 öğrenci ile 2023 yılında öğrenim gören aynı özelliklere sahip (yaş, cinsiyet ve sınıf düzeyi) 30 öğrenci katılmıştır. Bu çalışmada kullanılan araştırma modeli durum çalışmasıdır. Yapılan görüşmeler sonucunda elde edilen veriler betimsel analiz yöntemiyle analiz edilmiştir. Öğrencilerin oyun platformu olarak pandemi öncesinde en çok bilgisayarı, pandemi sonrasında ise en çok telefonu tercih ettiği görülmektedir. Öğrencilerin pandemi öncesi ve sonrasında en çok tercih ettiği oyun türü FPS olurken pandemi sonrası bu oyun türünün tercih edilme yoğunluğu artış göstermiştir. Öğrencilerin ortalama oyun oynama süresi pandemi öncesi günlük 3 saat 14 dakika haftalık ise 16 saat 44 dakika iken pandemi sonrası günlük 2 saat 15 dakika haftalık ise 19 saat 53 dakika olarak tespit edilmiştir. Pandemiden önce oynanan 39 oyun bulunurken pandemi sonrasında bu sayının 22'ye düştüğü tespit edilmiş olup bu oyunların yalnızca 11 tanesi ortaktır. Ayrıca 2018'de 15 öğrencinin oyunlara ortalama 156,53 TL ($30.28), 2023'te ise 14 öğrencinin ortalama 377,08 TL ($19.31) ödeme yaptığı görülmüştür.

**Anahtar kelimeler**: Dijital oyun alışkanlıkları, dijital oyunların etkileri, bilgisayar oyunları, dijital oyunlar, öğrenci görüşleri, COVID-19 pandemisi, COVID-19 salgını

## Abstract

The aim of the study is to evaluate the digital game playing habits of secondary school students from the students' point of view, before the COVID-19 pandemic (2018) and after the changes and developments in the pandemic process (2023). In the study, students with the same characteristics (age, gender, grade level) in the same sample area before and after the pandemic; The platforms they use while playing games, the way they meet the games, the types of games they play, the time they spend on the games and the expenses they spend on the games, the effects of the games on their course status, family and friendship relations were obtained by using a structured interview form. As a result of the interviews, the answers obtained from the students in the sample group before and after the pandemic were evaluated both among themselves and among each other. 30 students studying in 2018 and 30 students with the same characteristics (age, gender and grade level) studying in 2023 participated in the study in a secondary school with students from different socio-economic levels in Anatolia. The research model used in this study is a case study. The data obtained as a result of the interviews were analyzed with the descriptive analysis method. It is seen that students prefer the computer as a game platform the most before the pandemic and the phone the most after the pandemic. While FPS was the most preferred game type by students before and after the pandemic, the intensity of this game type increased after the pandemic. While the average playing time of the students was 3 hours 14 minutes per day before the pandemic and 16 hours 44 minutes per week, it was determined as 2 hours 15 minutes per day and 19 hours and 53 minutes per week after the pandemic. While there were 39 games played before the pandemic, it was determined that this number decreased to 22 after the pandemic, and only 11 of these games are common. In addition, it was observed that 15 students paid an average of 156,53 TL ($30.28) to the games in 2018, while 14 students paid an average of 377,08 TL ($19.31) in 2023.

**Keywords**: Digital game playing habits, effects of dijital games, computer games, digital games, students' opinions, COVID-19 pandemic, COVID-19 outbreak

## Giriş

Oyun, yüzyıllar boyunca bebeklikten yaşlılığa kadar insan hayatındaki önemli olgulardan biri olmuştur (Keskin vd., 2021). Son 60 yılda gelişimi çeşitli yollarla kayıt altına alınan dijital oyunlar, eğlence sektörünün önemli bir parçası haline gelmiştir (Forster, 2005; Herman, 2001; Kent, 2000). Aralık 2019 yılında ortaya çıkan ve COVID-19 olarak adlandırılan virüsün dünya çapında yayılması sonucunda Dünya Sağlık Örgütü (WHO), 11 Mart 2020'de bu salgının bir pandemi olarak nitelendirilebileceği değerlendirmesini yapmıştır (WHO, 2020). Salgınla beraber dünyanın çeşitli yerlerinde sosyal izolasyon uygulamaları hayata geçirilmiştir (Keskin vd., 2021). COVID-19, tüm dünyada hayatı olumsuz etkileyerek insanların hareket alanlarında kısıtlamalara ve zorluklara neden olmuştur (Tel, 2021). 11 Mart 2020 tarihi itibariyle Türkiye'de ilk vakanın ortaya çıkmasıyla birlikte okullar kapatılmış ve eğitim-öğretim faaliyetleri uzaktan eğitimle sağlanmaya çalışılmıştır (Şenol vd., 2023). İzolasyon uygulamaları sonrasında insanlar dijital materyallerle daha çok vakit geçirmeye başlamıştır (Keskin vd., 2021). Pandemi süreciyle birlikte tüm dünyada olduğu gibi ülkemizde de teknolojik aletlerle evde vakit geçirme oranları ile internet, bilgisayar ve cep telefonu kullanım oranlarında artış olduğu görülmüştür (Tel, 2021). WHO, 5 Mayıs 2023 tarihinde COVID-19'un küresel bir sağlık acil durumu olarak sona erdiğini ilan etmiştir (WHO, 2023).

Literatüre bakıldığında, öğrencilerin COVID-19 pandemisi öncesi ve sonrası oyun oynama alışkanlıkları hakkındaki görüşlerini karşılaştıran bir çalışmaya rastlanamamıştır. Öğrencilerin dijital platformlardaki oyun alışkanlıkları hakkında COVID-19 pandemisi öncesi ve sürecindeki değişim ve gelişmelere bağlı olarak COVID-19 pandemisi sonrası görüşlerinin karşılaştırılarak değerlendirilmesi; öğrencilerin eski ve yeni sosyal, psikolojik durumlarının tanımlanmasına katkı sağlaması bakımından bu çalışma önem taşımaktadır. Bu çalışmanın amacı; COVID-19 pandemisi öncesi (2018) ve sonrasında (2023) yaşanan değişim ve gelişmelere bağlı olarak ortaokul öğrencilerinin dijital oyun oynama alışkanlıklarının öğrencilerin bakış açısından değerlendirilmesidir. Dijital oyun oynama alışkanlıkları hakkında pandemi öncesi ve sonrası yapılan görüşmelerde öğrencilerden alınan yanıtların hem kendi içlerinde hem de birbirleri arasında değerlendirilmesi amaçlanmıştır. Öğrencilerin oyun oynama alışkanlıklarını betimleyebilmek ve ortaya koyabilmek amacıyla çalışma aşağıdaki sorular kapsamında analiz edilmiştir:

1. Öğrenciler kendi oyun oynama alışkanlıklarını nasıl değerlendirmektedir?
    a. Öğrencilerin oyun oynadıkları platformlar ve bu platformları tercih etme nedenleri nelerdir?
    b. Öğrencilerin tercih ettikleri oyun türleri ve bu oyun türlerini tercih etme nedenleri nelerdir?
    c. Öğrencilerin oyun oynama süreleri ne kadardır?
    d. Öğrencilerin tercih ettikleri oyun mekânları ve bu mekânları tercih etme nedenleri nelerdir?
    e. Öğrencilerin tercih ettikleri oyunlar nelerdir?
    f. Öğrencilerin oynadıkları oyunlarda önemli gördükleri özellikler nelerdir?
    g. Öğrenciler oyunlara ne kadar ödeme yapmışlardır ve bu ödemelerin yapılma nedenleri nelerdir?
    h. Öğrenciler oyunların üzerlerindeki etkilerini nasıl değerlendirmektedir?
    i. Öğrencilerin oynadıkları oyunlarla tanışma yolları nelerdir?

## Yöntem

Bu araştırma öğrencilerin görüşme sonuçlarının durum çalışmasıyla ortaya konduğu nitel bir çalışmadır.

### Araştırma Grubu

Araştırmaya Kütahya İli Simav İlçesi'ndeki bir ortaokulda 2018 yılında 5, 6, 7 ve 8. sınıfta öğrenim görmekte olan 30 öğrenci ile 2023 yılında aynı özelliklere sahip (yaş, cinsiyet ve sınıf düzeyi) 30 öğrenci ($N_{Toplam}$=60) katılmıştır. Her iki grupta da katılan öğrencilerin 8'i 5. sınıf (%26,67), 9'u 6. sınıf (%30,00), 8'i 7. sınıf (%26,67), 5'i 8. sınıf (%16,66) düzeyinde öğrenim görmektedir. Ayrıca her iki grup 18 erkek (%60,00), 12 kız (%40,00) öğrenciden oluşmaktadır. Araştırmaya katılan her iki gruptaki öğrencilerden 10 yaşında olan 4 öğrenciden 3'ü kız 1'i erkek, 11 yaşında olan 7 öğrenciden 3'ü kız 4'ü erkek, 12 yaşında olan 8 öğrenciden 2'si kız 6'sı erkek, 13 yaşında olan 6 öğrenciden 2'si kız 4'ü erkek, 14 yaşında olan 5 öğrenciden 2'si kız 3'ü erkektir.

### Veri Toplama Aracı

Araştırmadaki verilerin toplanmasında nitel araştırma yöntemlerinden biri olan görüşmeden yararlanılmıştır. Çalışmada öğrenciler için; dijital oyun oynama alışkanlıklarını ve bu konudaki görüşlerini belirlemek amacıyla 12 ana ve 8 alt ile birlikte toplamda 20 sorudan oluşan yapılandırılmış görüşme formu kullanılmıştır.

### Veri Analizi

Nitel araştırma yönteminin kullanıldığı bu çalışmada, görüşme verileri bireysel görüşme esnasında ses kaydı alınarak elde edilmiştir. Alınan ses kayıtları aslına bağlı kalınarak bilgisayara aktarılmış ve kodlanarak analiz edilmiştir.

## Bulgular

### 1. Oyun Platformları ve Bu Platformların Tercih Edilme Nedenleri

Öğrenciler pandemi öncesinde oyun oynamak için platform olarak en çok bilgisayarı ($N_{Kız}$=9, $N_{Erkek}$=18, $N_{Toplam}$=27) tercih etmektedir. Bilgisayardan sonra en çok tercih edilen oyun platformu telefondur ($N_{Kız}$=11, $N_{Erkek}$=14, $N_{Toplam}$=25). Tablet ($N_{Kız}$=7, $N_{Erkek}$=7, $N_{Toplam}$=14) ve konsol ($N_{Kız}$=0, $N_{Erkek}$=5, $N_{Toplam}$=5) ise diğer tercih edilen oyun platformlarıdır. Pandemi sonrasında ise öğrencilerin en çok tercih ettiği oyun platformu telefon ($N_{Kız}$=11, $N_{Erkek}$=17, $N_{Toplam}$=28) olmuştur. Telefondan sonra en çok tercih edilen platformun bilgisayar ($N_{Kız}$=9, $N_{Erkek}$=17, $N_{Toplam}$=26) olduğu görülmüştür. Tablet ($N_{Kız}$=2, $N_{Erkek}$=4, $N_{Toplam}$=6) kullanımında pandemi öncesine göre bir azalış görülmekle beraber konsol tercihinde ($N_{Kız}$=0, $N_{Erkek}$=6, $N_{Toplam}$=6) önemli bir değişim görülmemiştir.

Öğrencilere neden bu platformları tercih ettikleri sorulduğunda, pandemi öncesinde oyunların çekici gelmesi ($N_{Kız}$=3, $N_{Erkek}$=12, $N_{Toplam}$=15) en çok verilen yanıt olarak karşımıza çıkmaktadır. Bunu sırasıyla kullanım pratikliği-rahatlık ($N_{Kız}$=7, $N_{Erkek}$=6, $N_{Toplam}$=13), platforma sahip olma ($N_{Kız}$=4, $N_{Erkek}$=2, $N_{Toplam}$=6), donanımsal özellikler ($N_{Kız}$=1, $N_{Erkek}$=2, $N_{Toplam}$=3) ve oyunların maliyeti ($N_{Kız}$=0, $N_{Erkek}$=1, $N_{Toplam}$=1) yanıtları takip etmiştir. Pandemi sonrasında ise bu soruya en çok verilen yanıt pandemi öncesine göre önemli bir artışla kullanım pratikliği-rahatlık ($N_{Kız}$=10, $N_{Erkek}$=14, $N_{Toplam}$=24) olmuştur. Bu yanıtı ise oyunların çekici gelmesi ($N_{Kız}$=2, $N_{Erkek}$=11, $N_{Toplam}$=13), donanımsal özellikler ($N_{Kız}$=5, $N_{Erkek}$=4, $N_{Toplam}$=9), platforma sahip olma ($N_{Kız}$=4, $N_{Erkek}$=2, $N_{Toplam}$=6), ve oyunların maliyeti ($N_{Kız}$=0, $N_{Erkek}$=1, $N_{Toplam}$=1) yanıtları takip etmiştir.

### 2. Tercih Edilen Oyun Türleri ve Oyun Türü Tercih Nedenleri

Verilen yanıtlara göre, öğrenciler pandemi öncesinde en çok FPS türü ($N_{Kız}$=2, $N_{Erkek}$=16, $N_{Toplam}$=18) oyunları tercih etmektedirler. Tercih edilen diğer oyun türleri ise sırasıyla macera ($N_{Kız}$=4, $N_{Erkek}$=12, $N_{Toplam}$=16), MOBA ($N_{Kız}$=0, $N_{Erkek}$=9, $N_{Toplam}$=9), aksiyon ($N_{Kız}$=7, $N_{Erkek}$=0, $N_{Toplam}$=7), spor oyunları ($N_{Kız}$=2, $N_{Erkek}$=4, $N_{Toplam}$=6), strateji ($N_{Kız}$=2, $N_{Erkek}$=4, $N_{Toplam}$=6), bulmaca oyunları ($N_{Kız}$=5, $N_{Erkek}$=0, $N_{Toplam}$=5) ve simülasyon ($N_{Kız}$=5, $N_{Erkek}$=0, $N_{Toplam}$=5) şeklindedir. Pandemi sonrasında da öğrenciler en çok FPS türü ($N_{Kız}$=5, $N_{Erkek}$=18, $N_{Toplam}$=23) oyunları tercih etmektedirler. Tercih edilen diğer oyun türleri ise sırasıyla macera ($N_{Kız}$=8, $N_{Erkek}$=14, $N_{Toplam}$=22), spor oyunları ($N_{Kız}$=2, $N_{Erkek}$=10, $N_{Toplam}$=12), simülasyon ($N_{Kız}$=5, $N_{Erkek}$=2, $N_{Toplam}$=7), aksiyon ($N_{Kız}$=3, $N_{Erkek}$=0, $N_{Toplam}$=3), MOBA ($N_{Kız}$=0, $N_{Erkek}$=1, $N_{Toplam}$=0) şeklinde karşımıza çıkmaktadır. Pandemi sonrasında FPS ve macera türü oyunları oynayan öğrenci sayısında artış gözlenmiştir. Bununla birlikte pandemi öncesinde erkek öğrenciler FPS, macera, MOBA türü oyunları daha çok tercih ederken, pandemi sonrasında bu türlerin sırasıyla FPS, macera ve spor oyunları şeklinde değiştiği görülmektedir. Spor oyunu oynayan erkek öğrenci sayısında ciddi artış, MOBA oynayan erkek öğrenci sayısında ise ciddi düşüş görülmekle beraber, pandemiden önce erkek öğrenciler tarafından tercih edilmeyen simülasyon türü pandemi sonrasında tercih edilmeye başlamıştır. Pandemi öncesinde aksiyon, bulmaca ve simülasyon türü oyunları sadece kız öğrenciler tercih ederken pandemi sonrasında aksiyon türü oyunları sadece kız öğrenciler oynamaktadır. Pandemi öncesinde tercih edilen strateji ve bulmaca türü oyunlar pandemiden sonra öğrenci yanıtlarında yer almamıştır.

Öğrencilerin oyun türünü tercih etme nedenleri için vermiş oldukları yanıtlara bakıldığında pandemi öncesi ve sonrasında öğrencilerin tamamının kendi seçtiği oyun türlerini eğlenceli buldukları ($N_{Kız}$=12, $N_{Erkek}$=18, $N_{Toplam}$=30) görülmektedir. Pandemi öncesi bu yanıtı sırasıyla paylaşım ve iletişim ($N_{Kız}$=0, $N_{Erkek}$=4, $N_{Toplam}$=4) zihinsel gelişime katkı ($N_{Kız}$=3, $N_{Erkek}$=1, $N_{Toplam}$=4) yabancı dil gelişimine katkı ($N_{Kız}$=2, $N_{Erkek}$=1, $N_{Toplam}$=3) yanıtları takip ederken, pandemi sonrasında ise bu sıralama zihinsel gelişime katkı ($N_{Kız}$=4, $N_{Erkek}$=1, $N_{Toplam}$=5) ile paylaşım ve iletişim ($N_{Kız}$=1, $N_{Erkek}$=0, $N_{Toplam}$=1) şeklinde değişmiştir. Pandemi sonrasında yabancı dil gelişimine katkı yanıtı hiçbir öğrenciden gelmemiştir.

### 3. Oyun Oynanma Süreleri

Öğrencilerin pandemi öncesi günlük oyun oynama süreleri Tablo 1'de verilmiştir. Pandemi öncesi öğrencilerin günlük oyun oynama süreleri ortalama 3 saat 14 dakika olarak karşımıza çıkmaktadır. Kız öğrenciler günlük ortalama 2 saat 35 dakika oyun oynarken, erkek öğrencilerin ise günlük ortalama 3 saat 40 dakika oyun oynadığı görülmektedir. Bununla birlikte pandemi öncesi kız öğrencilerden günlük oyun oynama süreleri ile ilgili en az 30 dakika ($N_{Kız}$=2), en fazla 5 saat ($N_{Kız}$=1) yanıtı gelirken; erkek öğrencilerden ise en az 1 saat ($N_{Erkek}$=3) en fazla 12 saat ($N_{Erkek}$=1) yanıtı gelmiştir.

Tablo 1. Pandemi öncesi öğrencilerin günlük oyun oynama süreleri.

| Süre | $N_{Kız}$ | $N_{Erkek}$ | $N_{Toplam}$ | Toplam(%) | Süre | $N_{Kız}$ | $N_{Erkek}$ | $N_{Toplam}$ | Toplam(%) |
|------|------|--------|---------|-----------|------|------|--------|---------|-----------|
| 30 Dakika | 2 | 0 | 2 | 6,66 | 3 Saat | 4 | 1 | 5 | 16,66 |
| 1 Saat | 1 | 3 | 4 | 13,33 | 3,5 Saat | 1 | 1 | 2 | 6,66 |
| 1,5 Saat | 0 | 1 | 1 | 3,33 | 4 Saat | 1 | 1 | 2 | 6,66 |
| 2 Saat | 1 | 5 | 6 | 20,00 | 5 Saat | 1 | 2 | 3 | 10,00 |
| 2,5 Saat | 1 | 0 | 1 | 3,33 | 6 Saat ve Üzeri | 0 | 4 | 4 | 13,33 |

Öğrencilerin pandemi sonrası günlük oyun oynama süreleri ise Tablo 2'de yer almaktadır. Pandemi sonrasında öğrencilerin günlük oyun oynama süreleri ortalama 2 saat 15 dakikaya düşmüştür. Kız öğrenciler günlük ortalama 1 saat 40 dakika oyun oynarken, erkek öğrencilerin ise günlük ortalama 2 saat 39 dakika oyun oynadığı görülmektedir. Ayrıca pandemi sonrası kız öğrencilerden günlük oyun oynama süreleri ile ilgili en az 30 dakika ($N_{Kız}$=4), en fazla 6 saat ($N_{Kız}$=1) yanıtı gelirken; erkek öğrencilerden ise en az 30 dakika ($N_{Erkek}$=1) en fazla 5 saat ($N_{Erkek}$=3) yanıtı gelmiştir.

Tablo 2. Pandemi sonrası öğrencilerin günlük oyun oynama süreleri.

| Süre | $N_{Kız}$ | $N_{Erkek}$ | $N_{Toplam}$ | Toplam(%) | Süre | $N_{Kız}$ | $N_{Erkek}$ | $N_{Toplam}$ | Toplam(%) |
|------|------|--------|---------|-----------|------|------|--------|---------|-----------|
| 30 Dakika | 4 | 1 | 5 | 16,66 | 3 Saat | 0 | 3 | 0 | 10,00 |
| 1 Saat | 5 | 3 | 8 | 26,66 | 3,5 Saat | 0 | 0 | 0 | 0,00 |
| 1,5 Saat | 0 | 0 | 0 | 0,00 | 4 Saat | 0 | 2 | 2 | 6,66 |
| 2 Saat | 1 | 6 | 7 | 23,33 | 5 Saat | 1 | 3 | 4 | 13,33 |
| 2,5 Saat | 0 | 0 | 0 | 0,00 | 6 Saat ve Üzeri | 1 | 0 | 1 | 3,33 |

Pandemi öncesi öğrencilerin haftalık oyun oynama süreleri ise Tablo 3'te görülmektedir. Buna göre öğrencilerin haftalık oyun oynama süreleri ortalama 16 saat 44 dakikadır. Kız öğrencilerin haftalık oyun oynama süreleri ortalama 10 saat 30 dakika; erkek öğrencilerin ise ortalama 20 saat 53 dakikadır. Ayrıca kız öğrencilerden haftalık oyun oynama süreleri ile ilgili en az 2 saat ($N_{Kız}$=1), en fazla 28 saat ($N_{Kız}$=1) yanıtı gelirken; erkek öğrencilerden ise en az 5 saat ($N_{Erkek}$=1) en fazla 77 saat ($N_{Erkek}$=1) yanıtı gelmiştir.

Tablo 3. Pandemi öncesi öğrencilerin haftalık oyun oynama süreleri.

| Süre | $N_{Kız}$ | $N_{Erkek}$ | $N_{Toplam}$ | Toplam(%) |
|------|------|--------|---------|-----------|
| 0-5 Saat | 3 | 1 | 4 | 13,33 |
| 6-10 Saat | 6 | 5 | 11 | 36,66 |
| 11-20 Saat | 2 | 4 | 6 | 20,00 |
| 21-30 Saat | 1 | 6 | 7 | 23,33 |
| 30 Saat Üzeri | 0 | 2 | 2 | 6,66 |

Pandemi sonrası öğrencilerin haftalık oyun oynama süreleri ise Tablo 4'te yer almaktadır. Elde edilen verilere göre öğrencilerin haftalık oyun oynama süreleri ortalama 19 saat 53 dakika olarak karşımıza çıkmaktadır. Kız öğrencilerin haftalık oyun oynama süreleri ortalama 14 saat 26 dakika; erkek öğrencilerin ise ortalama 23 saat 30 dakikadır. Ayrıca kız öğrencilerden haftalık oyun oynama süreleri ile ilgili en az 4 saat ($N_{Kız}$=3), en fazla 50 saat ($N_{Kız}$=1) yanıtı gelirken; erkek öğrencilerden ise en az 4 saat ($N_{Erkek}$=1) en fazla 50 saat ($N_{Erkek}$=1) yanıtı gelmiştir.

Tablo 4. Pandemi sonrası öğrencilerin haftalık oyun oynama süreleri.

| Süre | $N_{Kız}$ | $N_{Erkek}$ | $N_{Toplam}$ | Toplam(%) |
|---|---|---|---|---|
| 0-5 Saat | 4 | 1 | 5 | 16,66 |
| 6-10 Saat | 3 | 2 | 5 | 16,66 |
| 11-20 Saat | 3 | 6 | 9 | 30,00 |
| 21-30 Saat | 0 | 4 | 4 | 13,33 |
| 30 Saat Üzeri | 2 | 5 | 7 | 23,33 |

### 4. Oyun İçin Tercih Edilen Mekânlar ve Mekânların Tercih Nedeni

Oyun için tercih edilen mekânlar ve tercih etme nedenlerine verilen yanıtlara bakıldığında pandemi öncesi ve pandemi sonrasında öğrencilerin tamamı evde ($N_{Kız}$=12, $N_{Erkek}$=18, $N_{Toplam}$=30) oyun oynamaktadır. Bunun yanında pandemi öncesi evden sonra tercih edilen mekânlar sırasıyla internet kafe ($N_{Kız}$=0, $N_{Erkek}$=13, $N_{Toplam}$=13), arkadaş-komşu evi ($N_{Kız}$=4, $N_{Erkek}$=4, $N_{Toplam}$=8), iş yeri ($N_{Kız}$=1, $N_{Erkek}$=2, $N_{Toplam}$=3) ve okul ($N_{Kız}$=1, $N_{Erkek}$=0, $N_{Toplam}$=1) şeklinde karşımıza çıkmaktadır. Pandemi sonrasında ise ev yanıtını arkadaş-komşu evi ($N_{Kız}$=11, $N_{Erkek}$=12, $N_{Toplam}$=23), internet kafe ($N_{Kız}$=5, $N_{Erkek}$=14, $N_{Toplam}$=19), okul ($N_{Kız}$=1, $N_{Erkek}$=60, $N_{Toplam}$=7) ve iş yeri ($N_{Kız}$=1, $N_{Erkek}$=3, $N_{Toplam}$=4) yanıtları takip etmiştir.

Öğrenciler oyun oynanacak mekân seçiminde pandemi öncesi en çok güvenlik ($N_{Kız}$=11, $N_{Erkek}$=8, $N_{Toplam}$=19) öğesine vurgu yaparlarken, pandemi sonrası güvenlik öğesi yerini tüm öğrencilerin hemfikir olduğu rahatlık ($N_{Kız}$=12, $N_{Erkek}$=18, $N_{Toplam}$=30) öğesine bırakmıştır. Pandemi öncesi güvenlik öğesini sırasıyla rahatlık ($N_{Kız}$=3, $N_{Erkek}$=10, $N_{Toplam}$=13), donanım ve altyapı ($N_{Kız}$=1, $N_{Erkek}$=11, $N_{Toplam}$=12), iş birliği ve iletişim ($N_{Kız}$=3, $N_{Erkek}$=7, $N_{Toplam}$=10) yanıtları takip etmiştir. Pandemi sonrasında ise rahatlık öğesinden sonra sırasıyla iş birliği ve iletişim ($N_{Kız}$=12, $N_{Erkek}$=16, $N_{Toplam}$=28), donanım ve altyapı ($N_{Kız}$=2, $N_{Erkek}$=10, $N_{Toplam}$=12) ve güvenlik ($N_{Kız}$=1, $N_{Erkek}$=0, $N_{Toplam}$=1) yanıtları verilmiştir.

### 5. Tercih Edilen Oyunlar

Öğrenci yanıtları incelendiğinde pandemi öncesi ve pandemi sonrasında öğrencilerin en çok tercih ettiği oyunlar ile en çok tercih edilen oyun türleri arasında tutarlılık görülmektedir. Pandemiden önce öğrencilerin en çok tercih ettiği FPS, macera ve MOBA türü oyunlar, pandemiden sonra ise FPS, macera ve spor oyunları en üst sıralarda yer almaktadır. Pandemi öncesi öğrenci yanıtlarına bakıldığında 30 öğrencinin oynadıklarını belirttiği toplamda 39 farklı oyun olup bunlar sırasıyla CS: GO ($N_{Toplam}$=14), Minecraft ($N_{Toplam}$=12), PUBG ($N_{Toplam}$=9), LoL ($N_{Toplam}$=8), CoD ($N_{Toplam}$=4), GTA 5 ($N_{Toplam}$=4), PES ($N_{Toplam}$=3), Clash Royale ($N_{Toplam}$=3), Kafa Topu ($N_{Toplam}$=3), Zula ($N_{Toplam}$=3), Half-Life ($N_{Toplam}$=2), Clash of Clans ($N_{Toplam}$=2), Roblox ($N_{Toplam}$=2), Far Cry ($N_{Toplam}$=2), Fortnite ($N_{Toplam}$=2), Assassin's Creed ($N_{Toplam}$=2), Subway Surfers ($N_{Toplam}$=2), Wolfteam ($N_{Toplam}$=2), Love Nikki ($N_{Toplam}$=1), Piano Tiles 2 ($N_{Toplam}$=1), Age of Wonders ($N_{Toplam}$=1), Sims 4 ($N_{Toplam}$=1), Kakuro ($N_{Toplam}$=1), Tomb Rider ($N_{Toplam}$=1), Farm Town ($N_{Toplam}$=1), Criminal Case ($N_{Toplam}$=1), Haunted ($N_{Toplam}$=1), Battlefield 1 ($N_{Toplam}$=1), Growtopia ($N_{Toplam}$=1), Pixel Worlds ($N_{Toplam}$=1), Overwatch ($N_{Toplam}$=1), 3D Bowling ($N_{Toplam}$=1), Agar.io ($N_{Toplam}$=1), Wormax.io ($N_{Toplam}$=1), Slither.io ($N_{Toplam}$=1), BlitzRoyale.io ($N_{Toplam}$=1), Bomb It 5 ($N_{Toplam}$=1), Gold Miner ($N_{Toplam}$=1), MentalUP ($N_{Toplam}$=1) şeklinde karşımıza çıkmaktadır. Pandemi sonrası ise öğrencilerden 22 farklı oyun yanıtı gelmiş, bu sıralama Minecraft ($N_{Toplam}$=16), Valorant ($N_{Toplam}$=14), PUBG ($N_{Toplam}$=12), Roblox ($N_{Toplam}$=9), CS:GO ($N_{Toplam}$=8), PES ($N_{Toplam}$=8), FIFA ($N_{Toplam}$=6), GTA 5 ($N_{Toplam}$=4), Zula ($N_{Toplam}$=3), Euro Truck Simulator ($N_{Toplam}$=2), Subway Surfer ($N_{Toplam}$=2), F1 Racing ($N_{Toplam}$=2), Toca Life World ($N_{Toplam}$=2), Forza Horizon 5 ($N_{Toplam}$=2), PK XD ($N_{Toplam}$=2), LoL ($N_{Toplam}$=1), ARK ($N_{Toplam}$=1), HayDay ($N_{Toplam}$=1), Piano Tiles ($N_{Toplam}$=1), Assetto Corsa ($N_{Toplam}$=1), Kafa Topu ($N_{Toplam}$=1), Ateş ve Su ($N_{Toplam}$=1) şeklinde olmuştur.

### 6. Oyunda Önemli Görülen Özellikler

Pandemi öncesi öğrenci yanıtları incelendiğinde öğrencilerin oynadıkları oyunlarda önemli gördükleri özellikler önem sırasına göre grafik kalitesi ($N_{Kız}$=10, $N_{Erkek}$=15, $N_{Toplam}$=25), oynayış ($N_{Kız}$=10, $N_{Erkek}$=11, $N_{Toplam}$=21), iş birliği ve iletişim ($N_{Kız}$=6, $N_{Erkek}$=14, $N_{Toplam}$=20), ses kalitesi ($N_{Kız}$=4, $N_{Erkek}$=13, $N_{Toplam}$=17) ve hikâye ($N_{Kız}$=4, $N_{Erkek}$=13, $N_{Toplam}$=17) olarak karşımıza çıkmaktadır. Pandemi sonrası öğrenci yanıtlarına göre bu sıralama ses kalitesi ($N_{Kız}$=6, $N_{Erkek}$=13, $N_{Toplam}$=19), grafik kalitesi ($N_{Kız}$=7, $N_{Erkek}$=10, $N_{Toplam}$=17), oynayış ($N_{Kız}$=5, $N_{Erkek}$=4, $N_{Toplam}$=9), iş birliği ve iletişim ($N_{Kız}$=0, $N_{Erkek}$=3, $N_{Toplam}$=3), hikaye ($N_{Kız}$=2, $N_{Erkek}$=1, $N_{Toplam}$=) olarak şekillenmiştir.

### 7. Oyunlara Yapılan Para Ödemesi ve Para Ödemesi Yapılma Nedenleri

Öğrencilerin verdiği yanıtlar incelendiğinde pandemi öncesi öğrencilerin yarısının ($N_{Kız}=1$, $N_{Erkek}=14$, $N_{Toplam}=15$) pandemi sonrasında da 14 öğrencinin ($N_{Kız}=1$, $N_{Erkek}=13$, $N_{Toplam}=14$) oyunlara ödeme yaptığı görülmektedir. Pandemi öncesi oyunlara para ödemesi yapan 15 öğrenciden 11 tanesi, oyun satın almak için ödeme yaparken; 9 öğrenci de oyun içi ödeme yaptığını ifade etmiştir. Oyun içi ödeme yapan 9 öğrenciden 8 tanesi görsel öğeleri özelleştirmesi; 3 tanesi de karakter-eşya güçlendirmesi için ödeme yaparken 1 kız öğrenci ise yanlışlıkla ödeme yapmıştır. Pandemi sonrasında ise oyunlara para ödemesi yapan 14 öğrenciden 4 tanesi, oyun satın almak için ödeme yaparken; 12 öğrenci de oyun içi ödeme yaptığını ifade etmiştir. Oyun içi ödeme yapan 12 öğrenciden 9 tanesi görsel öğeleri özelleştirmesi; 4 tanesi de karakter-eşya güçlendirmesi için ödeme yapmıştır.

### 8. Oyunların Etkileri

Öğrenciler pandemi öncesi ve pandemi sonrasında oyun oynama etkinliklerinin fiziksel, sosyal, psikolojik, akademik başarı gibi pek çok alanda olumlu veya olumsuz etkileri olduğunu belirtmektedir. Pandemi öncesinde öğrencilerin en çok bahsettikleri olumlu etkiler sırasıyla yabancı dil gelişimi, zekâ gelişimi, arkadaşlar arası iletişim ve paylaşım, bilgi ve genel kültür artışı iken; olumsuz etkiler ise sırasıyla notlarda düşüş, baş ağrısı, aile içi iletişim problemleri, göz ağrısı, vakit kaybı, arkadaşlar arası iletişim problemi ve el ve bileklerde ağrı şeklinde sıralanmakla beraber diğer olumlu ve olumsuz yanıtlar Tablo 5'te belirtilmiştir.

Tablo 5: Pandemi öncesi öğrenci yanıtlarına göre oyunların etkileri.

| Oyunların Olumlu Etkisi | $N_{Kız}$ | $N_{Erkek}$ | $N_{Toplam}$ | Oyunların Olumsuz Etkisi | $N_{Kız}$ | $N_{Erkek}$ | $N_{Toplam}$ |
|---|---|---|---|---|---|---|---|
| Yabancı Dil Gelişimi | 1 | 6 | 7 | Notlarda Düşüş | 2 | 4 | 6 |
| Zekâ Gelişimi | 4 | 2 | 6 | Baş Ağrısı | 2 | 3 | 5 |
| Arkadaşlar Arası İletişim ve Paylaşım | 0 | 5 | 5 | Aile İçi İletişim Problemleri | 4 | 1 | 5 |
| Bilgi ve Genel Kültür Artışı | 3 | 1 | 4 | Göz Ağrısı | 3 | 2 | 5 |
| Aile İçi İletişim ve Paylaşım | 0 | 3 | 3 | Vakit Kaybı | 2 | 2 | 4 |
| Dikkat ve Odaklanma Gelişimi | 1 | 2 | 3 | Arkadaşlar Arası İletişim Problemi | 0 | 4 | 4 |
| Eğlenceli Zaman Geçirme | 0 | 3 | 3 | El ve Bileklerde Ağrı | 0 | 3 | 3 |
| Refleks Gelişimi | 1 | 1 | 2 | Boyun Ağrısı | 1 | 1 | 2 |
| Hayal Gücü Gelişimi | 0 | 1 | 1 | Kulak Ağrısı | 0 | 1 | 1 |
| Korkuları Yenmeye Yardımcı Olma | 0 | 1 | 1 | Odaklanma Sorunu ve Dikkat Dağınıklığı | 0 | 1 | 1 |
| | | | | Omuz Ağrısı | 0 | 1 | 1 |
| | | | | Ayak Ağrısı | 0 | 1 | 1 |
| | | | | Mide Bulanması | 1 | 0 | 1 |

Pandemi sonrasında ise öğrencilerin en çok bahsettikleri olumlu etkiler sırasıyla yabancı dil gelişimi, arkadaşlar arası iletişim ve paylaşım, refleks gelişimi olarak sıralanırken; olumsuz etkiler ise sırasıyla aile içi iletişim problemleri, göz ağrısı, baş ağrısı ve notlarda düşüş şeklinde sıralanmış olup diğer olumlu ve olumsuz yanıtlar ise Tablo 6'da belirtilmiştir.

Tablo 6: Pandemi sonrası öğrenci yanıtlarına göre oyunların etkileri.

| Oyunların Olumlu Etkisi | $N_{Kız}$ | $N_{Erkek}$ | $N_{Toplam}$ | Oyunların Olumsuz Etkisi | $N_{Kız}$ | $N_{Erkek}$ | $N_{Toplam}$ |
|---|---|---|---|---|---|---|---|
| Yabancı Dil Gelişimi | 6 | 14 | 20 | Aile İçi İletişim Problemleri | 9 | 12 | 21 |
| Arkadaşlar Arası İletişim ve Paylaşım | 9 | 11 | 20 | Göz Ağrısı | 10 | 11 | 21 |
| Refleks Gelişimi | 5 | 11 | 16 | Baş Ağrısı | 7 | 6 | 13 |
| Eğlenceli Zaman Geçirme | 3 | 7 | 10 | Notlarda Düşüş | 4 | 8 | 12 |
| Bilgi ve Genel Kültür Artışı | 2 | 6 | 8 | Vakit Kaybı | 3 | 6 | 9 |
| Aile İçi İletişim ve Paylaşım | 4 | 3 | 7 | Arkadaşlar Arası İletişim Problemi | 2 | 7 | 9 |
| Hayal Gücü Gelişimi | 1 | 3 | 4 | El ve Bileklerde Ağrı | 3 | 6 | 9 |
| Dikkat ve Odaklanma Gelişimi | 1 | 2 | 3 | Odaklanma Sorunu ve Dikkat Dağınıklığı | 2 | 5 | 7 |
| Zekâ Gelişimi | 1 | 1 | 2 | Boyun Ağrısı | 2 | 5 | 7 |
| Korkuları Yenmeye Yardımcı Olma | 0 | 1 | 1 | Kulak Ağrısı | 0 | 2 | 2 |
| | | | | Omuz Ağrısı | 1 | 1 | 2 |
| | | | | Mide Bulanması | 0 | 2 | 2 |
| | | | | Ayak Ağrısı | 0 | 1 | 1 |

## 9. Oyunlarla Tanışma Biçimleri

Pandemi öncesi öğrenci yanıtlarına bakıldığında öğrencilerin oyunlarla internetteki reklamlardan ve oyun marketlerinin önerilerinden ($N_{Kız}$=10, $N_{Erkek}$=11, $N_{Toplam}$=21), arkadaşlarının tavsiyelerinden ($N_{Kız}$=7, $N_{Erkek}$=12, $N_{Toplam}$=19) ya da ailesinde oyun oynayan kişilerden ($N_{Kız}$=3, $N_{Erkek}$=7, $N_{Toplam}$=10) etkilenerek tanıştıkları görülmektedir. Pandemi sonrası yanıtlara bakıldığında ise bu sıralama arkadaşlarının tavsiyeleri ($N_{Kız}$=8, $N_{Erkek}$=16, $N_{Toplam}$=24), internet reklamları ve oyun marketlerinin önerileri ($N_{Kız}$=5, $N_{Erkek}$=13, $N_{Toplam}$=18), aile üyelerinin tavsiyeleri ($N_{Kız}$=9, $N_{Erkek}$=5, $N_{Toplam}$=14) şeklinde karşımıza çıkmaktadır.

## Sonuç

Öğrenci görüşmelerinden elde edilen bulgular ışığında ulaşılan sonuçlara bu bölümde yer verilmiştir. Öğrenciler, pandemi öncesinde en çok bilgisayarda (PC) oyun oynamayı tercih ederken pandemi sonrasında ise bilgisayarın yerini telefon almıştır. Pandemi öncesinde öğrenciler, oyun platformu seçiminde en çok oyunların çekiciliğini ön planda tutarken pandemi sonrasında ise kullanım pratikliği-rahatlık yanıtı en çok verilen yanıt olmuştur. Öğrenciler pandemi öncesi ve sonrasında en çok FPS türü oyunları tercih ettiklerini belirtmişlerdir. Ancak pandemi sonrasında FPS türü oyunlara ilginin arttığı görülmektedir. Pandemi öncesi öğrencilerin bu oyun türlerini seçmesinde eğlenceli olma, oyun içi paylaşım ve iletişim, yabancı dil gelişimine katkı sağlama gibi özellikler etkili olurken pandemi sonrasında ise paylaşım ve iletişim ile yabancı dil gelişimine katkı öğesinin etkisinin çok azaldığı sonucuna ulaşılmaktadır. Öğrenciler pandemi öncesi günlük ortalama 3 saat 14 dakika, haftalık ise ortalama 16 saat 44 dakika oyun oynamaktadırlar. Pandemi sonrasında ise bu süreler günlük ortalama 2 saat 15 dakika, haftalık ise ortalama 19 saat 53 dakika olarak tespit edilmiştir. Erkek öğrencilerin günlük ve haftalık oyun oynama sürelerinin ortalaması pandemi öncesinde ve sonrasında kız öğrencilerin ortalamalarından fazladır. Öğrencilerin pandemi öncesinde ve sonrasında günlük ve haftalık oyun oynama süresi ortalamalarında görülen tutarsızlığın asıl nedeni, velilerin çocuklarının hafta içinde oyun oynamalarını kısıtlamaları ve hafta sonu oyun oynamaya daha çok izin vermeleridir. Velilerin bu sıkı tutumunun pandemi sonrası verilen yanıtlarda daha açık şekilde görüldüğü

söylenebilir. Öğrenciler, pandemi öncesinde ve sonrasında dijital oyunları en çok evde oynadıklarını dile getirmişleridir. Öğrencilerin bazılarının hem pandemi öncesi hem sonrasında oyun oynamak için internet kafeye veya oyun salonuna gittikleri görülmektedir. Ancak internet kafeye giden öğrenci sayısında pandemi sonrasında artış görülmüştür. Pandemi öncesi internet kafeye giden hiç kız öğrenci bulunmazken, pandemi sonrasında kız öğrencilerin de internet kafeye gittikleri sonucuna ulaşılmıştır. Pandemi sonrasında oyun oynamak için arkadaş-komşu evine giden öğrenci sayısında ciddi artış olduğu görülmektedir. Pandemi öncesi öğrenciler oyun mekânlarının seçimi konusunda güvenlik ve rahatlığa vurgu yapmış, donanım ve altyapı koşullarını da mekan seçiminde önemli bir kriter olarak belirtmişlerdir. Pandemi sonrasında ise oyun mekanlarının seçiminde rahatlık ile işbirliği ve iletişim en çok verilen yanıtlar olmuştur. Pandemi sonrasında donanım ve altyapıya verilen yanıtlarda değişiklik olmamış, fakat pandemi öncesi en çok vurgulanan güvenlik yanıtını sadece 1 kız öğrenci vermiştir. Öğrencilerin oynadıkları tespit edilen oyunların sayısı pandemi öncesi toplam 39 iken pandemi sonrası bu sayı 22 olarak karşımıza çıkmaktadır. Pandemi öncesi ve pandemi sonrası öğrencilerin oynadıklarını söylediği oyunlardan sadece 11 tanesi ortaktır. Öğrencilerin tercih ettikleri ve oynadıkları oyun türleri pandemi öncesinde ve pandemi sonrasında birbiri ile örtüşmektedir. Pandemi öncesi öğrenciler oyun tercihlerinde en çok grafiksel özelliklere, oyun mekanikleri ve oyun içi dinamikleri kapsayan oynanış ile iletişim ve iş birliği özelliklerini dikkate alırken, pandemi sonrası bu durumun ses kalitesi, grafik kalitesi ve oynanış şeklinde değiştiği görülmüştür. Pandemi öncesi 15, pandemi sonrasında ise 14 öğrenci oyunlara para ödemesi yapmıştır. Oyunlara yapılan bu ödemeler pandemi öncesi en çok oyun satın almak için yapılırken pandemi sonrası ise oyun içi satın almak yapılmıştır. Pandemi öncesi elde edilen veriler incelendiğinde öğrenciler, oyunların en çok yabancı dil gelişimi ve zihinsel gelişimlerine olumlu katkı sağladığını belirtmiş; bununla birlikte dikkat ve odaklanma gelişimi, eğlenceli zaman geçirme, hayal gücü gelişimi ve korkuları yenmeye yardımcı olma faktörlerini de dijital oyunların olumlu etkileri olarak görmektedirler. Pandemi sonrası ise öğrenciler, en çok yabancı dil gelişimi, arkadaşlar arası iletişim ve paylaşıma olumlu etki olarak vurgu yapmış; bu sıralamayı refleks gelişimi, eğlenceli zaman geçirme, bilgi ve genel kültür artışı ve aile içi iletişim ve paylaşım takip etmiştir. Zekâ gelişimi pandemi sonrasında öğrenci yanıtlarında düşüş göstermiştir. Öğrenciler pandemi öncesinde oyunların en olumsuz etkisinin notlarda düşüş olduğunu söylerken pandemi sonrasında ise bunun yerini aile içi iletişim problemleri ve göz ağrısı almıştır. Ayrıca pandemi öncesi ve sonrasında öğrenciler oyunların neden olduğu fizyolojik problemleri olumsuz etki olarak görmektedirler. Bununla birlikte öğrenciler hem pandemi öncesi hem de pandemi sonrası oyunların olumsuz etkileri hakkında daha fazla yanıt belirtmelerine rağmen yapılan görüşmeler esnasında bu olumsuz etkilerden daha çok olumlu etkileri üzerinde durmuşlardır. Pandemi öncesinde öğrenciler oynadıkları oyunlarla tanışma yollarını sırasıyla reklamlar, arkadaş çevresi ve aile fertleri şeklinde ifade ederken bu sıralama pandemi sonrasında arkadaş çevresi, reklamlar ve aile fertleri şeklinde değişmiştir.

Ciris vd. (2022) 559 lise öğrencisi ile yaptığı çalışmasında öğrencilerin pandemi sürecinde oyun platformu olarak daha çok cep telefonu kullandığı sonucuna ulaşmıştır. Bu çalışmada da pandemi sonrasında telefonun oyun platformu olarak öğrenciler tarafından daha çok tercih edildiği görülmektedir. Bu yönüyle iki çalışmanın sonucu benzerlik göstermektedir. Barr ve Copeland-Stewart (2022) karantina sırasında oyunların nasıl kullanıldığını daha iyi anlamak için oyun alışkanlıklarını ve oyuncuların sağlığı üzerindeki etkilerini ortaya koymak amacıyla 781 kişilik çevrimiçi bir anket gerçekleştirmiş, çalışmanın sonunda pandemi sürecinde oyun oynama sürelerinin arttığı sonucuna varmıştır. Çelik ve Bektaş (2023) 10-14 yaşları arasında 619 ortaokul öğrencisi ile yapmış olduğu çalışmasında, öğrencilerin pandemi sürecinde oyun oynama sürelerinin arttığını, öğrencilerin yarısının günlük ortalama oyun oynama süresinin 2 saatten fazla olduğunu belirtmiştir. Ellis vd. (2020) 2004 katılımcıyla bir çalışma gerçekleştirmiş; COVID-19 sürecinde katılımcıların video oyun oynama süreleri ortalamasının 16 saat 23 dakikadan 20 saat 50 dakikaya çıktığı sonucuna ulaşmıştır. Bu çalışmada da öğrencilerin pandemi sonrasındaki haftalık ortalama oyun oynama sürelerinin pandemi öncesine göre arttığı, ayrıca pandemi öncesi ve sonrasında günlük ortalama oyun oynama süresinin 2 saatten fazla olduğu görülmektedir. Ayrıca pandemi öncesi 16 saat 44 dakika olan haftalık ortalama oyun oynama süresi pandemi sonrasında 19 saat 53 dakikaya çıkmıştır. Bu özellikler göz önüne alındığında çalışmalarda benzer bulgulara rastanmıştır. Ekinci vd. (2021) 5-8. sınıflarda öğrenim gören 398 ortaokul öğrencisiyle yapmış olduğu çalışmasında erkek öğrencilerin dijital oyunlara bağımlılık eğiliminin kız öğrencilere göre daha fazla olduğu sonucuna ulaşmıştır. Çelik ve Bektaş (2023) da yaptığı çalışmasında erkek öğrencilerin oyun oynama sürelerinin kız öğrencilerden daha fazla olduğunu ifade etmiştir. Bu çalışmada da erkek öğrencilerin pandemi öncesi ve sonrasındaki ortalama günlük ve haftalık oyun oynama sürelerinin kız öğrencilerden daha fazla olduğu görülmektedir. Bu özellikler göz önüne alındığında çalışmalardaki bulgular benzerlik göstermektedir. Barr ve Copeland-Stewart (2022)'ın çalışmasında katılımcılar, oyunların bilişsel ve zihinsel gelişime katkı, eğlenceli zaman geçirme, sosyalleşme gibi olumlu; vakit kaybı ve dikkat dağınıklığı gibi olumsuz özelliklerinin olduğunu belirtmişlerdir. Çelik ve Bektaş (2023) da oyun sürelerindeki artışın hareketsizliğe bağlı olarak hastalıklara neden olabileceğini söylemiştir. Ayrıca oyunların olumlu özelliklerinin olumsuz özelliklerinden daha çok olduğunu vurgulamışlardır. Bu çalışmada da öğrenciler tarafından pandemi öncesi ve sonrasında oyunların diğer çalışmalardaki benzer olumlu ve olumsuz özelliklerine vurgu yapılmıştır. Ayrıca öğrencilerin pandemi öncesi ve sonrasında görüşme esnasında oyunların olumsuz özelliklerinden ziyade

olumlu özelliklerinden bahsettikleri görülmektedir. Bu açılardan değerlendirildiğinde çalışmalar benzerlik göstermektedir.

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# Ortaokul Matematik Öğretmenlerinin Matematik Öğretim Kaygılarının Ve Yeterlik İnançlarının Öğretmenlik Uygulaması Dersi Bağlamında İncelenmesi

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## Özet

Bu çalışmanın amacı ortaokul matematik öğretmenlerinin matematik öğretmeye yönelik kaygılarının ve matematik öğretimi yeterlik inançlarının çeşitli değişkenler açısından incelenmesidir. Çalışmada ortaokul matematik öğretmenlerinin cinsiyet, mezuniyet not ortalaması ve öğretmenlik uygulaması dersinin uzaktan ya da yüz yüze alınmasının matematik öğretimi yeterlik inançlarına ve matematik öğretimine ilişkin kaygılarına bir etkisinin olup olmadığı incelenmiştir. Bu bağlamda nicel araştırma yöntemlerinden ilişkisel tarama modeli kullanılmıştır. Çalışmanın örneklemini lisansta öğretmenlik uygulamasını uzaktan ve yüz yüze alan ortaokul matematik öğretmenleri oluşturmaktadır. Ortaokul matematik öğretmenlerinden amaç doğrultusunda veri toplanabilmesi için "Matematik Öğretimi Öz-yeterlik İnanç Ölçeği", "Matematik Öğretimine Yönelik Kaygı Ölçeği" ve "Kişisel Bilgi Formu" kullanılmıştır. Matematik öğretmenlerinden elde edilen verilerin analizinde istatistik programı kullanılmıştır. Öğretmenlik uygulaması dersinin uzaktan ya da yüz yüze yapılmasının matematik öğretimi kaygıları ve yeterlik inançlarına etkisinin belirlenmesi için bağımsız örneklem t-testi kullanılmıştır. Matematik öğretimi kaygıları ve yeterlik inançlarının cinsiyet değişkeni açısından incelenmesi için bağımsız örneklem t-testi, mezuniyet not ortalaması değişkeni açısından incelenmesi için de Kruskall Wallis testi uygulanmıştır. Verilerin analizi sonucunda öğretmenlik uygulaması dersinin uzaktan yapılmasının matematik öğretmenlerinin matematik öğretimi kaygıları ve yeterlik inançlarına bir etkisinin olmadığı ortaya konulmuştur. Aynı zamanda matematik öğretimi yeterlik inanç düzeylerinde cinsiyetleri açısında erkek öğretmenler lehine anlamlı bir fark olduğu, matematik öğretimi kaygı düzeylerinde ise not ortalaması değişkeni açısından anlamlı bir farklılık olduğu ortaya konulmuştur. Matematik öğretmenlerinin matematik öğretimi kaygıları ile cinsiyetleri arasında ve matematik öğretimi yeterlik inançları arasında anlamlı bir farklılık olmadığı belirlenmiştir.

**Anahtar Kelimeler**: Uzaktan eğitim, matematik öğretim kaygısı, matematik öğretim yeterlik inancı, matematik öğretmeni

# Examination of Secondary Mathematics Teachers' Mathematics Teaching Anxiety and Teaching Belief in the Context of Teaching Practice Lessons

## Abstract

The aim of this study is to examine the secondary school mathematics teachers' anxiety towards teaching mathematics and their mathematics teaching efficacy beliefs in terms of various variables. has been examined. In this context, the relational survey model, one of the quantitative research methods, was used. The sample of the study consists of secondary school mathematics teachers who take the undergraduate teaching practice remotely and face-to-face. In order to collect data from secondary school mathematics teachers in line with the purpose, "Mathematics Teaching Self-Efficacy Belief Scale", "Mathematics Teaching Anxiety Scale" and "Personal Information Form" were used. Statistics program was used in the analysis of data obtained from mathematics teachers. An independent sample t-test was used to determine the effect of distance or face-to-face teaching practice course on mathematics teaching concerns and efficacy beliefs. Independent sample t-test was used to analyses mathematics teaching concerns and efficacy beliefs in terms of gender variable, and Kruskal Wallis test was used to analyses them in terms of graduation grade point average variable. As a result of the analysis of the data, it was revealed that the distance teaching practice course did not have an effect on the mathematics teaching anxiety and efficacy beliefs of the mathematics teachers. At the same time, it was revealed that there was a significant difference in favor of male teachers in terms of gender in mathematics teaching efficacy belief levels, and there was a significant difference in mathematics teaching anxiety levels in terms of grade point average variable. It was determined that there was no significant difference between mathematics teachers' anxiety about teaching mathematics and their gender, and between mathematics teaching efficacy beliefs.

# Giriş

Eğitim en genel tanımıyla davranış değişikliği oluşturma sürecidir. Bu sürecin niteliğini etkileyen birçok etmen bulunmaktadır. Bu etmenlerden bazıları eğitim ve öğretimin içerisinde yer alan öğrenciler, çevre ve öğretmenlerdir. Öğretmenler öğretimin niteliğini etkileyen önemli bir unsurdur. Bu bağlamda öğretmenlerin kaliteli ve yeterli bir öğretim yapabilmesi için nitelikli öğretmenlere ihtiyaç vardır. Zakaria ve Musiran (2010)'a göre öğretimin kalitesini, öğretmenlerin görev ve sorumluluklarına ilişkin inançları etkilemektedir. Matematik öğretmenlerinin matematik öğretimine yönelik olan yeterlik inancı ise kişinin matematiği öğretimi için gerekli olan becerilerine ilişkin inancı olarak tanımlanmıştır (Enochs, Smith ve Huinker, 2000). Aynı zamanda öğretime yönelik olarak yaşadıkları kaygı da öğretmenlerin davranışlarını etkileyen ve öğretimin niteliğini belirleyen ikinci bir faktördür. Matematik dersi özelinde incelenen öğretim kaygısı 'matematik öğretimine ilişkin kaygı olarak isimlendirilmiş ve matematiksel kavramların, kuralların, teoremlerin ve problem çözmenin öğretiminde hissettikleri kaygı şeklinde tanımlanmıştır. Yapılan çalışmalar staj, özgüven gibi faktörlerin matematik öğretim kaygısını etkilediğini ortaya koymuştur (Hoşşirin, 2010). Bu bağlamda öğretmenlik uygulaması olarak adlandırılan staj dersinin uzaktan yapılmasının öğretmenlerin öğretime yönelik kaygılarının ve yeterlik inançlarını etkileyip etkilemediğinin ortaya konulmasının gerekliliği ortaya çıkmıştır. Araştırmada ortaokul matematik öğretmenlerinin lisans programında aldıkları öğretmenlik uygulaması dersinin aynı zamanda cinsiyetlerinin ve not ortalamalarının matematik öğretmeye yönelik kaygılarını ve matematik öğretimine ilişkin yeterlik inançlarını etkileyip etkilemediğinin incelenmesi amaçlanmıştır. Bu bağlamda araştırmada şu sorulara yanıt aranmıştır:

Ortaokul matematik öğretmenlerinin;

1. Öğretmenlik Uygulaması dersini uzaktan eğitim olarak alanlar ile yüz yüze alanların matematik öğretmeye yönelik kaygıları ve yeterlik inanç düzeyleri arasında anlamlı bir farklılık var mıdır?
2. Matematik öğretimi kaygıları ne düzeydedir?
3. Matematik öğretimi yeterlik inançları ne düzeydedir?
4. Cinsiyet değişkenine göre matematik öğretimi kaygı düzeyleri ve matematik öğretim yeterlik inanç düzeyleri arasında anlamlı bir farklılık var mıdır?
5. Not ortalaması değişkenine göre matematik öğretimi kaygı düzeyleri ve matematik öğretim yeterlik inanç düzeyleri arasında anlamlı bir farklılık var mıdır?
6. Matematik öğretimi kaygı ve matematik öğretim yeterlik inanç düzeyleri arasında anlamlı bir farklılık var mıdır?

# Metodoloji

## Araştırmanın Modeli

Çalışmada nicel araştırma modellerinden ilişkisel tarama modeli benimsenmiştir. İlişkisel tarama modeli, iki ya da daha fazla değişken arasındaki ilişkiyi incelemeyi amaçlayan araştırma modelidir (Büyüköztürk, 2013).

## Evren ve Örneklem

Tüm dünyayı etkisi altına alan pandemi döneminde eğitimler uzaktan olarak yapılmıştır. Bu nedenle üniversitelerde eğitim alan matematik öğretmeni adayları o dönemde, Öğretmenlik Uygulaması dersi adı altında Milli Eğitime Bakanlığına bağlı okullara giderek yaptıkları stajlarını uzaktan gerçekleştirmişlerdir. Araştırmanın evrenini Öğretmenlik Uygulaması dersini alan matematik öğretmenleri oluşturmaktadır. Araştırmanın amacından dolayı öğretmenlik uygulaması dersini hem uzaktan hem de yüz yüze alan öğretmenlere ulaşılması gereklidir. Bu bağlamda seçkisiz örnekleme yöntemlerinden olan tabakalı örnekleme ile hedef evreni temsil edecek örneklem grubuna ulaşılmıştır. Tabakalı örnekleme, evreni oluşturan alt grupların birbirinden bağımsız olarak seçilen ve bu grupların evren içerisindeki oranlarını temsil etmeyi amaçlayan yöntemdir (Büyüköztürk, 2013).

## Veri Toplama Araçları

Araştırmada üç adet veri toplama aracı kullanılmıştır. Bunlar "Kişisel Bilgi Formu", "Matematik Öğretme Kaygısı Ölçeği" ve "Matematik Öğretim Yeterlik İnançları Ölçeği" olarak belirlenmiştir. Kişisel Bilgi Formu

araştırmacı tarafından hazırlanmış olup katılımcıların, Öğretmenlik Uygulaması dersini uzaktan eğitimle alıp almadıkları, cinsiyet ve lisans not ortalamalarının belirlenebilmesi için oluşturulmuştur.

Araştırmanın konusu olan öğretmenlerin matematik öğretimine yönelik kaygıları Peker (2006) tarafından geliştirilen "Matematik Öğretme Kaygısı Ölçeği" ile belirlenmiştir. Bu ölçeğin kullanımı için araştırmacılardan izin alınmıştır. Ölçek 23 maddeden oluşmaktadır ve beşli likert tipi olarak geliştirilmiştir. Matematik öğretmeye yönelik kaygı ölçeği dört faktörden oluşmaktadır. Bunlar "matematiği öğretmeye yönelik kaygıda öğretmenlerin alan bilgileri (AB)", "matematiği öğretmeye yönelik kaygıda öğretmenlerin özgüvenleri (OG)", "matematiği öğretmeye yönelik kaygıda öğretmenlerin matematik öğretmeye yönelik tutumları (OYT)", "matematiği öğretmeye yönelik kaygıda öğretmenlerin alan eğitimi bilgileri (AEB)" şeklinde sıralanabilir.

Araştırmaya katılan öğretmenlerin matematik öğretimi yeterlik inanç düzeylerini ise Çetinkaya ve Erbaş (2011) tarafından Türkçeye uyarlanan "Matematik Öğretmenlerinin Matematik Öğretimi Öz Yeterlik İnançları Ölçeği" ile belirlenmiştir. Ölçek 21 maddeden oluşmaktadır ve beşli likert tipindedir. Bu ölçeğin kullanımı için araştırmacılardan izin alınmıştır. Ölçek iki alt boyuttan oluşmaktadır. Bunlar kişisel matematik öğretme yeterliği (KY) ve matematik öğretimi sonuç beklentisidir (SB).

### Veri Analizi

Verilerin analizinde istatistik programlarından JASP kullanılmıştır. JASP açık kaynaklı ücretsiz bir istatistik programıdır ve Amsterdam Üniversitesi tarafından desteklenmektedir. Araştırmanın verilerinin normal dağılım gösterip göstermediğinin belirlenmesi için normallik testleri yapılmıştır. Normal dağılım gösteren verilerin analizinde parametrik testler, normal dağılıma uymayan alt boyutlar ve değişkenler için nonparametrik testler kullanılmıştır.

# Bulgular

## Birinci Alt Probleme İlişkin Bulgular

Araştırmanın birinci alt problemi olan "Öğretmenlik Uygulaması dersini uzaktan eğitim olarak alanlar ile yüz yüze alanların matematik öğretmeye yönelik kaygıları ve yeterlik inanç düzeyleri arasında anlamlı bir farklılık var mıdır?" sorusuna yanıt aranmıştır. Yeterlik inancının tüm alt boyutlar ve toplam puanlarının öğretmenlik uygulaması dersine göre normal dağılım gösterdiği görülmüştür. Yeterlik inancının öğretmenlik uygulamasını dersine göre anlamlı bir farklılık gösterip göstermediği bağımsız örneklem t-testi ile ortaya konmuştur. Test sonucu incelendiğinde matematik öğretimi yeterlik inancı alt boyutlarının ve toplam puanının öğretmenlik uygulaması dersine göre anlamlı bir farklılık ($p > 0.05$) göstermediği görülmüştür.

Aynı zamanda ortaokul matematik öğretmenlerinin matematik öğretimi kaygı düzeylerinin öğretmenlik uygulaması dersine göre anlamlı bir farklılık gösterip göstermediği bağımsız örneklem t-testi ile incelenmiştir. Test sonucu incelendiğinde matematik öğretimi kaygının alt boyutları ve toplamı ile öğretmenlik uygulaması dersi değişkeni arasında anlamlı bir farklılık olmadığı ($p > 0.05$) görülmektedir.

## İkinci Alt Probleme İlişkin Bulgular

Araştırmanın ikinci alt problemi olan "*İlköğretim matematik öğretmenlerinin matematik öğretmeye ilişkin kaygıları ne düzeydedir?*" sorusuna yanıt aranmıştır. Bu bağlamda matematik öğretmenlerinin kaygılarına ait verilerin betimsel analizi yapılarak kaygı puanlarına ilişkin ortalama ve standart sapma hesaplanmıştır. Matematik öğretmeye yönelik kaygı ölçeğinden en yüksek 115 puan alınabilir. Analiz sonucunda ilköğretim matematik öğretmenlerinin kaygılarının ortalama puana göre %33 olduğu görülmüştür. Öğretmenlerin kaygı puanlarının genel olarak düşük olduğu söylenebilir.

Matematik öğretimi kaygılarının alt boyutlara göre aritmetik ortalamaları ve standart sapmalarına bakılmıştır. İlköğretim matematik öğretmenlerinin matematik öğretimi kaygılarının alt boyutlarından özgüven (OG) alt boyutu ortalamasının X=1.684, alan eğitimi bilgileri (AEB) alt boyutu ortalamasının X=1.479, alan bilgileri (AB) alt boyutu ortalamasının X=1.729 ve öğretime yönelik tutum (OYT) alt boyutunun ortalamasının X=1.517 olduğu görülmüştür. Bu ortalamalar dikkate alındığında ilköğretim matematik öğretmenlerinin en fazla kaygı duydukları alt boyut alan bilgileri (AB) alt boyutundan kaynaklanan kaygının olduğu söylenebilir.

## Üçüncü Alt Probleme İlişkin Bulgular

Araştırmanın alt problemi olan "*İlköğretim matematik öğretmenlerinin matematik öğretimi yeterlik inançlarının düzeyleri nasıldır*?" sorusuna cevap aranmıştır. Araştırma grubundan elde edilen verilerin ortalaması, standart sapması ve yüzdesi hesaplanmıştır. Yeterlik inancının ölçeğinden en fazla 105 puan alınabilir. Analiz sonucunda ilköğretim matematik öğretmenlerinin matematik öğretimi yeterlik inancının ortalamaya göre %75 olduğu görülmektedir. Bu bağlamda yeterlik inançlarının genel olarak oldukça yüksek olduğu söylenebilir. Aynı zamanda alt boyutlar incelendiğinde matematik öğretimine yönelik sonuç beklentisi (SB) alt boyutunun ortalamasının X=3.302 ve kişisel matematik öğretim yeterliği (KY) alt boyutunun ortalamasının X=4.078 olduğu görülmüştür. Ortalamalar incelendiğinde ilköğretim matematik öğretmenlerinin kişisel matematik öğretim yeterliği (KY) alt boyutuna bağlı yeterlik inançlarının daha yüksek olduğu söylenebilir.

## Dördüncü Alt Probleme İlişkin Bulgular

Cinsiyetin kaygı ölçeğinin çarpıklık basıklık değerlerine göre özgüven (OG), alan bilgileri (AB) ve öğretime yönelik tutum (OYT) alt boyutlarında ve toplam puanda normal dağıldığı ancak Alan Eğitimi Bilgileri (AEB) alt boyutunda normal dağılmadığı görülmektedir. Normal dağılan alt boyutlar ve genel toplam için bağımsız gruplar t-testi analizi kullanılmıştır. Bağımsız t-testi p>0.05 anlamlılık değerine göre matematik öğretmeye yönelik kaygı puanlarının normal dağılım gösteren alt boyutları ve toplam puanları ile cinsiyet değişkenleri arasında anlamlı bir farklılığın olmadığı görülmüştür. Alan Eğitimi Bilgileri (AEB) alt boyutunun cinsiyet değişkenine göre anlamlı olup olmadığının incelenmesinde Mann Whitney U testi kullanılmıştır. Matematik öğretmeye ilişkin kaygının Alan Eğitimi Bilgileri alt boyutunun cinsiyete göre anlamlı bir farklılık göstermediği (p>0.05) ortaya konmuştur.

Matematik öğretimi yeterlik inancının alt boyutları ve toplam puanlarının cinsiyet değişkenine göre anlamlı bir farklılık gösterip göstermediği bağımsız gruplar t-testi ile analiz edilmiştir. Bağımsız t-testi sonuçlarına göre matematik öğretmeye yönelik yeterlik inancı puanları alt boyutlarından Kişisel Matematik Öğretme Yeterliği (KY) alt boyutunda cinsiyete göre anlamlı bir farklılık olmadığı (p>0.05) görülmüştür. Ancak Matematik Öğretim Sonuç Beklentisi (SB) alt boyutu ve toplam puanları ile cinsiyet değişkenine ait bağımsız gruplar t-testine göre anlamlı bir farklılık olduğu (p<0.05) belirlenmiştir.

Ortalamalara göre Matematik Öğretimi Sonuç Beklentisi Yeterliliğinin (SB) alt boyutunda erkek matematik öğretmenlerin ortalamasının (x=3.535) kadın öğretmenlerin ortalamasından (x=3.230) daha fazladır. Bu bağlamda Matematik Öğretimi Sonuç Beklentisi Yeterliliğinin (SB) erkek öğretmenler lehine anlamlı olarak farklılaştığı görülmektedir. Aynı zamanda erkek öğretmelerin yeterlik inancı toplam puan ortalamalarının (x=7.649) kadın öğretmenlerin toplam puan ortalamalarından (x=7.297) daha fazla olduğundan yeterlik inancının toplam puanlarının erkekler lehine anlamlı olarak farklılaştığı ortaya konulmuştur.

## Altıncı Alt Probleme İlişkin Bulgular

Çalışmanın altıncı alt probleminde "*İlköğretim matematik öğretmenlerinin matematik öğretimi kaygıları ile matematik öğretimi yeterlik inanç düzeyleri arasında anlamlı bir farklılık var mıdır?*" sorusuna cevap aranmıştır. Yeterlik inancına ait veri grubunun tüm alt boyutlarında ve toplam puana göre normal dağılım gösterdiği görülmektedir. Bu bağlamda iki değişken arasındaki ilişki pearson momentler çarpımı katsayısı analizi kullanılarak incelenmiştir. Pearson momentler çarpımı analizi sonucunda matematik öğretimi yeterlik inancı ve kaygı arasında anlamlı (p<0.05) orta düzeyde negatif yönlü (Pearson's r=-0.447) bir ilişki olduğu görülmektedir. Bu bağlamda ilköğretim matematik öğretmenlerinin matematik öğretimi yeterlik inançları arttıkça matematik öğretimine yönelik kaygı puanlarının azaldığı görülmektedir.

## Sonuç

Ortaokul matematik öğretmenlerinin öğretmenlik uygulaması dersini uzaktan ya da yüz yüze almış olmalarının matematik öğretim kaygılarına ve matematik öğretimi yeterlik inançlarına bir etkisinin olup olmadığının belirlenmesi için bağımsız t-testi uygulanmıştır. Analiz sonucunda uzaktan ya da yüz yüze alınmış olan öğretmenlik uygulaması dersinin matematik öğretim kaygısına ve yeterlik inancına bir etkisinin olmadığı görülmüştür.

Bu çalışmanın sonucunda ortaokul matematik öğretmenlerinin matematik öğretim kaygılarının düşük seviyede olması literatürdeki çalışmalarla benzerlik göstermektedir (Gökoğlu Uçar, 2019; Uysal 2019; Karaşahin,

2020). Matematik öğretmeni adaylarının matematik öğretmeye yönelik kaygılarının düşük olması öğretmenlerin eğitim hayatları boyunca matematik alan dersleri ile iç içe olmalarından kaynaklanabilir.

Araştırmanın sonucunda ortaokul matematik öğretmenlerinin matematik öğretim kaygılarının cinsiyete göre anlamlı bir farklılık göstermemesinin literatürde yer alan birçok araştırma ile paralellik gösterdiği görülmektedir (Karaman ve Çil, 2021; Gökoğlu-Uçar, 2019; Karaşahin, 2020; Ergen ve Durmuş, 2022; Eroğlu-Kazan, 2019).

Çalışmada ortaokul matematik öğretmenlerinin not ortalaması ile matematik öğretim kaygılarının anlamlı olduğu sonucuna varılmıştır. Eroğlu Kazan (2019), çalışmasında öğretmenlerin genel başarı notu ile matematik öğretimi kaygısının anlamlı olmadığını ortaya koymuştur.

Ortaokul matematik öğretmenlerinin matematik öğretimi yeterlik inançlarının yüksek sevide olduğu görülmüştür. Bu sonuç, Yerlikaya ve Takunyacı (2020) tarafından yapılan çalışmada elde edilen bulgularla paralellik göstermektedir.

Çalışmada matematik öğretmenlerinin cinsiyetleri ile matematik öğretimi yeterlik inançlarının genel puanları ve sonuç beklentisi (SB) alt boyutunda anlamlı olduğu ve bu anlamlılığın erkekler lehine olduğu görülmüştür. Literatür incelendiğinde matematik öğretimi yeterlik inancı ve cinsiyet arasındaki ilişkiyi; Uysal (2019), erkekler lehine anlamlı olduğunu ortaya koymuştur

Matematik öğretim yeterlik inancı ve not ortalamasının anlamlı bir farklılık göstermemesi, Uysal (2019) ve Eroğlu Kazan (2019) tarafından yapılan çalışmalarla paralellik göstermektedir.

Ortaokul matematik öğretmenlerinin matematik öğretim kaygıları ile matematik öğretim yeterlik inançları arasında ilişkinin negatif yönlü ve orta düzey anlamlı bir ilişki olduğu ortaya konulmuştur. Matematik öğretim kaygısı ile matematik öğretim yeterlik inancı arasındaki ilişkinin incelendiği çalışmalarda araştırmanın sonucu ile benzer şekilde orta düzey negatif yönlü anlamlı bir ilişki olduğu ortaya konulmuştur (Deringöl, 2018; Özben, 2019; Aksu, 2019; Uysal, 2019; Eroğlu Kazan, 2019).

Bu araştırmada ortaokul matematik öğretmenleri ile çalışılmış ve öğretmenlik uygulaması dersinin uzaktan ya da yüz yüze alınmasının matematik öğretimi yeterlik inancı ile kaygı düzeylerine etkisi incelenmiştir. Aynı zamanda cinsiyet ve not değişkenleri açısından anlamlı bir farklılık gösterip göstermediğine bakılmıştır. Matematik öğretimi yeterlik inancı ile matematik öğretim kaygı düzeyleri farklı değişkenler açısından ele alınabilir. Pandemi nedeniyle uzaktan eğitimle verilen lisans düzeyindeki derslerin öğretmen adaylarının yeterlik inançları ve kaygılarına olan etkisinin incelendiği başka çalışmalarda yapılabilir. Yapılan çalışmalar ile uzaktan eğitimi zorunlu kılan şartlarda bu eğitimin kalitesinin artırılmasının zorunluluğu ve önemi ortaya konulabilir.

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# Eğitim 4.0 ve Yükseköğretimde Yenilikçi Pedagojiler

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## Özet

Değişen öğrenen profili, küresel anlamda iş dünyasının çalışanlardan beklentileri, eğitim maliyetleri ve teknolojik gelişmeler, sürdürülebilir yenilikçi bir öğrenme anlayışı gerekliliğini ortaya çıkarmaktadır. Yükseköğretime yönelik kayıt ve katılımda 2025'e kadar ciddi bir düşüş yaşayacağı Horizon 2023 Öğretim ve Öğrenme Raporunda açıkça ifade edilmekte; bunun nedeni olarak da öğrenen profilindeki değişime bağlı olarak öğrenenlerin eğitime yaklaşımları ve eğitim maliyetlerinin yüksekliği gösterilmektedir. Bunun yanı sıra World Economic Forum tarafından yayınlanan Future of Works (İşlerin Geleceği) Raporu, 2023-2027 zaman aralığında iş gücü piyasalarının beklentilerini ortaya koymakta ve küresel beceriler taksonomisinde bilgi, beceri ve tutumların sıralamasında ilk beş sırada; analitik ve yaratıcı düşünme; dayanıklılık, esneklik ve çeviklik; motivasyon ve öz farkındalık; merak ve yaşam boyu öğrenmeye yer vermektedir. Bütün bunlar öğretmeden öğrenmeye yönelik paradigma değişiminin bir uzantısı olarak görülebilir. Ancak öğrenmenin temelinde yer alan pedagojik yaklaşımların zamana ayak uydurması ve yenilikçi bir pedagojik yaklaşım sergilemesi gereklidir. Bu çalışmada, yenilikçi pedagojileri temel alan, yenilikçi pedagojilere yönelik araştırmaların incelenmesi, yaklaşımların zaman içindeki seyrinin değerlendirilmesi, araştırma boşluklarının belirlenmesi amaçlanmaktadır. Bu amaç doğrultusunda Web of Science veri tabanında yenilikçi pedagojilere ilişkin ilk çalışmanın yapıldığı 1992 yılından Haziran 2023'e kadar bütün çalışmaları kapsayan bir sistematik literatür taraması gerçekleştirilmiş, VOSviewer programı kullanılarak bibliyometrik analizler yapılmıştır. Bulgular; esnek öğrenme, probleme dayalı öğrenme, aktif öğrenme, deneyimsel öğrenme, dönüştürücü öğrenme, sosyal ve duygusal öğrenme, bağlam temelli öğrenme, etkileşimli öğrenme, sorgulamaya dayalı öğrenme, ters-yüz öğrenme, çevrimiçi öğrenme, uzaktan öğrenme, harmanlanmış öğrenme, oyunlaştırma pedagojisi, dijital pedagoji, kendi kendine öğrenme, etkileşimli öğrenme, tasarım odaklı düşünme, öğrenen merkezli ders tasarımı, dengeli öğrenme tasarımı ve iş eğitimi şeklinde sıralanabilecek pedagojik yaklaşımlara 2022 sonrasında özel bir eğilimi işaret etmektedir. Çalışma yenilikçi pedagojileri bütüncül bir bakış açısıyla ele alarak, genel eğilimi ortaya koyması ve olası boşlukları belirlemeye katkı sağlaması açısından önemlidir.

**Anahtar Kelimeler**: Eğitim 4.0, Yükseköğretim, Yenilikçi Pedagojiler, Öğrenen Katılımı

# Education 4.0 and Innovative Pedagogies in Higher Education

## Abstract

The changing learner profile, the expectations of the global business world from employees, education costs, and technological developments reveal the need for a sustainable, innovative learning approach. It is clearly stated in the Horizon 2023 Teaching and Learning Report that there will be a significant decline in enrollment and participation in higher education until 2025; the reason for this is the change in the learner profile, the approach of learners to education, and the high education costs. In addition, the Future of Works Report published by the World Economic Forum sets out the expectations of labor markets in the 2023-2027 timeframe. The report ranks analytical and creative thinking; resilience, flexibility and agility; motivation and self-awareness; curiosity and lifelong learning as the top five in the ranking of knowledge, skills, and attitudes in the global skills taxonomy. All this may be an extension of the paradigm shift from teaching to learning. However, pedagogical approaches at the heart of learning must keep pace with the times and demonstrate an innovative pedagogical approach. This study aims to examine the research on innovative pedagogies based on innovative pedagogies, evaluate the course of approaches over time, and identify research gaps. For this purpose, we conducted a systematic literature review covering all studies from 1992, when the first study on innovative pedagogies was conducted, to June 2023, in the Web of Science database, and we conducted bibliometric analyzes using the VOSviewer program. The results indicate a particular trend after 2022 towards pedagogical approaches such as flexible learning, problem-based learning, active learning, experiential learning, transformative learning, social and emotional learning, context-based learning, interactive learning, inquiry-based learning, flipped learning, online learning, distance learning, blended learning, gamification pedagogy, digital pedagogy, self-directed learning, interactive learning, design thinking, learner-centered course design, balanced learning design, and job training. The study is essential in addressing innovative pedagogies holistically, revealing the general trend, and identifying possible gaps.

**Keywords**: Education 4.0, Higher Education, Innovative Pedagogies, Learner Engagement

# Giriş

"Bir ons (~31.10 gr) enformasyon bir kilo veriye bedeldir.

Bir ons bilgi, yarım kilo enformasyona bedeldir.

Bir gram anlayış, bir kilo bilgiye bedeldir (Ackoff, 1989)".

Ackoff (1989), veriden bilgeliğe adını taşıyan makalesinde veri-enformasyon-bilgi-anlayış-bilgelik olarak sıralanan hiyerarşiyi ortaya koyarak verinin enformasyonu, enformasyonun bilgiyi, bilginin anlayışı ve anlayışında bilgeliği doğurduğu şeklinde doğrusal bir yapı ortaya koyar ve bu yapıda anlayış üretme ve bilgelik konusunda eğitim sürecindeki eksikliği vurgular. Ayrıca verinin bilgiye dönüştürülmesi konusunda da eğitim sürecinde çok az şey yapıldığını belirtir. O günden bugüne yirmi yıldan fazla zaman geçmiş olmasına rağmen, anlayış geliştirme ve bilgelik konusunda eğitim sürecinde hala eksiklikler olduğunu söylemek mümkün. Anlayış geliştirecek ve bilgeliğe ulaşmayı sağlayacak pedagojik yaklaşımlar nelerdir?

İçinde bulunduğumuz çağda, değişen öğrenen profili, küresel anlamda iş dünyasının çalışanlardan beklentileri, eğitim maliyetleri ve teknolojik gelişmeler, sürdürülebilir yenilikçi bir öğrenme anlayışı gerekliliğini ortaya çıkarmaktadır. Yükseköğretime yönelik kayıt ve katılımda 2025'e kadar ciddi bir düşüş yaşayacağı Horizon 2023 Öğretim ve Öğrenme Raporunda açıkça ifade edilmekte; bunun nedeni olarak da öğrenen profilindeki değişime bağlı olarak öğrenenlerin eğitime yaklaşımları ve eğitim maliyetlerinin yüksekliği gösterilmektedir. Bunun yanı sıra World Economic Forum tarafından yayınlanan Future of Works (İşlerin Geleceği) Raporu, 2023-2027 zaman aralığında iş gücü piyasalarının beklentilerini ortaya koymakta ve küresel beceriler taksonomisinde bilgi, beceri ve tutumların sıralamasında ilk beş sırada; analitik ve yaratıcı düşünme; dayanıklılık, esneklik ve çeviklik; motivasyon ve öz farkındalık; merak ve yaşam boyu öğrenmeye yer vermektedir. Bütün bunlar öğretmeden öğrenmeye yönelik paradigma değişiminin bir uzantısı olarak görülebilir. Ancak öğrenmenin temelinde yer alan pedagojik yaklaşımların zamanın ruhuna ayak uydurması ve yenilikçi bir yaklaşım sergilemesi gereklidir. Zamanın ruhuna uygun değişimi anlamak için öncelikle Eğitim 4.0 kavramını, sonrasında yenilikçi pedagoji kavramını açıklamak faydalıdır.

## Eğitim 4.0 ve Yenilikçi Pedagojiler

Endüstri devrimleri toplumları yeniden şekillendiren ve toplumları oluşturan bireylerin değişimine/dönüşümüne neden olan önemli etkilerdir. Endüstri devrimleri her ne kadar endüstri alanında ortaya çıkan gelişmeleri ifade etse de, endüstri devrimleriyle ortaya çıkan yenilik ve gelişmeler, bireylerin bu yenilik ve gelişmelere uyumlu hale gelmesini gerektirir. Bunun yolu da, eğitimden geçer ve tam da bu nedenle sanayi devrimleriyle paralel olarak eğitimde Eğitim 1.0, Eğitim 2.0, Eğitim 3.0 ve Eğitim 4.0 şeklinde bir sınıflama ortaya çıkmıştır.

Wyman (2020), Sadiku, Omotoso ve Musa (2020), Puncreobutr (2016), López vd. (2021) tarafından gerçekleştirilen çalışmalarda söz konusu endüstri devrimleri ve eğitim sınıflamalarına ilişkin açıklamalara yer verilmektedir. Bu açıklamalar ışığında endüstri devrimleri ve paralelinde gelişen eğitim sınıflamaları şu şekilde özetlenebilir:

Su ve buhar enerjisiyle üretimin güçlendirilerek makineleşmenin sağlandığı Endüstri 1.0'ın yansıması olarak Eğitim 1.0'da bilgi öğrenciye kavramlar yoluyla aktarılmış ve dikte edilmiştir. Elektrik enerjisiyle seri üretimin sağlandığı Endüstri 2.0'a paralel olarak Eğitim 2.0'da öğrenme sosyal olarak yapılandırılmış ve okullar aynı tip öğrenenler üreten bir fabrikaya dönüşmüştür. Elektronikleşmeye enformasyon ve iletişim teknolojileri sayesinde üretimin otomatikleştiği Endüstri 3.0'ın yansıması, Eğitim 3.0'da kendi kendine öğrenme, eğitimde internetin ve sosyal medyanın yoğunluğu, sosyal olarak yapılandırılmış ve bağlamsal olarak yeniden keşfedilmiş öğrenme şeklinde kendini göstermiştir. Endüstri 4.0 ise, nesnelerin interneti (IoT), hizmetlerin interneti, fiziki ve sanal gerçeği birleştiren siber fiziksel akıllı üretim sistemleriyle bambaşka bir dönüşüm gerektirir. Bu etki Eğitim 4.0'da eğitimde inovasyon etkisi, eğitim ve öğrenme araçlarında görselleştirme, öğrenme deneyiminin kişiselleştirilmesi, yeniliklerle oluşturulmuş yaşam boyu öğrenmeyi gündeme taşımıştır.

Özcesi Eğitim 4.0, öğrenenlere nasıl öğreneceklerine ve ortaya çıkan teknolojik gelişmelerdeki çeşitliliğe uyum sağlamalarına katkı sağlamaya odaklanır. Böylece iş gücü piyasalarının beklentilerine uygun olarak hem var olan işgücünün gelişmelere uyumlanması, hem de yeni işgücünün gerekli donanıma sahip olması sağlanabilir. Bütün bunların olabilmesi için ise, öğrenenlerin katılımının sağlanması, daha doğrusu öğrenen ihtiyaçları doğrultusunda eğitim faaliyetlerinin düzenlenmesi gerekir.

Öğrenenlerin ihtiyaçlarını her ne kadar iş gücü piyasalarının talepleri ve beklentileri şekillendirse de, öğrenen öncelikleri daha çok içinde bulunulan çağın gerekleri doğrultusunda değişip/dönüşmektedir. Lee vd. (2018), sanayi devrimlerini bireylerin arzularıyla teknolojik yeniliklerin birlikte evrimleşmesi şeklinde tanımlarlar. Bu tanımlamada esas alınan Maslow'un ihtiyaçlar hiyerarşisidir. Bu hiyerarşik yükselişte, her endüstri devrimi

doğrudan bir ihtiyaç aşamasına denk gelmez, çünkü endüstri devrimleri geçiş dönemleriyle birlikte ele alınır. Bu anlamda toplumu oluşturan bireylerin dolayısıyla öğrenenlerin ihtiyaçlara yönelik yaklaşımında Endüstri 4.0'ın geçiş dönemiyle birlikte "Biz" duygusundan "Ben" duygusuna doğru bir geçiş söz konusudur. Bu bağlam öğrenenleri, statü, kendini ifade etme şeklinde beliren "Saygı İhtiyaçları" ile kendini gerçekleştirme ve diğer gerçekleştirmeler şeklinde ortaya çıkan "Kendini Gerçekleştirme İhtiyaçları" gibi yüksek ihtiyaç seviyesine taşımıştır. İşte bu nedenle Ackoff (1989) tarafından 2000'li yıllar öncesinde ifade edilen eğitimde anlayış geliştirme ve bilgelik konusundaki eksiklik, 2023'lü yıllarda yükseköğretimde kendini daha belirgin olarak hissettirmektedir.

Endüstri 4.0 ile ortaya çıkan dijitalleştirme, dijitalleşme ve dijital dönüşüm olarak ifade edilebilecek dijital dönüşüm süreci (Reinitz, 2020), eğitimdeki süreçlere uygulandığında yeni pedagojik yaklaşımların ortaya çıkmasına yönelik yüksek bir potansiyel söz konusudur (QAA, 2020). Yapılan araştırmalar (Akimov et al., 2023; Bizami, Tasir, & Kew, 2023; López et al., 2021; Kondratyev, Kazakova, & Kuznetsova, 2022) bu düşünceyi doğrular niteliktedir. Açık inovasyon yeterlilik çerçevelerinde Eğitim 4.0'ın bileşenlerini inceleyen Akimov vd. (2023), yaptıkları araştırma sonucunda Eğitim 4.0'ın beş bileşeni (yeterlilikler, öğrenme ve öğretme stratejileri, enformasyon ve iletişim teknolojileri, altyapı, paydaşlar) üzerine odaklanmaktadır. Bizami, Tasir ve Kew (2023) ise, Eğitim 4.0 ve buna bağlı gelişen yenilikçi pedagojileri; hetagoji, akranagoji ve sibergoji çerçevesinde ele almakta, teknolojik öğrenme araçlarının yeteneklerini Facebook, blog ile Moodle bağlamında incelemektedir.

Özetleyecek olursak Eğitim 4.0, ezbere dayalı sistemin yerine dijital teknolojilerden faydalanan ve kişiye özel eğitim ve iş gücü piyasalarının ihtiyaçlarına yanıt veren, deneyim temelli bir eğitim sistemine işaret etmektedir. Z kuşağı ve Alfa kuşağının Endüstri 4.0 dünyasının ihtiyaçlarına yanıt verecek şekilde eğitilmesini öngören Eğitim 4.0; teknolojiyi, bireyselliği ve keşfe dayalı öğrenmeyi yaşamımıza taşımaktadır. Başka bir ifadeyle Eğitim 4.0, Miranda vd. (2021) tarafından belirtildiği gibi, yükseköğretim pedagojik prosedürlerini iyileştirmek için modern altyapıdan ve gelişmekte olan teknolojilerden yararlanma anlamına gelir. Yenilikçi Pedagoji ise, eşitlikçi öğrenmeyi teşvik etmek, akademik sonuçları iyileştirmek ve gerçek sorunları ele almak için, yeni öğretim stratejilerini ve yöntemlerini proaktif olarak tanıtma sürecidir. Temel amaç, sınavda değil, hayatta başarılı olan bireylerden oluşan toplumlar yaratmaktır.

Bu bilgilerden hareketle çalışmada, Eğitim 4.0 bağlamında ortaya çıkan yenilikçi pedagojilerin neler olduğu ve bu pedagojik yaklaşımların zaman içindeki değişiminin sistematik tarama çalışmasıyla keşfedilmesi amaçlanmaktadır. Araştırmada "Geçmişten 2023'e yükseköğretimde yenilikçi pedagojiler ve eğilimler nelerdir?" sorusuna yanıt aranmaktadır.

## Yöntem

Araştırmanın amacına bağlı olarak yanıt aranacak soruları yanıtlayabilmek için, sistematik tarama yöntemi benimsenmiştir. Araştırma sistematik inceleme prosedürlerinden PRISMA 2020 Kontrol Listesi (Page vd., 2021) ve PRISMA 2020 Genişletilmiş Kontrol Listesi rehberliğinde gerçekleştirilmiş ve PRISMA 2020 akış şablonu (Page vd., 2021) kullanılmıştır. Bu araştırmada sistematik tarama yöntemi benimsenmiş, Web of Science (WOS) veri tabanında 09.06.2023 tarihinde "innovative pedagogy", "innovative pedagogies", "education 4.0" kelimeleri kullanılarak tarama gerçekleştirilmiş ve genel taramada toplam (n=308) yayına ulaşılmıştır. Araştırmada hakemli çalışmalar olarak makalelerin incelenmesi hedeflendiğinden, yayın dili İngilizce olan makalelerle çalışma sınırlandırılmıştır.

Çalışmanın arama dizgisi aşağıdaki gibidir:

> Results for "innovative pedagogy" (Topic) OR "innovative pedagogies" (Topic) AND "education 4.0" (Topic) and Article (Document Types) and Proceeding Paper or Early Access or Book Chapters (Exclude – Document Types) and English (Languages)

Yukarıda verilen arama dizgisiyle yapılan taramada "Web of Science Core Collection for 171 results" elde edilmiş ve n=171 çalışma araştırmaya dâhil edilmiştir.

Taramaya ilişkin veriler "Excel" dosyası olarak indirilmiş, gerekli veri temizleme işlemleri sonrasında veri dosyası Tableau ve VOSviewer 1.6.18 programlarında kullanılarak analiz edilmiştir.

İki araştırmacı hem veri toplama hem de analiz süreçlerinde aktif olarak rol almıştır. Sınırlamalara dayalı olarak araştırmaya dâhil edilen makalelerin yıllara göre dağılımı Şekil 1'de yer almaktadır.
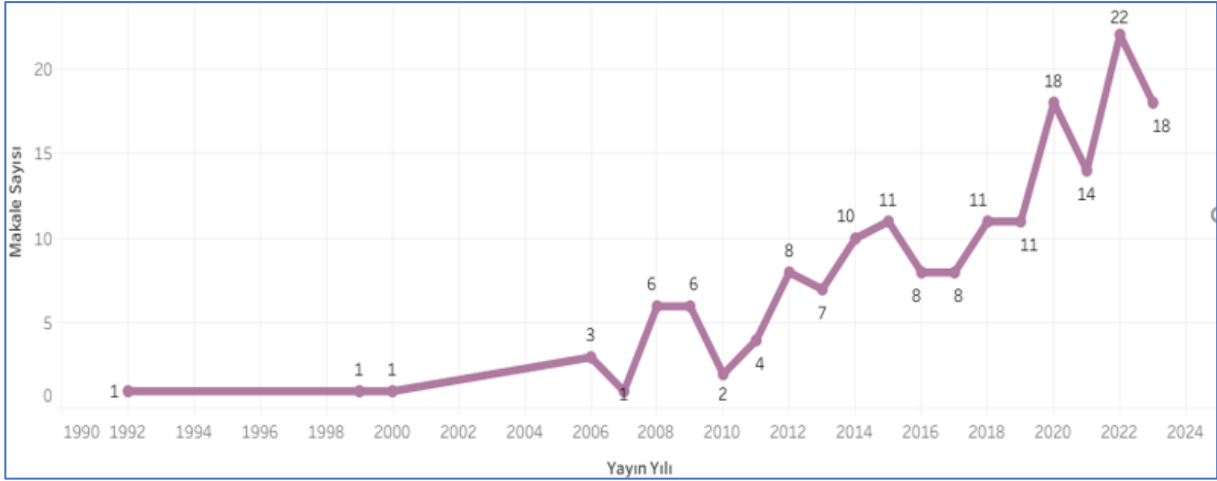
Şekil 1. Çalışmaya dâhil edilen makalelerin yıllara göre dağılımı

Yılara göre dağılımı Şekil 1.'de yer alan araştırmaya dahil edilen (n=171) makalede kullanılan anahtar kelimelerin analizi gerçekleştirilerek, yükseköğretimde yenilikçi pedagojilere yönelik eğilimler incelenmiştir.

## Bulgular

Sistematik alan yazın taraması ile ulaşılan yayınların bibliyografik veri analizi sonucunda ulaşılan bulgular araştırma sorularına cevap vermek amacıyla ilgili başlıklarda sunulmuştur.

### Genel Yenilikçi Pedagojik Eğilimler

1991-2023 yılları arasındaki 171 makalenin yazar anahtar kelimelerinin ağ haritası incelendiğinde 712 anahtar kelimenin 46 kümede toplandığı belirlenmiştir. Yenilikçi pedagojilerin temel ağı oluşturduğu dikkat çekmekte, buna bağlı olarak yükseköğretim, pedagoji, aktif öğrenme, çevrimiçi öğrenme, ters-yüz öğrenme, deneyimsel öğrenme, harmanlanmış öğrenme, eğitimsel amaçlar, sürdürülebilir gelişme amaçları, yaşam boyu öğrenme, bilim eğitimi, yenilik, demokrasi, mobil öğrenme, dijital teknoloji, dijital beceriler, öğretmen uygulamaları, öğrenme tasarımı, Endüstri 4.0, çeşitlilik, eğitim yönetimi, özgün öğrenme, profesyonel gelişim, katılım ve eşitlik anahtar kelimeleri sıklıkla kullanılan kelimeler olarak karşımıza çıkmaktadır.
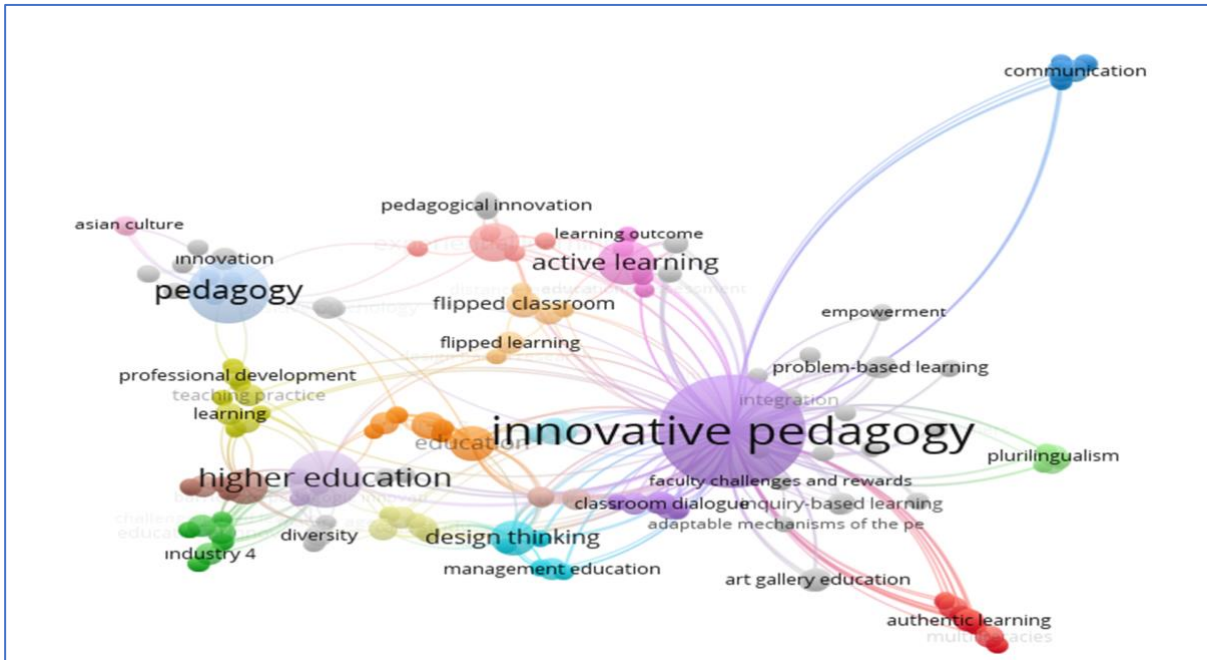


Şekil 2. Bütün yıllara ait makalelerin yazar anahtar kelimeleri ağ haritası

Bu genel yayılımın yıllara göre dağılımı Şekil 3'de yer almaktadır. Şekil 3 incelendiğinde, yenilikçi pedagojilerle ilgili anahtar kelimelerin 2016 sonrasında yoğun olarak kullanılmaya başlandığı, yükseköğretime ilişkin çalışmaların 2020'lerle birlikte ortaya çıktığı, Endüstri 4.0 ile çalışmaların ise 2022'de ağırlık kazandığı söylenebilir.



Şekil 3. Bütün yıllara ait makalelerin yazar anahtar kelimelerinin yıllara göre ağ haritası

Şekil 4.'de genel yapıda yükseköğretime daha yakından baktığımızda, e-learning, m-learning, öğrenme çevreleri, öğretmen uygulamaları, ters-yüz öğrenme, tasarım temelli araştırma, sanal simülasyon, sarmalayan sanal gerçeklik, yenilikçi pedagojinin engelleri, eğitimsel yenilik, endüstri 4.0, çeşitlilik öğrenme tasarımı, olgun yaştaki bireylerin eğitimi anahtar kelimeleri ön plana çıkmaktadır.



Şekil 4. Bütün yıllara ait makalelerin yazar anahtar kelimelerinin yükseköğretim vurgulu ağ haritası

## Sonuç ve Öneriler

Genel olarak yenilikçi pedagojik eğilimlerin bütün zaman dilimlerinde önemli görüldüğü, ancak 2018 sonrasında düzenli bir yükseliş dikkat çekmektedir. Esnek öğrenme, probleme dayalı öğrenme, aktif öğrenme, deneyimsel öğrenme, dönüştürücü öğrenme, sosyal ve duygusal öğrenme, bağlam temelli öğrenme, etkileşimli öğrenme, sorgulamaya dayalı öğrenme, ters-yüz öğrenme, çevrimiçi öğrenme, uzaktan öğrenme, harmanlanmış öğrenme, oyunlaştırma pedagojisi, dijital pedagoji, kendi kendine öğrenme, etkileşimli öğrenme, tasarım odaklı düşünme,

öğrenen merkezli ders tasarımı, dengeli öğrenme tasarımı ve iş eğitimi şeklinde sıralanabilecek pedagojik yaklaşımlara 2022 sonrasında özel bir eğilimi işaret etmektedir. Anahtar kelimeler içinde çıkmasa da, hetagoji, akranagoji ve sibergoji gibi yenilikçi pedagojiler özellikle 2023 yılında yapılan çalışmalarda yer almaktadır. 2016 sonrasında ele alınmaya başlanan öğrenenin duygusal yönünün yenilikçi pedagojilerde özellikle üzerinde durulması gereken bir konu olduğu, yenilikçi pedagojileri şekillendirmede psikoloji biliminden yararlanılmasının faydalı olacağı söylenebilir.

## Not

Araştırmada daha derinlemesine anahtar kelime ağ harialarını görmek için gerçekleştirilen görselleştirmeler, bildirilere ilişkin minimum 4-maximum 6 sayfa kısıtlaması nedeniyle tam metne eklenememiş, ancak sözlü sunumda kullanılmıştır. Detaylı bilgi için yazarlarla iletişime geçebilirsiniz.

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# Erken Çocukluk Dönemine Hitap Eden Dijital Oyunların İncelenmesi

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## Özet

Araştırmanın amacı, Türkiye'de ve yurtdışında en popüler oyun platformlarından birer tanesinin Google Play üzerinden ulaşılabilen dijital oyunlarını, belirtilen yaş grubundaki çocuklara uygunlukları açısından incelemektir. Yabancı kaynaklı platformdan 11, Türkiye kaynaklı platformdan 13 oyun olmak üzere toplam 24 oyun incelenmiştir. Tüm veriler bütün halinde verilmiş ve yorumlanmıştır. Verilerin analizi için araştırmaların oluşturduğu "Dijital Oyun İnceleme Formu" kullanılmıştır. Dijital Oyun İnceleme Formu, oyunların genel özelliklerinin olduğu bir kısım ve bundan ayrı 9 ayrı bölümden ve 24 maddeden oluşmaktadır. Bu 9 bölümde oyunlar her maddeye göre "Uygun", "Kısmen Uygun" ve "Uygun Değil" olarak işaretlenebilmektedir. Oyunlar veri toplama aracı ile incelenmiştir ve elde edilen bulgular betimsel olarak sunulmuştur. Oyunlar Google Play'in kategorilendirdiği şekilde, 0-5 yaş ve 0-8 yaş için oyunlardan seçilmiştir. Platformlarda bu yaş kategorilerinde bulunan tüm oyunlar incelenmiştir. Oyunların dilleri, kategorileri, oynama süreleri, 6 temada yaşa uygunluğu, dil özellikleri, görsel özellikleri, ilerleme özellikleri, yaratıcılık özellikleri, pekiştireç özellikleri ve reklam özellikleri; iki yaş grubu için ayrı ayrı incelenmiş ve raporlanmıştır. Sonuç olarak oyunların çoğu özellikte çocuklara uygun olduğu görülmüş. Oyunlarının kategori çeşitliliği, pekiştireçler, dil öğesi yerine geçebilecek görsel ipuçları, basitten karmaşığa ilerleme, öznelleştirelebilirlik ve geribildirim verme konularında geliştirilmesi gerektiği görülmüştür.

**Anahtar Kelimeler:** dijital oyun, erken çocukluk, okul öncesi, Google Play

# Examine of Digital Games Addressing Early Childhood Period

## Abstract

The research aimed to examine the digital games of one of the most popular game platforms in Türkiye and one of the most popular game platforms in abroad, which can be accessed via Google Play, regarding their suitability for children in the specified age group. A total of 24 games, 11 from the foreign-sourced platform and 13 from the Turkish-sourced platform, were examined. All data is displayed and interpreted as a whole. The "Digital Game Review Form" created by the researchers was used to analyze the data. The Digital Game Review Form consists of a part with the general features of the games, nine separate sections, and 24 items. In these nine sections, the games can be marked as "Appropriate", "Partially Appropriate", or "Not Appropriate" according to each item. The games were examined with the data collection tool, and the findings were presented descriptively. The games are selected from the games for 0–5 years old and 0–8 years old as categorized by Google Play. All games in these age categories on the platforms were examined. Languages, categories, playing times, age appropriateness in six themes, language features, visual features, progression features, creativity features, reinforcement features, and advertising features of the games; were analyzed and reported separately for the two age groups. As a result, it has been seen that the games are suitable for children in most aspects. It has been seen that the games need to be developed in terms of category diversity, reinforcers, visual cues that can replace language elements, progression from simple to complex, subjectivism, and giving feedback.

**Keywords:** digital game, early childhood, preschool, Google Play.

## Giriş

Günümüz dijital çağda, artık çocukların ve gençlerin dünyasına giderek daha fazla yanıt veren dijital oyun türleri geliştirilmiştir. Çocuklar günlük yaşamlarında sıklıkla hem eğlenmek hem de öğrenmek için dijital oyun oynamaktadırlar (Michael ve Chan, 2006). Ancak oyun içeriklerinin çocuk gelişimi açısından uygunluğu önemli bir konudur. Dijital oyunların çocuklar için eğitim amaçlı kullanma ve sunmanın ve uygulanıp uygulanamayacağı sorusunun yanıtını bulmak gerekmektedir. Rajic ve Tasevska (2019) ilkokul düzeyinde 3. ve 4. sınıf 388 çocukla yaptıkları çalışmada çalışmaya katılan çocukların tamamının dijital oyunları serbest zamanlarında oynadıklarını

bulmuşlardır. Çocuklar çoğunlukla eğlence ve aynı zamanda yeni bir eğitim içeriğini anlamak ve gözlemlemek için oynadıklarını belirtmişlerdir. Araştırma sonuçları ayrıca devlet okullarına göre özel okullara devam eden çocukların daha fazla dijital oyun oynadıklarını, genel olarak tüm çocukların dijital oyun oynamak için motive olduklarını saptamışlardır. Özellikle 21. yüzyılda, okul öncesi çocukların da yeni teknolojilere etrafındaki insanları gözlemleyerek dahil olmaya başladığı, bunun da ötesinde artık yeni teknolojileri öğrenmenin okul öncesi dönem çocuğu için bile eğitsel anlamda bir ihtiyaç olmaya başladığı görülmektedir. Elektronik eğitsel oyunlar da eğitime dahil edilebilecek öğelerden biridir ve erken çocuklukta kullanıma en uygun olan araçlardır çünkü aktif öğrenmeyi başarılı bir şekilde desteklerler (Nousia, 2023). Buradan yola çıkarak, dijital oyunlar hem kullanım kolaylığı, hem ulaşılabilirlik, hem kapladığı alan hem de gelecekte eğitime daha çok dahil olacağının öngörülmesi noktasında önem arz etmektedir.

Dijital oyunlar çocuklar üzerinde faydalı ve bazen de tehlikeli olabilecek etkileri bulunmaktadır. Dolayısıyla dijital oyunların erken çocukluk dönemindeki çocuklar üzerindeki olumlu ve olumsuz etkilerinin sorgulanması konusu ortaya çıkmıştır (Aydemir, 2022). Bu nedenle dijital oyun içeriklerinin çocukların gelişimleri açısından uygunluğunun incelenmesi önemli bir konudur.

**Araştırmanın Amacı:**

Bu araştırmada Türkiye'de 0-8 yaş grubundaki çocuklara yönelik olan dijital oyun içeriklerinin incelenmesi amaçlanmıştır.

# Yöntem

**Araştırmanın Yöntemi:**

Çalışmada araştırma deseninin nitel araştırma deseni, toplanan verilerin analizi için ise yönteminin içerik analizi olmasında karar kılınmıştır. Nitel araştırmayı Büyüköztürk ve arkadaşları, (2016, s. 13) "*Araştırmacının bilgileri ve deneyimleriyle gerçekliğin bulunduğu bağlamda anlamlandırılmasını temel alan anti-pozitivist yorumcu bakış açısı.*" şeklinde tanımlamıştır. Olgun, (2008, s. 66) ise içerik analizi şu şekilde tanımlamıştır; "*İçerik analizi, sosyal bilimlerde gerek bir araştırma sonucu elde edilen transkript ya da kayıtların, gerek de yazılı veya görsel medya mesajlarının üzerinden çıkarımlar yapılmasıyla kullanılan biçimci bir araştırma tekniğidir*.".

**Evren ve Örneklem:** Araştırmanın evrenini Türkiye'de 0-8 yaşları arasındaki çocuklara hitap eden dijital oyunlar oluşturmuştur. Araştırmanın örneklemi için uygun kolay örnekleme yöntemi ile Türkiye'de yaygın dijital oyun platformunda yer alan 0-8 yaş çocuklarına hitap eden toplam 24 oyun örneklemi oluşturmuştur. Bu oyunlardan 18 tanesi 0-5 yaşa, 6 tanesi 0-8 yaşa hitap etmektedir.

**Veri Toplama Aracı:**

Araştırmada dijital oyunları değerlendirmek için araştırmacılara tarafından "Çocuklara Yönelik Dijital Oyun Değerlendirme Formu" geliştirilmiştir. Araç geliştirme sürecinde alan yazın incelemesi yapılmış ve dijital oyunları değerlendirmek için 7 tema belirlenmiştir (Chau, 2014; Çakmak, 2016; NAEYC, 2012; Topuz ve Kaplan, 2017; Üstündağ, 2019). Buna göre oyunlar; yaşa uygunluk, dil, görsellik, ilerleme, ilgi çekici olma, pekiştireç özelliği, fırsat eşitliği ve reklam özelliği temaları altında incelenmiştir.

**Verilerin Analizi:**

Araştırmada incelenen çocuklara yönelik dijital oyunlar içerik analizi yöntemi ile incelenmiştir. İncelenen oyunların içeriği "Çocuklara Yönelik Dijital Oyun Değerlendirme Formu" ile değerlendirilmeye çalışılmıştır. Dijital oyunlara ait özellikler betimsel olarak verilmiştir.

# Bulgular

Tablo 1. Örneklemi oluşturan dijital oyunların genel özelliklerinin yaş gruplarına göre dağılımı.

| Yaş grubu | 0-5 yaş n=18 | | | | 0-8 yaş n=6 | | | | Toplam | |
|---|---|---|---|---|---|---|---|---|---|---|
| Kategori | Eğlendirici | | Öğretici | | Eğlendirici | | Öğretici | | | |
| | n | % | n | % | n | % | n | % | n | % |
| | 8 | 33.3 | 10 | 41.7 | 2 | 8.3 | 4 | 16.7 | 24 | 100.0 |
| Dili | Türkçe | | İngilizce | | Türkçe | | İngilizce | | | |
| | n | % | n | % | n | % | n | % | n | % |
| | 9 | 37.5 | 9 | 37.5 | 4 | 16.7 | 2 | 8.3 | 24 | 100.0 |

| Oynama Süresi | 0-10 dk. | | 10-20 dk. | | 20 dk üzeri | | 0-10 dk. | | 10-20 dk. | | 20 dk üzeri | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | n | % | n | % | n | % | n | % | n | % | n | % | n | % |
| | 4 | 16.7 | 6 | 25.0 | 8 | 33.3 | 0 | 0.0 | 4 | 16.7 | 2 | 8.3 | 24 | 100.0 |

Örneklemi oluşturan toplam 24 oyun dijital oyunların genel özelliklerinin yaş gruplarına göre dağılımı Tablo 1'de incelenmiştir. Dijital oyunlardan 10 tanesinin eğlendirici, 14 tanesinin ise öğretici olarak kategorilendirildiği görülmektedir. Türkçe ve İngilizce dilindeki oyun sayıları neredeyse eşittir. Dijital oyunların, çoğunluğunun (10 tanesi) 10-20 dakika arası ve 20 dk üzeri (10 0yun) oynama süresinin olduğu görülmüştür.

Tablo 2. Örneklemi oluşturan öğretici dijital oyunların hedef aldığı alanların yaş gruplarına göre dağılımı.

| Yaş grubu | 0-5 yaş | 0-8 yaş |
|---|---|---|
| Alt Kategoriler | n | n |
| Dil | 7 | 0 |
| Matematik | 4 | 0 |
| Duygusal | 3 | 4 |
| Sanat | 2 | 0 |
| Bilim | 1 | 0 |

*Öğretici dijital oyun sayısı 14'tür. Bazı dijital oyunlar birden fazla alan içermektedir.

Tablo 2'de Örneklemi oluşturan öğretici dijital oyunların hedef aldığı alanların yaş gruplarına göre dağılımı verilmiştir. Öğretici kategorisinden 0-5 yaş grubunda 10, 0-8 grubunda ise 4 oyun bulunmaktadır. Öğretici kategorisinin alt konu alanları dil, matematik, duygusal, sanat ve bilimdir. Her oyun birden fazla kategoriye sahip olabilmektedir. Dijital oyunların ağırlıklı olarak dil ve duygusal konu alanlarını hedeflediği görülmüştür. Ayrıca, 0-8 yaş grubunun sadece duygusal konu alanını hedeflediği görülmüştür. Bilim konu alanında ise sadece bir dijital oyun bulunmaktadır.

Tablo 3. Örneklemi oluşturan dijital oyunların genel özelliklerinin yaş gruplarına göre dağılımı.

| Yaş grubu | 0-5 yaş n=18 | | | 5-8 yaş n=6 | | | Tüm Oyunlar Toplamı n=24 | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Yaşa uygunluk | Uygun n | Kısmen Uygun n | Uygun Değil n | Uygun n | Kısmen Uygun n | Uygun Değil n | Uygun n | Kısmen Uygun n | Uygun Değil n | T |
| Dil* | 13 | 0 | 0 | 5 | 0 | 0 | 18 | 0 | 0 | 18 |
| Görsellik | 13 | 4 | 1 | 5 | 1 | 0 | 18 | 5 | 1 | 24 |
| İlerleme | 8 | 4 | 6 | 2 | 3 | 1 | 10 | 7 | 7 | 24 |
| İlgi çekicilik | 10 | 7 | 1 | 4 | 2 | 0 | 14 | 9 | 1 | 24 |
| Pekiştireç özelliği | 9 | 4 | 5 | 4 | 1 | 1 | 13 | 5 | 6 | 24 |
| Fırsat eşitliği | 2 | 8 | 9 | 1 | 4 | 1 | 3 | 11 | 10 | 24 |
| Reklam özelliği | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3* |

*Oyunlardan 6 tanesi (%25) dil öğesi barındırmadığından, dil özelliği açısından değerlendirmeye alınmamıştır. Dil öğesi barındırmayan 5 oyun 0-5 yaş, 1 oyun ise 0-8 yaş grubundadır.

*Reklam içeren 3 dijital oyun incelenmiştir. Reklam içermeyen 21 adet (%87.5), değerlendirilmeye alınmamıştır.

Tablo 3'te araştırmacılar tarafından belirlenen temalara göre dijital oyunların yaşa uygunluk açısından değerlendirilmesi verilmiştir. Altı dijital oyun sesli olarak dil özelliği barındırmadığından, ilk maddeye göre değerlendirilmeleri yapılmamıştır. Yine dil öğesi barındırmayan dijital oyunlar bile, oyun ismi dahi olsa bazı yazılar içermektedir. Ancak bunlar cümle içermediği ve 0-5 yaş grubu da okur-yazar olmadığı için, değerlendirmeye alınmamıştır.

Dil özelliği açısından değerlendirilen tüm dijital oyunlar yaşa uygun bulunmuştur. Dijital oyunların yarısından fazlası görsellik, ilgi çekicilik ve pekiştireç özellikleri açısından uygun bulunmuştur.

Tablo 4. Örneklemi oluşturan dijital oyunların dil özelliklerinin yaş gruplarına göre dağılımı.

| | Yaş grubu | 0-5 yaş n=18 | | | 5-8 yaş n=6 | | | Tüm Oyunlar Toplamı n=24 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Dil özelliği | Uygun n | Kısmen Uygun n | Uygun Değil n | Uygun n | Kısmen Uygun n | Uygun Değil n | Uygun n | Kısmen Uygun n | Uygun Değil n | T |
| 1 | Sesli olarak dil öğesi barındırır. | 12 | 1 | 5 | 5 | 0 | 1 | 17 | 1 | 6 | 24 |
| 2 | Çocuğun yaş ve gelişimine uygun ifadeler içerir.* | 12 | 1 | 0 | 5 | 0 | 0 | 17 | 1 | 0 | 18 |
| 3 | Yeni sözcük-kavram kazandırır.* | 11 | 0 | 2 | 1 | 1 | 3 | 12 | 1 | 5 | 18 |
| 4 | Kötü örnek olabilecek ifadeler içermez.* | 13 | 0 | 0 | 5 | 0 | 0 | 18 | 0 | 0 | 18 |

*2., 3. ve 4. maddelerin 6'şar verisi (%25) eksiktir, çünkü sesli olarak dil öğesi barındırmayan oyunlar bu maddeler açısından değerlendirilmeye alınamamıştır.

Dijital oyunların çoğunun sesli olarak dil öğesi barındırdığı Tablo 4'te görülmektedir. Ancak bazı oyunlar sesli olarak dil öğesi barındırmadığından diğer maddeler açısından değerlendirilmeye alınmamıştır.

Dördüncü maddede kötü örnek olarak, çocuğun yaşına uygun olmayan sokak jargonları, çocuğun yaşına uygun olmayan düzeyde içerikler içeren sözler ve ifadeler kastedilmiştir. Değerlendirmeye alınan oyunlarda bu gibi kötü örneklere hiç rastlanmamıştır. Ayrıca, oyunların çoğunlukla (18 dijital oyun) çocuğa katkı sağlayabilecek özellikte olduğu saptanmıştır.

Dijital oyunların görselleri 4 maddede incelenmiştir. Dijital oyunlarda yer alan görsellerin büyük çoğunluğunun (n=19) çocukların ilgisini çekebilecek düzeyde ve anlaşılır olduğu ve hiçbir dijital oyunun kötü örnek olabilecek görselleri (çocuğun yaşına uygun olmayan olumsuz örnek ve şiddet içerikli görseller veya yetişkin içeriği olabilecek görseller) içermediği görülmüştür. Ancak dijital oyunların yarısında (n=12) dil öğesi yerine geçebilecek yardımcı öğelerin (Çocuk ne yapması gerektiğini bilemediğinde; nereye dokunmasını gerektiği gösteren bir el, işaret veya vurgu) bulunmadığı tespit edilmiştir.

Çalışma kapsamında ayrıca  dijital oyunun ilerleme özelikleri yaşlara göre incelenmiştir. Buna göre dijital oyunların 21 tanesinin  uygun ve farklı değişen özellikler içerdiği, sadece 2 oyunun basitten karmaşığa doğru ilerlediği, 5 oyunun (kümülatif ilerleme özelliğine (Çocuğun oyunun başında öğrendiği bilgileri, oyunun ilerleyen bölümlerinde kullanması. Bu özellik basitten karmaşığa maddesiyle yakından ilgilidir) sahip olduğu bulunmuştur.

Dijital oyunların yaratıcılık özellikleri 3 maddede incelenmiştir. Genel anlamda dijital oyunların yaratıcılığı geliştirmek anlamında yeterli olmadığı, ancak çocuğa seçim hakkı tanıdığı görülmektedir. Değiştirilebilirlik maddesi, aynı oyunun yeniden farklı şekillerde oynanmaya elverişli olup olmadığı ile ilgilidir. Öznelleştirilebilirlik ise, oyunların tamamı veya bir kısmında çocuğun tamamen kendine ait bir çizim, karakter veya düzen yaratabileceği bir özellik olarak açıklanabilir. Seçim yapabilme ise, oyunun çocuğun istediği kategoriyi veya oynama sırasını seçebilmesi ile alakalıdır.

Tablo 8'de dijital oyunların pekiştireç özellikleri 2 maddede incelenmiştir ve oyunların olumlu pekiştireç vermede (Doğru seçenek işaretlemesi uygulamanın çıkardığı durumunda olumlu bir ses veya yanlış yapınca cesaretlendirme amaçlı bir tepki gibi) ortalama olduğu ancak geribildirim verme (Çocuk oyunda yapması gerekeni yapınca, neden doğru olduğunu veya yapılan yanlıştan sonra doğru olanın nasıl yapılabileceğinin gösterilmesi, ipucu verilmesi veya doğru seçeneğe işaret edilmesi) konusunda geliştirilmesi gerektiği tespit edilmiştir.

Son olarak, örneklemi oluşturan dijital oyunların reklam özellikleri 2 maddede incelenmiştir. Reklam içermeyen oyunlar 2. maddede değerlendirmeye alınmamıştır. Oyunlardan sadece 3 tanesinde reklam olduğu tespit edilmiştir.

Bu reklamların 2 tanesinde, oyunun yapımcı platformu kendi reklamını oyunun içine gömülü şekilde vermiştir ve reklamların hiçbiri oyunun akışını bozmayan, durdurmayan ayrıca kötü örnek olabilecek öğeler içermeyen reklamlar olduğu için zararsız oldukları sonucuna varılmıştır.

## Yorum ve Sonuç

Türkiye'de 0-8 yaş grubundaki çocuklara yönelik olan dijital oyun içeriklerinin incelenmesinin amaçlandığı bu çalışmada, 2 popüler platformun Google Play'den ulaşılan oyunları arasından seçilen oyunlar incelenmiştir ve değerlendirilmiştir.

Genel olarak bakıldığında, oyunlarının 18 tanesi 0-5 yaşa, 6 tanesi 0-8 yaşa hitap etmektedir. Oyunların çoğunun oynama sürelerinin 10 dakikadan uzun olduğu görülmüştür.

Yirmi dört oyundan 6 tanesinde dil öğesi bulunmadığı görülmüştür. Oyunların belirtildiği yaş grubunda, özellikle de 0-5 yaş grubu için sesli olarak dil öğesi barınması gereklidir. Dil öğesi bulundurmayan 6 oyunun çoğu 5 tanesi 0-5 yaş grubundadır. Çocuklar okur-yazar olmadığı için, oyundan sıkılıp bırakmaması adına da sesli dil öğeleri gerekmektedir.

Bazı oyunlarda dil öğesi bulunmamaktadır ancak, geriye kalan dijital oyunların büyük çoğunluğu dil açısından yaşa hitap etmektedir ve kullanılan dil oldukça başarılı bulunmuşlardır.

Yapılan incelemelerde dijital oyunların büyük çoğunluğunun görsel açıdan gerçekçi ve anlaşılır olduğu, çocuklar açısında ilgi çekici olabileceği ve kötü örnek barındırmadığı görülmüştür. Ancak dijital oyunların çoğunun dil öğesi yerine geçebilecek yeterli görsel yönlendirme içermediği görülmüştür.

Dijital oyunların ilerleme özellikleri incelendiğinde, her iki yaş grubunda da benzer şekilde oyunların farklı değişen öğeler içerdiği görülmüştür. Dijital oyunların çoğunluğu kümülatif ilerlememektedir. Basitten karmaşığa ve kümülatiflik birbiriyle ilgilidir ve ikisinin de incelenen dijital oyunlarda geliştirilmesi gereken alanlar olduğu düşünülmektedir.

Dijital oyunların yaratıcılık özelliği incelendiğinde; oyunların çoğunun bu anlamda yeterli olmadığı tespit edilmiştir. Yine önemli bir diğer madde olan "Öznelleştirilebilirlik" ise dijital oyunların çoğunda bulunmamaktadır.

Pekiştireçler özellikle eğitici oyunlarda çocuğun oyun ile öğrenmesine destek olur ve çocuğu oyuna motive tutar. Dijital oyunların teşvik edecek öğeler açısından yeterli olduğu görülmüştür.

Dijital oyunların sadece 3 tanesinde reklam olduğu tespit edilmiştir. Ancak bu reklamlar dijital uygulamalarda yaygın olarak rastladığımız, uygulamayı habersiz bir şekilde aniden bölerek dikkati dağıtan nitelikteki reklamlardan değildir. Bu noktada tüm oyunlar reklam özelliği açısından olumlu bulunmuştur.

Günümüzde okul öncesi çocukların dijital oyun oynamayı sevdikleri (Kadan ve Aral, 2018; Şalcı ve diğ; 2018; Üstündağ, 2019) en çok tablet ile oynanan oyunları tercih ettikleri (Sağsağlam, 2017) yapılan araştırmalarla belirlenmiştir.

Artan teknoloji kullanımı ekran süreleri ile ilgili bazı endişeleri de beraberinde getirmiştir. Amerikan Pediatri Akademisi, çocukların medya kullanımı için öneriler oluşturmuştur. Öneriler şu şekildedir:

*"• 18 aydan küçük çocuklar için görüntülü sohbet dışında ekran tabanlı ortamlardan kaçının.*

*• 18 aydan 24 aya kadar olan çocuklar için, ebeveynler yüksek kaliteli programları seçmeli ve çocuklarıyla birlikte izlemelidir.*

*• 2 ila 5 yaş arası çocuklar için, yüksek kaliteli programlama için ekran süresini günde bir saatle sınırlayın.*

*• 6 yaş ve üzeri çocuklar için, medyayı ve medya türlerini kullanarak harcanan süre konusunda tutarlı sınırlar belirleyin (Digital Guidelines, 2020)".*

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# Ortaokulda Uzaktan Eğitim Yoluyla Yapılan Matematik Dersine Yönelik Öğrenci Görüşleri

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## Özet

Bu çalışma, uzaktan eğitim yoluyla yapılan matematik öğretimi hakkında ortaokul öğrencilerinin görüşlerini incelemeyi hedeflemektedir. Çalışmada nicel araştırma yöntemlerinden betimsel yaklaşım tarama yöntemi kullanılmıştır. Araştırmanın evreni İstanbul iline bağlı 1 okulda 100 öğrenciden meydana gelmektedir. Araştırmada veri toplama aracı olarak iki adet ölçek kullanılmıştır. Ortaokul öğrencilerine uzaktan eğitim yoluyla almış oldukları matematik derslerine yönelik görüşlerinin belirlenmesi maksadıyla "Uzaktan Eğitimde Matematik Derslerine Yönelik Görüş Ölçeği" ile öğrencilerin mevcut teknolojiyi kullanabilme yeteneklerinin belirlenmesi için "Dijital Okuryazarlık Ölçeği (DOÖ)" ölçekleri ile anket yapılmak suretiyle verilere ulaşılmıştır. Öğrenci görüşlerinin vermiş olduğu sonuçlar, SPSS programı ve Excel Pivot Table yardımıyla analiz edilip yorumlanmıştır.

**Anahtar Sözcükler:** Uzaktan Eğitim, Ortaokul, Matematik Öğretimi

# Student Opinions About the Mathematics Lesson Conducted Through Distance Education in Secondary School

## Abstract

This study aims to examine secondary school students' perspectives on mathematics teaching through distance education. In the study, descriptive approach scanning method, which is one of the good research methods, was used. The universe of the research consists of 1 crowd of 100 students connected to the Istanbul line. Two scales were used as data collection tool in the study. In order to find the approach to the mathematics lessons learned through distance education to secondary school students, the "Opinion Scale for Mathematics Lessons in Distance Education" and the "Digital Literacy Scale" scales to obtain the ability of students to benefit from the current environment were reached to conduct a survey. The results of the student's experience were interpreted using the SPSS program and the Excel Pivot Table.

**Keywords:** Distance Education, Secondary School, Mathematics Teaching

## Giriş

Matematik günümüzde öğrenciler tarafından zor ve kaygılandırıcı bir ders olarak düşünülmektedir (Işık vd., 2008). Matematik öğretiminin belirli kalıplardan çıkarak, ezbere dayandırılmayan uygulamaların hakim olması ve öğrencilerin matematik derslerinde görmüş oldukları konuların gerçek hayatları ile harmanladıkları bir ortamın meydana getirilmesi öğrenciler ile öğretmenleri arasındaki iletişim bağlarını daha ileri seviyeye taşıyacaktır (Doğan ve Kılıç, 2019).

Uzaktan eğitim öğrenciler açısından daha fazla esnekliği içerisinde barındırması ve geleneksel yüz yüze eğitimdeki katılığın daha aza indirilmiş olması bakımından ön plandadır. Geleneksel sınıfların aksine ders konularına istenilen zamanda ve yerde tekrar ulaşmak mümkündür. Yüz yüze eğitime göre uzaktan eğitim öğrenciler açısından daha ekonomiktir. İnsanlar hayatlarının genelini kapsayacak eğitim faaliyetlerini uzaktan eğitim yoluyla devam ettirebilirler. Bunların yanı sıra öğrenciler uzaktan eğitimde yüz yüze eğitimdeki gibi sorularını eğer canlı uzaktan eğitim yoluyla yapmıyorlarsa sorularını öğretmenleri ile iletişim fırsatı yakaladıklarında veya çevrimiçi uygulamada iken sorabilirler. Öğretmenlerin öğrencilerini izleme fırsatı olmadığında rehberlik etme faaliyetlerinde sıkıntılar doğabilmektedir (Akkoloğlu, 2022).

Uzaktan eğitim öğrencilerin bireyselliklerinin ön planda olduğu kişiselleştirilmiş bir yaklaşımdır. Öğrenciler uzaktan eğitim ile birlikte kendi öğrenme hızlarında istedikleri gibi sanal etkinliklerin içerisinde bulunabilir, simülasyonlardan faydalanarak işbirliği içerisinde çalışabilir (Basak, Wotto ve Belanger, 2018).

## Yöntem

### Araştırmanın Yöntemi

Bu araştırma ortaokulda uzaktan eğitim yoluyla yapılan matematik derslerine yönelik öğrenci görüşlerini belirlemek maksadıyla nicel araştırma yöntemlerinden olan betimsel yaklaşım tarama yöntemi kullanılmıştır.

Günümüzde veya önceki zamanlarda yaşanan durumun üzerinde etki, düzenleme ve değiştirme yapmadan, yaşanılan veya şimdiki durumu betimlemeye çalışan yaklaşım tarama yöntemidir (Karasar, 1999).

Araştırmada öğrencilere iki farklı ölçek uygulanmıştır. İlk olarak Gürel ve Sağırlı (2022) tarafından hazırlanan "Uzaktan Eğitimde Matematik Derslerine Yönelik Görüş Ölçeği" uygulanmıştır. İkinci olarak Pala ve Başıbüyük (2020) tarafından hazırlanan "Dijital Okuryazarlık Ölçeği (DOÖ)" uygulanmıştır. Öğrencilerin görüşlerine ait veriler 2022-2023 eğitim öğretim yılı 2.döneminde toplanmıştır.

### Araştırmanın Evren ve Örneklemi

Bu çalışma evrenini İstanbul ili Silivri İlçesine bağlı 1 okulda 100 öğrenci oluşturmaktadır. Yapılacak çalışmalar yönünden izinler Milli Eğitim Bakanlığı'ndan alındıktan sonra belirlenen dönemde 30 gün içerisinde sınıf ortamında veya Google forms üzerinden yapılmıştır. Katılım sağlayan öğrenciler gönüllülük esasına göre belirlenmiş ve daha önce uzaktan eğitim yoluyla eğitim almış olmaları şartını sağlamışlardır.

Birçok araştırmacı, çalışmalarda örneklem sayısının fazla olması ile sonuçların doğruluğunun arttığı yanılgısına düşer. Bu konudaki asıl etken örneklem evreninin sayısı değil evreni temsil eden örneklemlerin doğru olarak tespit edilmesidir (Şimşek, 2012).

### Araştırmanın Veri Toplama Aracı

Araştırma ile ilgili tüm kişi, kurum ve kuruluşlardan gerekli izin onayları alındıktan sonra, araştırmada görüşlerine başvurulacak tüm öğrencilere araştırmaya katılımın gönüllülük esasına dayandığı hatırlatılmış, araştırmanın konusu, amacı ve kapsamı hakkında bilgilendirme maksatlı açıklamalar yapılmıştır. Araştırmadan elde edilen veriler ortaokul öğrencilerine uzaktan eğitim yoluyla almış oldukları matematik derslerine yönelik görüşlerinin belirlenmesi maksadıyla ilgili veriler "Uzaktan Eğitimde Matematik Derslerine Yönelik Görüş Ölçeği" ile öğrencilerin mevcut teknolojiyi kullanabilme verileri ise "Dijital Okuryazarlık Ölçeği (DOÖ)" ile toplanmıştır. Örneklem grubu 100 kişiden meydana gelmekte olup ortaokuldaki her kademedeki sınıftan 25 öğrenci olacak şekilde uygulama yapılmıştır. Öğrenci görüşlerinden elde edilen veriler, SPSS programı ve Excel Pivot Table ile analiz edilip yorumlanmıştır.

## Bulgular

Bu bölümde araştırmanın amacına uygun olarak, uzaktan eğitimde matematik derslerine yönelik görüş ölçeği ve dijital okuryazarlık ölçeğinden elde edilen verilere yer verilmektedir.

Araştırmada kullandığımız 2 ölçeğimiz olan uzaktan eğitimde matematik derslerine yönelik görüş ölçeği ve dijital okuryazarlık ölçeklerinin SPSS programı kullanarak yapmış olduğumuz ölçeklere ait güvenirlik analizler Tablo 1 ve Tablo 2' deki gibidir.

| Güvenirlik Analizi | |
|---|---|
| Cronbach's Alpha | Öğe Sayısı |
| 0,895 | 16 |

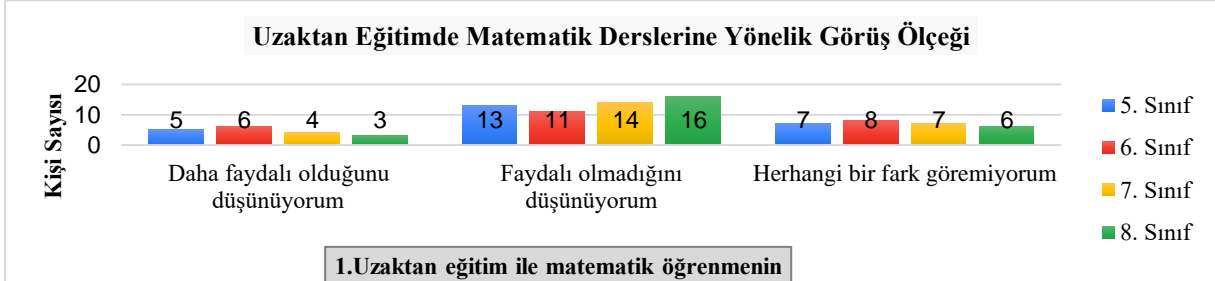**Tablo 1** Uzaktan Eğitimde Matematik Derslerine Yönelik Görüş Ölçeği Güvenirlik Analizi

Tablo 1'e baktığımızda uzaktan eğitimde matematik derslerine yönelik görüş ölçeği güvenirlik analizi (Cronbach's Alpha) sonucu %89,5 olarak hesaplanmıştır. Araştırmada kullanılan ankette 16 soru sorulmuştur.

| Güvenirlik Analizi | |
|---|---|
| Cronbach's Alpha | Öğe Sayısı |
| 0,832 | 21 |

**Tablo 2** Dijital Okuryazarlık Ölçeğine Ait Güvenirlik Analizi

Tablo 2'ye baktığımızda dijital okuryazarlık ölçeğine ait güvenirlik analizi (Cronbach's Alpha) sonucu %83,2 olarak hesaplanmıştır. Araştırmada kullanılan ankette 21 soru sorulmuştur.

Ölçeklerin iç tutarlılığını değerlendirmede Cronbach Alpha güvenirlik ölçütünün kullanılması gerekmektedir. Bu iç tutarlılık ayrıca homojenliğinin de ölçüsüdür. Cronbach Alpha değerinin yüzdesel olarak yüksekliği ölçekte kullanılan maddelerin birbiriyle olan tutarlılığını ve benzer özelliklere sahip öğelerden oluştuğunu öngördüğü kabul edilmektedir. Bu değerin %70 ve üzeri olması kullanılacak ölçeğin araştırmada uygulanabileceğini belirtmektedir (Özgüven, 1999'dan aktaran Bakır ve Erbil, 2009). Her iki tabloda da Cronbach Alpha değerlerinin %70 den fazla olması güvenirlik değerlerinin yüksek olduğu anlamına gelmektedir.



**Şekil 1** Uzaktan Eğitimde Matematik Derslerine Yönelik Görüş Ölçeği 1. Soru

Şekil 1 de uzaktan eğitimde matematik derslerinin faydalı olmadığını düşünenlerin toplamı %54 (n=54) tür. Bu durum öğrencilerin uzaktan eğitim ile matematik derslerinin kendilerine fayda sağlamayacağı görüşünü belirtmektedir. 8.Sınıf öğrencilerinin sadece %12'i (n=3) uzaktan eğitim ile matematik derslerinin faydalı olduğunu düşünmektedir. 6.Sınıf öğrencilerinin %32'ı (n=8) uzaktan eğitim ile matematik derslerinin faydalı veya faydalı olmadığı arasında herhangi bir fark görmemektedir. Tüm ortaokul öğrencilerinde uzaktan eğitim ile matematik derslerinin daha faydalı olduğunu düşünenlerin oranı %18 (n=18) dir.
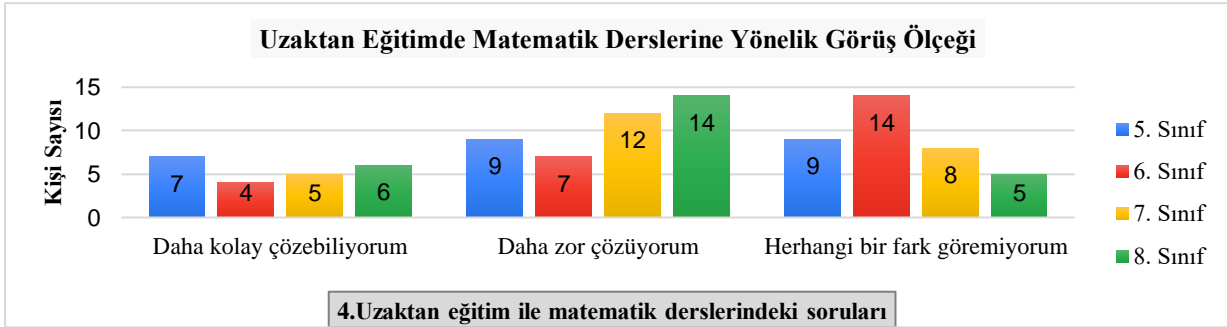


**Şekil 2** Uzaktan Eğitimde Matematik Derslerine Yönelik Görüş Ölçeği 4. Soru

Şekil 2' de uzaktan eğitim ile matematik sorularını öğrencilerin %42'si (n=42) daha zor çözebildiğini belirtmiştir. Öğrencilerin sadece %22'si (n=22) uzaktan eğitim ile matematik sorularını daha kolay çözebildiğini ifade etmiştir. Uzaktan eğitim ile matematik sorularını çözmede herhangi bir fark göremeyenlerde 7.Sınıf öğrencilerinin %56'sı (n=14) ile ilk sıradadır. Özellikle liselere giriş sınavına hazırlanan 8.Sınıf öğrencilerinin %56'sı (n=14) uzaktan eğitim ile matematik sorularını daha zor çözdüklerini belirtmişlerdir.

| | | | | | | |
|---|---|---|---|---|---|---|
| 14.Kimlik bilgilerimin çalınabileceğinin farkında olduğum için kişisel bilgilerimi internette paylaşmamam gerektiğini bilirim. | 75 | 15 | 3 | 2 | 5 | 100 |
| 15.Dijital teknolojiyi yoğun kullanmanın sağlığımı olumsuz etkileyebileceğini bilirim. | 49 | 27 | 13 | 4 | 7 | 100 |
| 16.Teknolojinin çevreye pozitif ve negatif etkilerini anlayabilirim. | 44 | 40 | 7 | 6 | 3 | 100 |
| 17.Yeni bir cihaz veya uygulamayı kullanırken teknik bir sorun oluştuğunda destek ve yardım bulabilirim. | 40 | 19 | 26 | 10 | 5 | 100 |
| 18.Dijital teknolojileri kullanırken sıkça ortaya çıkan sorunların çoğunu çözebilirim. | 27 | 27 | 31 | 12 | 3 | 100 |
| 19.Dijital teknolojileri kullanırken teknik olmayan problemleri çözebilirim. | 20 | 29 | 28 | 16 | 7 | 100 |
| 20.Programlar veya araçların teknolojik problemlerini çözebilirim. | 30 | 28 | 21 | 12 | 9 | 100 |
| 21.Teknoloji ile ilgili bir problem ile karşı karşılaştığımda, problemi çözmek için dijital araçları kullanabilirim. | 44 | 28 | 18 | 6 | 4 | 100 |
| **Genel Toplam** | **910** | **479** | **377** | **202** | **132** | **2100** |

**Tablo 3** Öğrencilerin Dijital okuryazarlık durumlarına göre vermiş oldukları cevaplar

| | | | | | | |
|---|---|---|---|---|---|---|
| eklemek, Facebook vb. sitelerde fotoğraf paylaşmak gibi). | | | | | | |
| 9.İnternette başkalarının oluşturduğu/paylaştığı herhangi bir dokümana katkıda bulunabilirim. | 19 | 11 | 29 | 20 | 21 | 100 |
| 10.Sosyal ağları (Facebook, Twitter, İnstagram vb.) kullanabilirim. | 48 | 22 | 11 | 10 | 9 | 100 |
| 11.Dijital araçları kullanırken uyulması gereken kurallar olduğunu bilirim (ör: yorum yaparken, kişisel bilgi paylaşırken). | 61 | 17 | 11 | 7 | 4 | 100 |
| 12.İnternette bilgi aktarımında/paylaşımında bulunabilirim. | 37 | 21 | 22 | 13 | 7 | 100 |
| 13.Bilgisayar, akıllı telefon, tablet gibi araçlarımı korumak için şifreler kullanabilirim. | 73 | 12 | 6 | 5 | 4 | 100 |

Tablo 3'de öğrencilerin Dijital okuryazarlık durumlarına göre vermiş oldukları tüm cevaplar yer almaktadır. Bu tablodan hareketle öğrencilerin verdikleri cevaplar üzerinden analiz yapılacaktır. 14.Soruda "kimlik bilgilerimin çalınabileceğinin farkında olduğum için kişisel bilgilerimi internette paylaşmamam gerektiğini bilirim" tüm sorular arasında en yüksek orana sahip her zaman seçeneği ile ön plana çıkmıştır. Öğrencilerin internet ortamında gezinirken özellikle kişisel verilerinin çalınabileceğinin farkında olmaları öğrencilerin paylaşım yaparken daha dikkatli davranacaklarına işaret etmektedir.

13. Soruda "bilgisayar, akıllı telefon, tablet gibi araçlarımı korumak için şifreler kullanabilirim" sorusuna karşılık öğrencilerin %73 (n=73) ü her zaman cevabını vermiştir. Öğrencilerin bu durumda internet ortamında gezinirken gizliliklerine dikkat ettikleri ve olası bilgi ve veri çalınmasının önüne geçmek için bu durumu her zaman kullandıkları görülmüştür.

## Sonuçlar ve Öneriler

Yapılan çalışmada alınan sonuçlara göre; ortaokul öğrencileri uzaktan eğitim yoluyla yapılan matematik derslerini faydalı bulmadıkları gözlemlenmiştir. Özellikle liselere giriş sınavlarına hazırlanan 8.Sınıf öğrencilerinin uzaktan eğitim ile yapılan matematik dersleri yerine geleneksel yöntemlerle anlatılan matematik derslerini tercih ettikleri görülmüştür.

Ortaokul öğrencilerinin yarısından çoğunun uzaktan eğitim yoluyla yapılan matematik derslerini sıkıcı buldukları gözlemlenmiştir. Özellikle ortaokula yeni başlayan öğrencilerin büyük çoğunluğunda bu durum daha belirgin şekilde görülmektedir. Bu durumun sonucu olarak öğrencilerin matematik problemlerini çözmekte zorlandıkları yanıtları çoğunlukta alınmıştır.

Yapılan çalışmada da ortaokul öğrencileri uzaktan eğitim ile matematik derslerinde konsantre olmakta güçlük çektiklerini belirtmişlerdir. Bu durum çevresel faktörlerin yansımasından kaynaklanabilir.

Dijital okuryazarlık kısmında ortaokul öğrencilerin vermiş oldukları cevapların sonucunda öğrencilerin çoğunluğunun temel düzeyde mevcut teknolojiyi kullanabildiği sonucuna varılmıştır. Öğrencilerin internet üzerinden aramış oldukları bilgileri ve belgeleri mevcut mobil cihazlarında arama yaparak bulabildiklerini belirtmişlerdir. Bu durum öğrencilerin istedikleri zaman merak ettikleri konularda araştırma yapabileceklerini ve bulmuş oldukları bilgilerin kontrolünü ve teyidini sağlayarak güvenilir bilgiye birçok öğrencinin ulaşabileceğine işaret etmektedir.

Araştırma neticesinde mevcut veriler doğrultusunda şu öneriler sunulmaktadır.

1. Matematik dersinde konu genişliği ve derinliği çok fazladır. Uzaktan eğitim yolu ile yapılacak matematik derslerinin konuları uzaktan eğitime uygun olacak şekilde yeniden düzenlenebilir. Böylelikle anlaşılması güç konularda konuların daha iyi kavranabilmesi için içerik uzaktan eğitime uygun hale getirilebilir.

2. Uzaktan eğitim ile matematik derslerine yönelik yeni programlar geliştirilerek, öğrencilerin ve öğretmenlerin daha kolay soru yazabilmesi ve cevap verebilmelerini kolaylaştıracak şekilde çözümler üretilebilir.

3. Öğrencilere okullarda sağlanacak bilgisayar kullanımı ile dijital okuryazarlık düzeylerinin arttırılmasına katkı sağlanabilir. Böyle maddi imkansızlıklar sebebiyle ortaya çıkabilecek bu problemin önüne geçilebilir. Okullardaki bilgisayar sayısı ve bilgisayar programlarının sayısında yapılacak güncellemeler öğrencilerin performanslarının artmasına olumlu katkı sağlayabilir.

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# Sınıf Öğretmeni Adaylarının Dijital Okumaya Yönelik Tutumlarının İncelenmesi

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## Öz

Bu araştırma sınıf öğretmenliği bölümünde öğrenim gören öğretmen adaylarının dijital okumaya yönelik tutumlarının belirlenmesini ve bu tutumlarının bazı değişkenler açısından incelenmesini amaçlamaktadır. Araştırma nicel araştırma desenlerinden tarama araştırmasıyla yürütülmüştür. Araştırma Atatürk Üniversitesi ve Adıyaman Üniversitesi Sınıf Öğretmenliği Bölümünde öğrenim gören 139 öğretmen adayıyla yürütülmüştür. Araştırmanın verileri, Kişisel Bilgi Formu ve Öğretmen Adayları İçin Dijital Okumaya Yönelik Tutum Ölçeği aracılığıyla toplanmıştır. Araştırmanın verileri betimleyici istatistiki veriler ve Anova testi ile çözümlenmiştir. Araştırma sonuçları öğretmen adaylarının dijital okuma ortalamalarının 5 puan üzerinden olmak üzere, dijital okuma özellikleri alt boyutunda ortalama 3,70 puan; dijital okuma tercihleri alt boyutunda ise ortalama 2,42 olduğunu göstermiştir. Ortalama dijital okuma tutumu puanlarının ise 3,24 olduğu belirlenmiştir. Öğretmen adaylarının dijital okumaya yönelik tutumlarının, dijital okumaya yönelik algılarına göre farklılaştığı belirlenmiştir. Araştırmanın verileri ışığında birtakım önerilerde bulunulmuştur.

**Anahtar Sözcükler**: dijital okuma, öğretmen adayı, okuma tutumu, İlk okuma yazma ve Türkçe eğitimi

## Giriş

Okuma; insan yaşamında doğal olmayan, ancak sonradan kazanılabilen, bireye bütün yaşamını etkileyebilecek nitelikte, sosyal, kültürel ve bilişsel alanlarda yeterlilik sağlayan oldukça karmaşık bir süreçtir (Keskin ve Akyol, 2014). Okuma, yazının anlamlandırılması ve seslendirilmesidir. Dolayısıyla bireyin yaşamının her alanında gerekli olan önemli bir beceridir. Okuma becerisinin okul yaşamının ilk yıllarından itibaren kritik bir role sahip olması, öğretmen ve ebeveynlere çocuklara olumlu bir okuma tutumu geliştirmeleri ve böylece iyi bir okuyucu olmaları noktasında önemli sorumluluklar yüklemektedir (Kocaarslan, 2016). Okuma, ilkokul 1. Sınıftan itibaren öğrenilen ve geliştirilen, yaşam boyu devam eden uzun bir süreci ifade etmektedir. Ancak harfleri seslendirme, okuma olarak düşünülemez. Yazının doğru, belirli bir akıcılıkta ve anlaşılır okunması gerçek anlamda okumayı ifade eder. Dahası, okunulan yazının doğru tonlamayla ve vurgulamayla okunması da, hem okuyan hem dinleyenler açısından önemlidir.

Çağımızda, basılı kaynaklar yerini büyük oranda dijital kaynaklara bırakmıştır. Dolayısıyla okuma da bu yönde evrilmiştir. Dijital araçlardan yapılan bu okuma da dijital okuma kavramını ortaya çıkarmıştır. Dijital okuma bilgisayar, televizyon, cep telefonu, tablet bilgisayar, e-kitap okuyucular, elektronik tabelalar, bilgi ekranları vb. gibi araçlardan yapılan okumalara denir. Bu okuma türünü e-okuma veya ekran okuma olarak isimlendiren çalışmalarda mevcuttur. Dijital okuma, bireyin dijital araçların ekranlarında sunulan bilgilerden yeni anlamlar oluşturduğu ve zihinde yapılandırdığı aktif bir süreçtir (Akkaya ve Çıvğın, 2020).

Bu süreç, yaşamın her alanında yer aldığı gibi eğitimde de yer almaktadır. Dijital okuma yapılabilecek birçok içerik geliştirilmiştir. Bu kapsamda geliştirilen dijital öykülerin, öğrencilerin okuma becerileri ve okuma davranışları üzerinde önemli etkiler bıraktığı ortaya konulmuştur (Odabaş, 2017; Şentürk Leylek, 2018; Çiftci, 2019).

Dijital okumaya ilişkin, üzerinde çalışmalar yürütülen bir grup da üniversite öğrencileridir. Odabaş vd. (2018) çalışmalarında üniversite öğrencilerinin dijital okuma eğilimlerini bazı değişkenler açısından ele almıştır. Daha özelde öğretmen adaylarını ele alan çalışmalar da mevcuttur. Erkan vd. (2015) çalışmalarında, öğretmen adaylarının yazılı ve dijital okuma alışkanlıklarının cinsiyet, anabilim dalı, yaş, kitaplığa sahip olma, bilgisayara sahip olma değişkenlerine göre farklılaştığını belirlenmiştir.

Öğretmen adaylarının dijital okuma davranışları, genel anlamda okumaya yönelik yaklaşımlarıyla ve ilgileriyle ilişkilidir. Bir araştırmada dijital okuma eğitimleri ile ilgileri arasında ilişki olduğu belirlenmiştir (Bulut ve Karasakaloğlu, 2019). Ayrıca dijital okuma yapmaları, dijital okumaya nasıl bir tutum geliştirdikleriyle de doğrudan ilişkilidir. Alan yazında farklı yaş gruplarından öğrencilerin yanı sıra öğretmen adaylarının da okuma yönelik tutumları, dijital okuryazarlıkları, dijital okuma düzeyleri üzerine çalışmalar bulunmaktadır. Öğretmen adayları özelinde dijital okumaya yönelik tutumlarını ele alan çalışmalar sınırlıdır. Geleceğin öğretmenleri olacak olan öğretmen adaylarının, çağın bir gerekliliği olan dijital okumaya nasıl yaklaştıklarının incelenmesi önemlidir. Bu nedenle, araştırmanın alan yazına bir katkı sunacağı düşünülmektedir.

### Araştırmanın Amacı

Bu araştırma sınıf öğretmenliği bölümünde öğrenim gören öğretmen adaylarının dijital okumaya yönelik tutumlarının belirlenmesini ve bu tutumlarının bazı değişkenler açısından incelenmesini amaçlamaktadır. Bu amaçla aşağıdaki sorulara yanıt aranmıştır:

1. Sınıf öğretmeni adaylarının dijital okumaya yönelik tutumları ne düzeydedir?

2. Sınıf öğretmeni adaylarının dijital okumaya yönelik tutumları sınıf düzeyi, dijital okumaya yönelik yeterlik algısı ve okuma alışkanlığı açısından anlamlı düzeyde farklılaşmakta mıdır?

## Yöntem

Öğretmen adaylarının dijital okumaya yönelik tutumlarını çeşitli değişkenler açısından incelemeyi amaçlayan bu araştırmada tarama modeli kullanılmıştır. Tarama deseni, geçmişte ya da hâlen var olan bir durumu etkilemeden var olduğu şekliyle betimlemeyi amaçlayan bir araştırma yaklaşımıdır (Karasar, 2009; Fraenkel ve Wallen, 2003).

### Örneklem

Araştırma, Atatürk Üniversitesi ve Adıyaman Üniversitesinin Sınıf Eğitimi Bölümünde öğrenim gören 139 öğretmen adayıyla yürütülmüştür. Öğretmen adayları, iki üniversitenin öğrencileri içerisinden amaçlı örnekleme yöntemlerinden "kolay ulaşılabilir durum örneklemesi" kullanılarak seçilmiştir. Kolay ulaşılabilir durum örneklemesi yöntemi, araştırmacıya hız ve pratiklik kazandırır. Çünkü bu yöntemde araştırmacı, yakın olan ve erişilmesi kolay olan bir durumu seçer (Yıldırım & Şimşek, 2008).
Öğretmen adaylarının 37'si 1. sınıf, 64'ü 2. sınıf, 24'ü 3. sınıf ve 14'ü 4. sınıftır.

### Veri Toplama

Araştırmanın verileri, Kişisel Bilgi Formu ve Öğretmen Adayları İçin Dijital Okumaya Yönelik Tutum Ölçeği (Yurdakal ve Susar Kırmızı, 2021) aracılığıyla toplanmıştır. Ölçek iki alt boyuttan oluşmaktadır: «Dijital okumanın özellikleri» ve «dijital okuma tercihleri». İlk boyut için Cronbach Alpha değeri ,87; ikinci boyut için ,62; ölçeğin toplamı için ise ,79 olarak hesaplanmıştır. Örnek maddeler aşağıdaki gibidir:
Dijital okuma sayesinde dünyanın her yerinden bilgiye erişebilirim (1. Boyut)
Dijital okumayı, uzun süreli okumalarda tercih etmem (2. Boyut)

### Verilerin Çözümlenmesi

Araştırma sorularını yanıtlamadan önce veriler gözden geçirilmiş, uç değer analizi yapılmıştır. Ayrıca normallik testleri ile değişkenler açısından varyansların homojenliğine analizler yapılmıştır. Verilerin normal dağıldığı ve varyansların homojen olduğuna karar verilmiştir.

Araştırma sorularını yanıtlamak için veriler, betimleyici istatistiki teknikler ve tek yönlü varyans analizi (ANOVA) ile çözümlenmiştir.

## Bulgular

Öğretmen adaylarının dijital okumaya yönelik ortalama tutum puanları ile alt boyutlara ilişkin puan ortalamaları Tablo 1'de sunulmuştur.

Tablo 1. Öğretmen Adaylarının dijital okumaya yönelik tutum puan ortalamaları.

| Boyut | Ortalama |
|---|---|
| Dijital Okumanın Özellikleri | 3,70 |
| Dijital Okuma Tercihleri | 2,42 |
| Ortalama Tutum | 3,24 |

Tablo 1 incelendiğinde, öğretmen adaylarının dijital okuma tutumu puanlarının «Dijital okumanın özellikleri» boyutunda 3,70 ve en yüksek ortalamaya sahip olduğu; «dijital okuma tercihleri» boyutunda ise 2,42 ortalama ile diğer boyuta oranla oldukça düşük olduğu görülmektedir. Ölçüt değerlere göre ilk boyutun yüksek düzeyde tutumu, ikinci boyutun orta düzeyde tutumu gösterdiği söylenebilir. Ortalamanın ise orta düzeyde tutumu gösterdiği görülmektedir.

Öğretmen adaylarının dijital okumaya yönelik tutumlarının sınıf düzeylerine göre farklılaşıp farklılaşmadığını belirlemek üzere yapılan tek yönlü varyans analizi sonuçları Tablo 2'de sunulmuştur.

Tablo 2. Dijital okumaya yönelik tutum puanlarının sınıf düzeyi değişkenine göre karşılaştırılması.

| | | Kareler Toplamı | Sd | Kareler Ortalaması | F | p |
|---|---|---|---|---|---|---|
| Dijital Okumanın Özellikleri | Gruplar Arası | 0,226 | 3 | 0,075 | | |
| | Gruplar İçi | 41,039 | 135 | 0,304 | 0,248 | ,86 |
| | Toplam | 41,265 | 138 | | | |
| Dijital Okuma Tercihleri | Gruplar Arası | 0,590 | 3 | 0,197 | | |
| | Gruplar İçi | 35,497 | 135 | 0,263 | 0,748 | ,52 |
| | Toplam | 36,087 | 138 | | | |
| Ortalama | Gruplar Arası | 0,304 | 3 | 0,101 | | |
| | Gruplar İçi | 20,982 | 135 | 0,155 | 0,653 | ,58 |
| | Toplam | 21,287 | 138 | | | |

Tablo 2 incelendiğinde, öğretmen adaylarının dijital okumaya yönelik tutumlarının sınıf düzeyi değişkeni açısından, hiçbir boyutta gruplar arası farklılaşmadığı görülmektedir.

Öğretmen adaylarının dijital okumaya yönelik tutumlarının dijital okuma yeterlik algısına göre farklılaşıp farklılaşmadığını belirlemek üzere yapılan tek yönlü varyans analizi sonuçları Tablo 3'te sunulmuştur.

Tablo 3. Dijital okumaya yönelik tutum puanlarının dijital okuma yeterlik algısı değişkenine göre karşılaştırılması.

| | | Kareler Toplamı | Sd | Kareler Ortalaması | F | p |
|---|---|---|---|---|---|---|
| Dijital Okumanın Özellikleri | Gruplar Arası | 3,155 | 3 | 1,052 | | |
| | Gruplar İçi | 38,110 | 135 | 0,282 | 3,72 | ,013 |
| | Toplam | 41,265 | 138 | | | |
| Dijital Okuma Tercihleri | Gruplar Arası | 1,429 | 3 | 0,476 | | |
| | Gruplar İçi | 34,658 | 135 | 0,257 | 1,85 | ,140 |
| | Toplam | 36,087 | 138 | | | |
| Ortalama | Gruplar Arası | 2,386 | 3 | 0,795 | | |
| | Gruplar İçi | 18,901 | 135 | 0,140 | 5,68 | ,001 |
| | Toplam | 21,287 | 138 | | | |

Tablo 3'te görüldüğü üzere, öğretmen adaylarının dijital okumaya yönelik tutumları, «Dijital Okumanın Özellikleri» boyutu ve ortalama tutum açısından anlamlı düzeyde farklılaşmaktadır.

Farklılaşmanın hangi gruplar lehine olduğunu belirlemek üzere, yapılan çoklu karşılaştırma testi (Gabriel Testi) sonucuna göre:

1. Dijital Okumanın Özellikleri boyutunda, Dijital okuma yeterliğini «İyi» ve «az» düzeyde algılayan kişiler arasında, «iyi» düzeydekiler lehine;

2. Ortalama Tutumda ise, dijital okuma yeterliğini «iyi», «az» ve «kötü» düzeyde algılayanlar arasında, «iyi» düzeydekiler lehine farklılaşmaktadır.

Öğretmen adaylarının dijital okumaya yönelik tutumlarının okuma alışkanlığına göre farklılaşıp farklılaşmadığını belirlemek üzere yapılan tek yönlü varyans analizi sonuçları Tablo 4'te sunulmuştur.

Tablo 4. Dijital okumaya yönelik tutum puanlarının okuma alışkanlığı değişkenine göre karşılaştırılması

|  |  | Kareler Toplamı | Sd | Kareler Ortalaması | F | p |
|---|---|---|---|---|---|---|
| Dijital Okumanın Özellikleri | Gruplar Arası | 1,398 | 3 | 0,466 | | |
| | Gruplar İçi | 39,867 | 135 | 0,295 | 1,57 | ,197 |
| | Toplam | 41,265 | 138 | | | |
| Dijital Okuma Tercihleri | Gruplar Arası | 1,537 | 3 | 0,512 | | |
| | Gruplar İçi | 34,550 | 135 | 0,256 | 2,00 | ,137 |
| | Toplam | 36,087 | 138 | | | |
| Ortalama | Gruplar Arası | 0,264 | 3 | 0,088 | | |
| | Gruplar İçi | 21,022 | 135 | 0,156 | 0,56 | ,638 |
| | Toplam | 21,287 | 138 | | | |

Tablo 4'te görüldüğü üzere, öğretmen adaylarının dijital okuma tutumu boyutları ve ortalama puanı, okuma alışkanlığına göre anlamlı düzeyde farklılaşmamaktadır.

## Sonuç ve Tartışma

Araştırmada sınıf öğretmeni adaylarının dijital okumaya yönelik tutumları hem betimlenmiş hem de bazı değişkenler açısından ele alınmıştır. Araştırmanın sonuçları, öğretmen adaylarının «Dijital okumanın özellikleri» boyutunda yüksek bir tutuma; «dijital okuma tercihleri» boyutunda orta düzeyde bir tutuma sahip olduğunu ortaya koymuştur. Ölçeğin tamamı açısından ise, orta düzeyde bir tutuma sahip olduklarını ortaya koymuştur. Dijital okuma tutumu puan ortalaması 3,24 olarak hesaplanmış olup, toplam olarak 64,8 puana (100 üzerinden) karşılık gelmektedir. Dedeoğlu ve Ulusoy (2013) çalışmalarında sınıf öğretmeni adaylarının okuma tutumunu ortalama 68,48 olarak hesaplamış olup, bu çalışmanın bulgularıyla benzerlik göstermektedir. Temizkan ve Sallabaş (2008)'ın çalışmasında da dört farklı bölümden öğretmen adaylarının okumaya yönelik tutumları incelenmiş ve genel olarak yüksek bir tutuma sahip oldukları belirlenmiştir. Dolayısıyla bu çalışmadan elde edilen sonuçlardan farklı bir sonuç elde edildiği söylenebilir.

Araştırma sonucunda, öğretmen adaylarının dijital okumaya yönelik tutumları bazı değişkenler açısından da ele alınmıştır. Sınıf düzeyi açısından, dijital okuma tutumlarının anlamlı düzeyde farklılaşmadığı belirlenmiştir. Dolayısıyla, dört yıllık eğitim sürecinin dijital okumaya yönelik tutumu etkilemediği söylenebilir. Dedeoğlu ve Ulusoy (2013) çalışmalarında birinci sınıf öğrencilerinin dördüncü sınıflara oranla daha yüksek bir tutuma sahip olduklarını belirtmişlerdir. Yine Çıvğın (2020)'nin çalışmasında da öğretmen adaylarının dijital okumaya yönelik öz yeterliklerinin sınıf düzeyine göre farklılaştığı belirlenmiştir. Dolayısıyla bu iki çalışmanın bulgularının, bu araştırmanın sonuçlarıyla aykırılık gösterdiği söylenebilir. Araştırma sonucunda yine dijital okuma tutumunun okuma alışkanlığına/ davranışına göre de farklılaşmadığı belirlenmiştir.

Ancak araştırmada dijital okuma tutumunun, dijital okuma yeterliğine göre hem «Dijital okumanın özellikleri» boyutunda hem de ölçeğin toplamında farklılaştığı görülmüştür. Bu farklılaşmaların okuma yeterliğini iyi düzeyde algılayanlar lehine olduğu belirlenmiştir. Dolayısıyla, okumaya yönelik yeterlik algısının okuma tutumunu etkileyen bir etken olduğu söylenebilir.

### Sınırlıklar ve Öneriler

▶ Araştırma nispeten küçük bir örneklem grubu üzerinde yürütülmüştür. Daha büyük bir örneklemle yürütülecek bir araştırma daha sağlıklı sonuçlar verebilir.

▶ Araştırmaya iki farklı üniversitede öğrenim gören öğretmen adayları dahil edilmiştir. Farklı üniversitelerden ve bölümlerden öğretmen adaylarının da dahil edilmesi daha genellenebilir sonuçlar verebilir.

▶ Bulgulara göre, öğretmen adaylarının dijital okumaya yönelik tutumlarını, dolayısıyla okumalarını etkileyen etmen, kendilerini yeterli hissetmeleridir. Bu nedenle, bu alana ilişkin becerilerin sistemli bir eğitim süreciyle verilmesi yararlı olacaktır. Dijital okuryazarlık gibi bir dersle, dijital okuma becerileri etkin bir şekilde kazandırılabilir.

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# Müzik Eğitiminde Sanal Sınıfın Kullanımı Ve Uygulama Alanları

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## Özet

Günümüz koşullarında teknolojinin gelişmesi sanal sınıfın eğitim sistemindeki önemini göstermiştir. Eğitim sistemi içerisinde birçok disiplinde kullanılan sanal sınıf, müzik eğitiminde de varlığını sürdürmektedir. Ancak, özellikle pandemi sürecinde zorunlu uzaktan eğitim kapsamında uygulanan sanal sınıfın müzik eğitimindeki yeri ve kullanımı belirsizliğini korumaktadır. Bu nedenle, bu çalışma müzik eğitiminde sanal sınıfların kullanımını ve uygulama alanlarını ortaya koymayı amaçlamaktadır. Literatür taraması kapsamında elde edilen verilerin analizi sonucunda çalışmaların öğretmen, öğrenci, müzikal etkinlikler ve müzik eğitimi olmak üzere 4 tema altında toplandığı görülmüştür. Elde edilen bulgulara göre sanal sınıfın öğrenciler üzerinde hem müzik eğitimine hem aile içi iletişime olumlu etkisinin olduğu görülmüştür. Sonuç olarak sanal sınıfların etkin kullanımı için öğrencilerin ve öğretmenlerin teknoloji konusunda desteklenmeleri ve günümüz koşullarında da sanal sınıfın müzik eğitimine ve eğitim sistemine entegre edilmesinin gerekliliği sonucuna varılmıştır.

**Anahtar Sözcükler**: Virtual classroom, music education, education, distance learning.

# Giriş

Günümüzde sağlık, tarım, sanayi gibi yaşamının birçok alanında kullanılan teknoloji eğitim alanında da kendini göstermektedir. Eğitim alanında ortaya çıkan teknolojik gelişmeler eğitim sistemlerinin sorgulanmasını, değiştirilmesini, işlevsel çözüm yollarının oluşturulmasını zorunlu hale getirmiştir. Özellikle bilgisayar, internet ve mobil cihaz teknolojileri, eğitimi doğrudan etkileyen önemli unsurlardan olmuştur. Bu bağlamda, geleneksel eğitime alternatif olarak görülen "uzaktan eğitim" yöntemi teknolojinin gelişimiyle işlevselliğini artırmıştır. Uzaktan eğitim geleneksel eğitime ihtiyaç duyan fakat geleneksel sistemin gerektirdiği şartları sağlayamayan bireyler için bir fırsat olarak değerlendirilmektedir (Can ve Yungul, 2017). Uzaktan eğitim farklı içeriklerle ve programlarla bağımsız ve bireysel öğrenmeyi sağlama, daha fazla uzmandan yararlanma gibi birçok avantajı da beraberinde sunmaktadır (Avcı, 2020).

Uzaktan eğitimde öğrencilerin derse katılabilmeleri "sanal sınıf" ile mümkündür. Sanal ortamda "sınıf" atmosferinin oluşabilmesi için bir yazılıma ihtiyaç duyulmaktadır. Bu yazılım sayesinde sanal sınıf ortamı oluşturularak ders süreci başlatılabilir. Sanal sınıflar öğretmenin ve öğrencinin görsel, işitsel, metin tabanlı sohbet, anında veri toplama, sınav yapma gibi yazılım araçlarını kullanarak senkron modelde iletişim kurmasında köprü görevi gören çevrimiçi ortamlardır. Bu ortamlarda tüm katılımcılar birbirleriyle karşılıklı konuşabilir, kullanmakta oldukları bilgisayar ya da mobil cihaz ile web kamerası üzerinden birbirlerini görebilir, sanal sınıf içerisinde oluşturulan ara odalarda birlikte çalışabilirler. Uzaktan eğitim sisteminin çok önemli bir bileşeni haline gelen sanal sınıflar öğrenme, öğretme odaklı kullanımın dışında; hizmetiçi eğitim, seminer verme, etkileşimli laboratuar uygulamaları, simülasyonlar, çeşitli yazılımların tanıtımları, video konferans, çevrimiçi danışmanlık gibi pek çok farklı alanda ve akademik disiplin içerisinde kullanılmaktadır. Bu disiplinlerden biri de müzik eğitimidir.

Uzaktan müzik eğitimi ile ilgili ülkemizde yapılan çalışmalara bakıldığında ilk çalışmanın 1975 yılında Edip Günay ve Ali Uçan tarafından "Mektupla Keman Öğretimi" metodu olduğu görülmektedir. Televizyon uygulamalarında Muammer Sun'un çocuklar için TRT'deki müzik eğitim programları uzaktan müzik eğitiminin ilk örneklerindendir (Sağer, Eden ve Şallıel, 2014). Bilgisayar ve internet teknolojilerinin gelişmesi ile de günümüzdeki formuna ulaşmıştır. Müzik eğitimi sadece performansa dayalı bir disiplin değil, aynı zamanda müzik teorisi, müzik tarihi gibi derslerin de içerisinde olduğu bir alandır. Bu ders içeriklerinin dijitalize edilerek uzaktan eğitim dahilinde kullanışlı hale getirilmesi ve uygulanması önemlidir. Kaschub (2020), uzaktan eğitimde öğretmenleri müfredatı gözden geçirmeye ve yüz yüze etkinlikleri uzaktan eğitim projelerine dönüştürmeye teşvik ederek müzik öğretmenlerinin teknolojik bilgilerinin ve öğrencilerin dijital müzik yapma becerilerinin geliştirilmesi gerekliliğine dikkat çekmiştir.

Ülkemizde müzik eğitiminde sanal sınıf ile ilgili çalışmaların formal eğitim içerisinde sadece pandemi döneminde uygulandığı ve bu süreç dışında akademik çalışmalar kapsamında olduğu görülmektedir. Dünya geneline bakıldığında Berklee College of Music, Hochschule für Musik und Theater Hamburg, Sydney Konservatuvarı ve

Melbourne Konservatuvarı gibi kurumların enstrüman eğitimi, müzik tarihi, müzik teorisi ve armoni gibi alanlarda sanal sınıfı kullandığı bilinmektedir.

Yapılan çalışmalar sanal sınıfın sağladığı olumlu yönleri ile birlikte olumsuzluk yaratan ve geliştirilmesi gereken yönlerini de ortaya koymaya başlamıştır. Bilginin anlık erişilebilir olması, zamanının tasarruflu kullanımı, materyal paylaşımının kolaylığı gibi birçok avantajı olsa da bireylerin asosyal bir yaşam sürmesi, ekran karşısında odaklanamama ve sınıf içi etkileşimden uzak kalarak tek başına çalışma eylemini sürdürmekte zorlanması sanal sınıfın geliştirilmesi gereken yönleri olarak ifade edilebilir. Ayrıca teknolojik kaynaklı yetersizliklerin geliştirilmesi de sanal sınıf için önemlidir. Çevik Kılıç ve Güven (2022) yapmış oldukları çalışmada, sesin karşı tarafa iletilmesinde karşılaşılan sorunların ders işleyişini olumsuz etkilediğini ifade etmişlerdir.

Sanal sınıf bireylerin aynı zaman diliminde, farklı mekânlarda, bir öğretmen öncülüğünde interaktif iletişim gerçekleştirdikleri çevrimiçi öğrenme ortamıdır (Clark & Kwinn, 2007; Kaya, 2011, s.87). Başka bir ifade ile yazılımlar aracılığıyla eş zamanlı (senkron) olarak en az iki kişinin karşılıklı etkileşime geçtiği sanal ortamlar şeklinde tanımlandığı görülmektedir (Can, 2020, s.252-253). Sanal sınıfın anlık veri paylaşımı, istenilen mekandan sanal sınıfa katılım gibi birçok avantajı vardır. Lugrin vd. (2016) sanal sınıf ortamlarının kullanışlı ve geri bildirime imkan tanıyacak şekilde tasarlanmasının önemli olduğunu ifade etmişlerdir. Sanal sınıf uygulamaları, etkili bir şekilde geri bildirim olanağı ile ailelerin çocuklarının eğitim yaşantısına katılımları (Can, 2020), sanal derslerin eğitim ve ulaşım maliyetlerinin düşük olması (Liu, Lomovtseva & Korobeynikova, 2020), kendini ifade etmekte zorlanan içe dönük öğrencilerin derslere katılımına olanak sağlaması (Mills, 1996) bakımından önemlidir.

*Tablo 1 Sanal Sınıfın Kullanım Alanları*
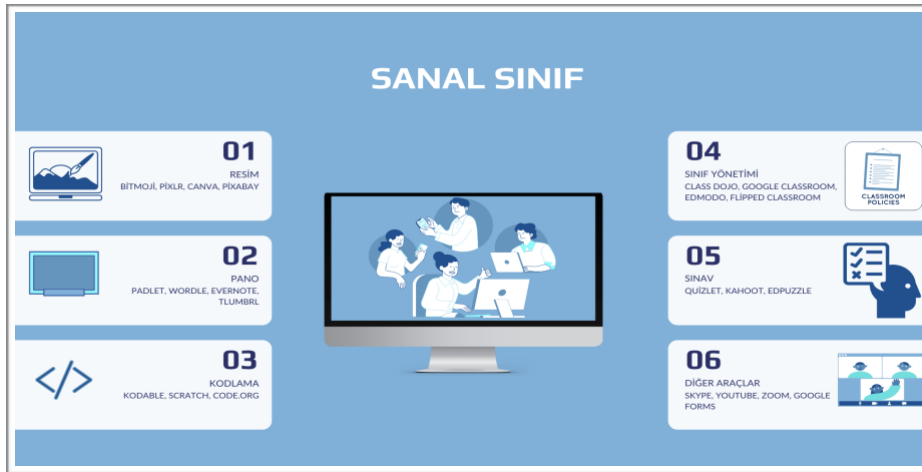


Sanal sınıf birçok uygulama ile farklı disiplinlerde uygulanabilir. Ders anlatımı, ölçme değerlendirme, not tutma, materyal üretme, kodlama ile anlatabilme gibi özellikleri ile işlevsel bir eğitim ortamı olarak tanımlanabilir. Bu uygulamalar materyal paylaşımı ve erişimi bakımından kolaylık sağlamakla birlikte uygulamaların desteği ile özellikle ders içeriği hazırlanmasında, sınavların yapılmasında ve not tutmada oldukça önemlidir. Tüm bu özelliklerin işlevsel kullanılması, uygulamaların planlanarak ders sürecine dahil edilmesi niteliği etkilemektedir. Sanal sınıfı başarıya ulaştıracak en önemli unsurlardan biri, hiç kuşkusuz, dijital ders materyalleridir. Ders materyalleri uygulamalar üzerinden paylaşılarak ve karşılıklı geri bildirim ile sanal sınıf ortamı interaktif bir alana dönüştürülebilir. Bu interaktif alanda öğretmenlerin dijital eğitim sistemine olumlu yönde katkı vermelerinin sanal sınıftaki ders niteliği bakımından önemli olduğu söylenebilir. Bu nedenle, öğretmen yetiştiren kurumların (eğitim fakülteleri) dijital eğitime uygun içerik üretmeye dönük dersleri programa alması önemli görülmektedir (Altunel, 2020). Yılmaz (2020) öğretmenlerin en çok materyal ve eğitsel etkinlik oluşturma ve bunları uygulama konusunda kendilerini geliştirme gereksinimleri olduğunu belirtmektedir.

*Tablo 2 Sanal Sınıf Yönetimi*
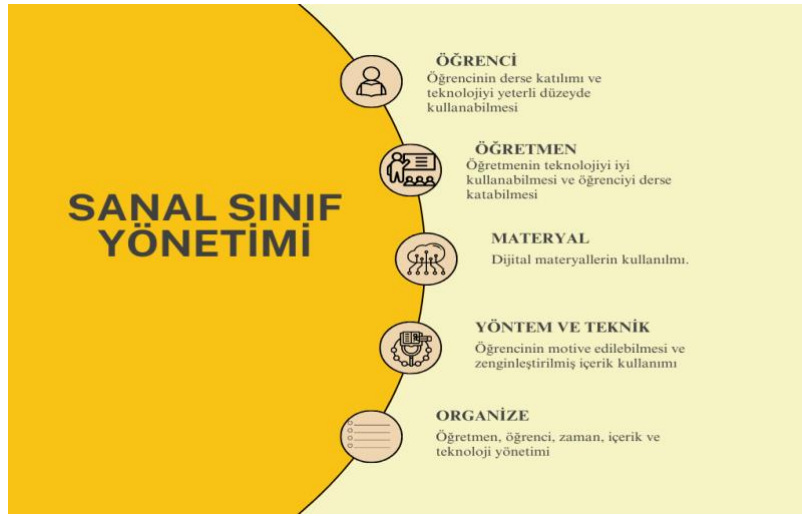


Geleneksel sınıf yönetiminde olduğu gibi, sanal sınıfın da belirli kurallarının olması ve bu kuralların uygulanması gerekmektedir (Kaya, 2011). Teknolojinin organize edilmesi, dersin işlenişi, öğretim yöntem ve stratejilerinin organize edilmesi, öğrencinin ilgisinin sağlanması gibi birçok değişken sanal sınıf yönetimine girmektedir. Sanal sınıf yönetiminde sınıf içi etkileşimi sağlamak nitelikli bir eğitim için gereken önemli etkenlerden birisidir. Bu etkileşim dersin dinamiğini artırmak ve öğrencinin ilgisini derse katabilmek amacıyla verimli olmalıdır. Bu bağlamda sanal sınıf içerisinde de olsa güveni inşa edip kapsayıcı, teşvik edici bir öğrenme ortamı oluşturmak öğretmene aittir (Franklin & Harrington, 2019, s.10). En önemli kısım ise tüm bu işleyişlerin ders süresi boyunca planlanabilmesidir. (Can ve Gündüz, 2021). Sanal sınıf ortamında ders süreci içerisinde öğrencilerin ve öğretmenlerin karşılıklı bilgi alışverişlerinin anlam kazandığı, kendilerini sosyal bir topluluğun bir parçası olarak daha verimli hissettikleri ve aynı zamanda sınıf içi geri dönütlerle motivasyonlarının arttığı yapılan çalışmalarda görülmektedir (Martin, Parker & Doye, 2011). Öğretmenlerin sanal sınıfta yaşadıkları yoklama alma, internet altyapısından kaynaklı derse zamanında başlayamama, teknolojik cihaz veya yazılım sorunları, ders saatinin verimli kullanılamaması gibi problemler sanal sınıf yönetiminde öğretmenin ders işleyişini etkilemektedir (Arslan ve Şumuer, 2020).

Öğretmenler sanal sınıfın avantajlarını kullanarak anlık ya da ders sonrası materyal paylaşımı yaparak öğrenme sürecine katkıda bulunabilirler. Sanal sınıfın avantajlarına rağmen ses ve görüntü paylaşımı gibi teknik unsurlar sanal sınıfta müzik eğitiminin niteliğini etkileyebilmektedir. Bunun başlıca sebepleri internet altyapısının çalgı eğitimi, orkestra, koro gibi dersler için yeterli olmaması, öğretmenlerin ve öğrencilerin müzik eğitimi teknolojisini tam anlamıyla kullanamaması olarak ifade edilebilir (Yücetoker, 2020). İstikrarlı bir internet bağlantısı olmadan, sanal sınıflarda işitsel, görsel gecikmeler ve öğrenmeyi engelleyebilecek diğer sorunlar yaşanabilir. Sadece teknik açıdan yaşanabilecek aksaklıklar değil, eğitim odaklı problemler de yaşanabilmektedir. Öğretmenlerin çevrimiçi öğretim için gerekli yazılım ve araçları etkili bir şekilde kullanabilmeleri, belirli bir düzeyde teknik yeterliliğe sahip olmaları, eğer yeterliliğe sahip değiller ise desteklenmeleri gerekmektedir. Atasoy (2023) yapmış olduğu çalışmasında, müzik öğretmenlerinin teknolojiyi yeterli düzeyde kullanabilmelerinin kurum içi desteğe, hizmet içi eğitime bağlı olduğu sonucuna ulaşmıştır.

Müzik eğitiminde teori ve kompozisyon derslerinin müzik yazılım programları ile sanal sınıfta uygulanması mümkündür. Temel müzik yazı ve ögelerinin ayırt edilmesini, temel hız ve gürlük basamaklarının öğretimini desteklediği düşünülen; The Rhythm Trainer, Classics For Kids, Music Theory Academy, Music Tech Teacher, Music Fun, Music Play Online, Ouia, Mr.Q's Music, Gmajormusictheory, Teoria isimli uygulamalar mevcuttur. Özdemir ve Yıldız (2017) yapmış oldukları çalışmada müzik öğretmeni adayları ders içeriklerinin teknoloji ile desteklenmesinin hem bireysel hem de mesleki olarak katkı sağladığını ifade etmişlerdir. Birçok disiplin birbiri ile etkileşime girerek, bilgi alışverişi yaparak farklı kaynaklara ulaşmaktadır. Özer ve Demirbatır'ın (2023) yaptıkları steam tabanlı çalışmada Chrome Music Lab, Scratch Music, Groove Pizza, Earsketch, Upısketch ve İmusica uygulamaları ile öğrencilerin müzik öğrenimini daha keyifli ve kalıcı hale getirdiği görülmüştür.

Çalışmaların genelinde ortaya çıkan sonuçlarda sanal sınıf için yapılandırılmış müzik dersi müfredatı, seslerin net iletilmesi ve öğretmenlerin teknolojiyi kullanma durumları ders işleyişini etkileyen önemli unsurların başında gelmektedir. Teknoloji gelişmeye devam ettikçe ve çevrimiçi eğitimin kullanımı arttıkça, sanal sınıflar ülkemiz müzik eğitiminde giderek daha önemli bir rol oynayabilir. Geleneksel eğitimde müzik öğretmeni için ders materyalinin niteliği ve paylaşımı önemlidir. Benzer durum sanal sınıf içinde geçerlidir. Sanal sınıfın geleneksel eğitime göre bu konudaki farkı, materyale ders içerisindeki herkesin anlık erişebilmesidir. Bu bağlamda google classroom, edmodo gibi uygulamalarla sanal kütüphaneler oluşturulabilir ya da pandemi döneminde de tüm dünyada kullanılan "İMSLP" gibi dijital müzik nota arşiv sitelerinden faydalanılabilir (Mawarni & Handayaningrum, 2022).

Sanal sınıf kapsamında farklı alanlarda yapılmış birçok çalışma mevcuttur. Ancak spesifik olarak covid-19 dönemi ve sonrasında müzik eğitiminde sanal sınıfın mevcut durumu, yapılan çalışmaların alana olan katkısı net bilinmemektedir. Buradan yola çıkarak; Müzik eğitiminde sanal sınıfın kullanımı ve uygulama alanlarının ne olduğu çalışmanın problemini oluşturmaktadır. Araştırmanın amacı günümüz koşullarında müzik eğitiminde sanal sınıfın mevcut durumunun incelenmesidir. Bu amaç doğrultusunda müzik eğitiminde öğretmenlerin ve öğrencilerin yaşamış oldukları sanal sınıf deneyimleri ile birlikte enstrüman ve müzik eğitiminde sanal sınıfın katkısının ortaya konulması hedeflenmektedir.

## Methodology

Bu araştırmada, yöntem olarak geleneksel alanyazın taraması benimsenmiştir. Geleneksel alanyazın taraması çalışmalarında; ilgili alanyazında dağınık bir biçimde bulunan bilgi bir bütün olarak ele alınıp, tartışılan konular arasında bir bağ kurulur ya da bir senteze ulaşılır (Baumeister & Leary, 1997). Bu doğrultuda sanal sınıfın müzik eğitimindeki kullanım alanlarını ve yapılan çalışmaların ne yönde ağırlık kazandığını öğrenmek amacıyla akademik çalışmalar incelenmiştir. İncelenen çalışmalar 2020- 2023 yılları arasında sınırlandırılmıştır. Bunun başlıca sebebi ise 2020 yılında covid-19 sebebiyle özellikle örgün eğitimde tüm dünyada sanal sınıfın kullanılmaya başlanmasıdır.

## Results

Bu araştırmada sanal sınıfın müzik eğitimindeki kullanım alanlarını ve yapılan çalışmaların ne yönde ağırlık kazandığını öğrenmek amacıyla akademik çalışmalar incelenmiştir. Tablo 3'te görüldüğü üzere inceleme sonucunda çalışmaların öğretmen, öğrenci, müzikal etkinlikler ve müzik eğitimi olmak üzere 4 temada toplandığı tespit edilmiştir.

*Tablo 3 Temalar*

| TEMA | ÇALIŞMALAR |
|---|---|
| Öğretmen | *Rolandson ve Hekkel (2022), İsmail, Anuar ve Loo (2022), Rautiainen (2023).* |
| Öğrenci | *Bucura (2021), Beirnes (2022).* |
| Müzikal Etkinlikler | *Telhi (2020), Kusuma (2020), Levstek, Barnby, Pocock ve Banerjee (2021), Afifah, Milyartini ve Sukmayadi (2021), Boyacıoğlu (2020), Güdek, Sezgin ve Akmanoğlu (2022), Son, Yang, Lee ve Kim (2023).* |
| Müzik Eğitimi | *Gil, Cuevo ve Bonastre (2022), Kristiandri, Dewi, Sarjoko, Winarko ve Suwahyono (2021), Kuyumcu (2022), Cabezas ve Arcos, (2022), Zhang (2022), Ünal,(2022), Fick ve Tegart (2022), Wengs Si, Sequeira, Fernando, Manve Cheng (2022).* |

Öğretmen teması altında toplanan çalışmalarda, müzik öğretmenlerinin mesleki gelişimlerinin desteklenmesi için sanal sınıfın kullanıldığı tespit edilmiştir. Öğrenci temasında ise, öğrencilerin sanat yolu ile kendilerini ifade edebilmelerinin önemli olduğu, sanal sınıf ortamında daha özgüvenli oldukları görülmüştür. Ayrıca aile ve çocuk arasındaki ilişkinin daha sağlam temellere oturduğu, çocukların müzik sayesinde teknolojiye karşı olan tutumlarının öğrenme odaklı değiştiği tespit edilmiştir. Müzikal etkinlikler temasında, sanal sınıf ortamındaki konserlerin sayısında artış olmuştur. Ayrıca kazancını müzikten sağlayan insanlar için sanal konserlerin gelir kaynağı haline geldiği görülmüştür. Özellikle pandemi döneminde gerçekleştirilmiş olan sanal konserlerin maliyet açısından sağladığı avantajlar sebebiyle popüler hale geldiği ve pandemi sürecinden sonra da sanal konser etkinliklerinin devam ettiği tespit edilmiştir. Müzik eğitimi temasında ise müfredatın sanal sınıfta kullanılmasına yönelik revize edilmesinin gerekliliği ve nota yazımı, ritim öğretimi gibi mevcut uygulamaların müzik eğitimine dahil edilmesinin önemli olduğu belirlenmiştir.

*Tablo 4 Çalışmalar*
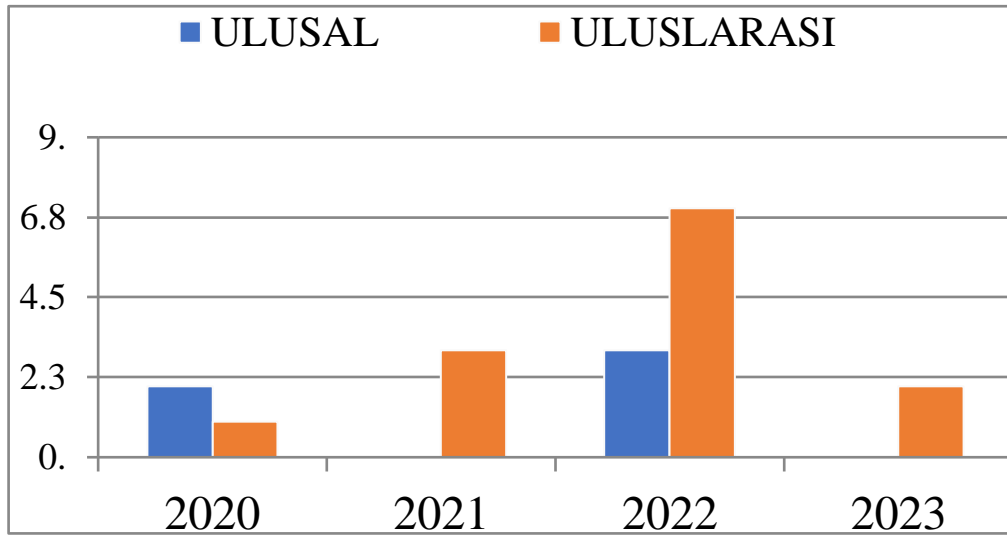


Tablo 4'de görüldüğü üzere toplam 18 çalışmaya ulaşılmıştır. Elde edilen verilere göre çalışmaların %55,6 ile en çok 2022 yılına, %11,1 ile de en az 2023 yılına ait olduğu görülmektedir. Analiz sonucundaki verilere göre %66,7'nin uluslararası çalışmalara ait olduğu %33,3'ünün ise ulusal çalışmalara ait olduğu görülmektedir. Yapılan literatür taramasında, 2020 yılında 2 tanesi ulusal 1 tanesi uluslarası olmak üzere toplam 3, 2021 yılında 3 tanesi uluslarası olmak üzere toplam 3, 2022 yılında 3 tanesi ulusal, 7 tanesi uluslarası olmak üzere toplam 10, 2023 yılında ise sadece uluslarası 2 tane çalışmaya ulaşılmıştır. Elde edilen veriler ışığında internet hızı, bilgisayar, ses sistemi, mobil cihazlar gibi teknolojik unsurların sanal sınıftaki önemi vurgulanmıştır. Bu unsurların uyum içerisinde çalışması müzik eğitiminde sanal sınıf ortamının niteliğini artırarak öğrenmeyi olumlu yönde etkileyecektir. Bu işleyişin önemli bir parçası da öğretmenin teknolojiyi yeterli seviyede kullanabilmesidir. Geleneksel bir sınıf içerisinde müzik dersinde nota öğretimi için dizekli tahtaya, enstrüman eğitimi için bir çalışma odasına, lisans seviyesinde müzik teknolojilerinin öğretimi için nota yazım programına ve diğer aksamlara ihtiyaç olması ne kadar normal ise nitelikli bir sanal sınıf eğitimi için de gerekli koşulların karşılanması bir o kadar normal ve gereklidir (Arslan ve Şumuer, 2020).

## Conclusions

Sanal sınıfın müzik eğitimindeki kullanım alanlarının ve yapılan çalışmaların ne yönde ağırlık kazandığını öğrenmek amacıyla incelenen akademik çalışmalar sonucunda elde edilen bulgular öğretmen, öğrenci, müzikal etkinlikler ve müzik eğitimi olmak üzere 4 tema altında toplanmıştır. Öğretmen teması altında araştırmanın sonuçlarına göre müzik öğretmenlerinin teknolojiyi iyi seviyede kullanamadıkları, yeterli teknolojik donanıma sahip olmadıkları ve öğretmenlerin teknoloji kullanma konusunda desteğe ihtiyaç duydukları belirlenmiştir. Rolandson &Hekkel (2022) yaptıkları çalışmada yeterli imkana sahip olmayan kırsaldaki müzik öğretmenlerine teknolojiyi anlamaları ve ders içerisine aktarım yapabilmeleri için destek verildiğinde öğretmenlerin kendilerini

geliştirerek nitelikli bir eğitim ortamı hazırladıkları sonucuna ulaşmışlardır. Bilginin sürekli güncellendiği dünyada öğretmenlerin teknolojiyi yeterli düzeyde kullanamamaları öğrencilerin eğitim süreçlerini olumsuz etkilemektedir. Bu bağlamda öğretmenlerin teknoloji desteği ile nitelikli eğitimi sürdürebilmelerinin önemi ortaya çıkmaktadır (Usta, Güntepe ve Durukan, 2020).

Öğrenci temasına göre; öğrencilerin özellikle pandemi döneminde sosyal ortamlarının kısıtlandığı, öz güvenlerinin azaldığı sonucu ortaya çıkmıştır. Ayrıca geleneksel eğitim içerisinde topluluk arasında konuşmaktan, söz almaktan kaçınan öğrencilerin sanal konserde konfor alanlarında oldukları için daha özgüvenli oldukları ve iyi performans sergiledikleri görülmüştür. Yılmazsoy, Özdinç ve Kahraman (2018) çalışmalarında, çekingen yapıdaki öğrencilerin, sanal sınıf ortamında kendilerini rahat hissettiklerini ve derse aktif katılım sağlayarak başarı durumlarını artırdıklarını ifade etmişlerdir.

Müzikal etkinlik temasına göre; pandemi döneminde sanal konserlerin popüler hale gelmesi ile müzisyenler, organizatörler gibi gelirini müzikten sağlayan insanlar için alan oluştuğu ortaya çıkmıştır. Afifah, Milyartini & Sukmayadi (2021) tarafından yapılan çalışmada da benzer bulgular tespit edilmiştir. Bu etkinlikler aynı zamanda müzik eğitimi alan öğrenciler içinde performanslarını sergileyebildikleri bir alan haline gelmiştir.

Müzik eğitimi temasına göre; her ne kadar geleneksel eğitime devam edilse de pandemi döneminde sanal sınıfın müzik eğitiminde öğrencilere sağladığı kazanımlar göz önüne alındığında, enstrüman eğitiminin ilerletilmesi, öğrencilerin özgüvenlerinin geliştirilmesi ve teknolojinin eğitim odaklı kullanılması gibi becerilerin sanal sınıf çalışmaları ve sanal konserlerin sürdürülmesi ile de kazandırılabileceği düşünülmektedir. Kuyumcu'nun (2022) çalışmasında da gitar eğitiminde sanal sınıfın öğrencilerin müzikal gelişimlerine katkı sağladığı görülmüştür.

Günümüz koşullarında sanal sınıfın müzik eğitimine olan katkısı teknolojinin gelişimiyle birlikte giderek artmaktadır. Teknolojinin her geçen gün kendini yenilemeye ve farklı yönleri ile eğitim sürecini değiştirmeye devam ettiği görülmektedir. Bu bağlamda sanal sınıfın anlayışı ve işleyişi de kuşkusuz değişecektir. Bu duruma Yamaha markasının geliştirdiği "disklavier" sistemi örnek olarak verilebilir. Bu sistemde performans sergileyen öğrencinin bulunduğu ortamdaki piyano ile öğretmenin bulunduğu ortamdaki piyano arasında bağlantı kurularak öğrencinin çaldığı nota ve tüm nüanslar öğretmenin bulunduğu ortamdaki piyano tuşları ile eş zamanlı olarak gösterilmektedir (https://usa.yamaha.com/products/musical_instruments/pianos/disklavier/index.html, 2023). Bu sayede öğretmenin bulunduğu ortamdaki piyano sesi bilgisayar hoparlör desteği olmaksızın piyanonun kendisinden alınmaktadır. Bu durum sanal sınıfın farklı bir boyutunu ve teknolojinin sanat eğitimine olan etkisini göstermektedir. Satır (2019), yaptığı çalışmada müzik eğitiminde uygulanan teknolojinin geleneksel eğitime göre öğrencilerin öğrenmesine katkı sağladığını ifade etmiştir. Ders planlaması, içerik planlaması gibi süreçlerin teknolojiyi kullanabilme ile doğrudan ilgili olması sebebiyle öğretmenlerin bu konuda kendilerini alan içi ve alan dışı geliştirmeleri gerekecektir. Yazılımların ve uygulamaların müzik öğretmenleri tarafından uygulanabilir olması, mesleki yaşamlarına etki edeceği gibi, derslerine girecek olan öğrencileri de motive edecektir (Kuyumcu, 2020). Yıldız ve Topal'ın (2022) yaptıkları araştırma sonucuna göre müzik öğretmeni adaylarının bilgi iletişim teknolojileri konusunda gelişime ihtiyaç duydukları ve lisans seviyesinde bu eğitimi ders olarak almaları gerekliliği sonucuna varılmıştır.

Elde edilen bulgulara göre araştırmada; olası bir doğal afet, pandemi gibi sebeplerle geleneksel eğitimin aksaması ve kalıcı sanal sınıf eğitimine geçilmesi durumunda ilkokul, ortaöğretim ve lisans seviyesinde kullanılabilecek online dökümanların hazırlığının yapılmasının ve ders programlarının bu doğrultuda düzenlenmesinin gerekliliği, müzik eğitiminde sanal sınıf kullanımı için yeterli dökümanın olmadığı sonucu ortaya çıkmıştır. Bununla birlikte öğrencilerin teknolojiyi eğitim odaklı kullanamadıkları, sanal konserlerin pandemi sonrası eğitim odaklı yapılmadığı ve müzik öğretmenlerinin teknolojiyi amacına uygun kullanamadıkları tespit edilmiştir. Formal eğitim kapsamında gerçekleştirilen sanal sınıf çalışmalarında, "Yök Dersleri Platformu" gibi bir dijital ders materyal havuzu müzik eğitimi adına oluşturulmadığı için müzik öğretmenlerinin yeterli dijital ders materyallerine ulaşamadığı sonuçları ortaya çıkmıştır.

Elde edilen sonuçlara göre araştırmacılara şunlar önerilmektedir;

• Günümüzde hızla gelişim göstermekte olan teknolojinin müzik eğitimi alanında kullanılması oldukça önemlidir. Ders içerisinde kullanılan uygulamaların derse entegre edilebilmesi ve planlanmasıyla sanal sınıfın niteliği artacaktır. Sadece alan içi değil alan dışı uygulamaların da öğrenilmesi, takip edilmesi, farklı öğretim yöntemlerinin geliştirilmesi günümüz koşullarında teknoloji ile mümkün olacaktır. Bu bağlamda müzik öğretmenlerinin sanal sınıf içerisinde müzik eğitiminin kullanım amacına yönelik kendilerini geliştirmeleri ve kamu kurumları tarafından desteklenmeleri önerilmektedir.

- Öğrencilerin sanal sınıf kapsamındaki müzik eğitiminde teknolojiyi eğitim odaklı kullanmayı öğrendikleri sonucuna ulaşılmıştır. Özellikle pandemi döneminde sanal sınıf içerisinde başarılı bir müzikal performans sergiledikleri görülmüştür. Ek olarak öğrencilerin sanal sınıfta teknolojiyi yeterli kullanamadıkları tespit edilmiştir. Bu bağlamda öğrencilerin hem eğitim sistemi içerisinde teknolojiyi amacına uygun kullanabilmeleri konusunda desteklenmeleri hem de geleneksel eğitim içerisinde de sanal konserlerin devam ettirilmesi önerilmektedir.

- Müzikal etkinlikler pandemide bireylerin asosyal olarak yaşamlarına devam ettiği süreçte oldukça önem arz etmiştir. Pandemi süresince maliyetinin düşük olması, gelirini müzikten kazanan insanlar için bir alan oluşturması ve bireylere topluluğun bir parçası olma imkanı tanıması bakımından sanal konserler popüler hale gelerek geçimini müzisyenlik ve organizatörlük alanlarından sağlayan insanlar için de bir geçim kapısı haline gelmiştir. Elde edilen sonuçlara göre; sanal konserlerin geçim kaynağını müzikten sağlayan insanlara ve topluma sağladığı fayda sebebiyle günümüz koşullarında devam etmesi önerilmektedir.

- Sanal sınıf içerisinde öğrencinin derse karşı ilgisinin yüksek olması, kullanılan materyallerle doğru orantılıdır. Müzik eğitiminde de dijital ders materyallerinin sistemli, planlı olması öğrenciye bilginin aktarılması konusunda oldukça verim sağlayacaktır. Bu noktada müzik dersi ile ilgili ders materyallerinin tüm sınıf kademelerinde düzenlenerek dijital bir platforma aktarılması ve bu platformun Millî Eğitim Bakanlığı bünyesinde kurularak müzik öğretmenlerinin erişimine açılması önerilmektedir.

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