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CONTENT

A Bibliometric Analysis of Publications on Problem-Based Learning

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Abstract

The study aims to perform a bibliometric analysis of scientific research published in the field of problem-based learning (PBL). In this context, 3522 scientific studies published between 1980 and 2020 in the field of PBL were examined bibliometrically and the trend in the last 40 years was revealed. In the Web of Science Core Collection database, a search was carried out under the title of "Problem-Based Learning" and bibliometric data of the studies were obtained. The studies were examined under the sub-titles of the number of publications by years, publication types, country and institution collaborations, publication and author citation networks, research areas, and keywords used. As a result of the analyses, collaborations and relationship patterns were visualized in the form of cognitive maps. It has been determined that more than half of the studies on PBL have been published in the last ten years, the most published type of study on the subject in the article. In addition, it has been revealed that the author of the most cited source is Hmelo-Silver (2004), the most cited researcher is Howard S. Barrows. It is thought that the results of the research will guide those who will research with problem-based learning.

Keywords: Bibliometric analysis, problem-based learning, Web of Science Core Collection.

Probleme Dayalı Öğrenmeye İlişkin Yayınların Bibliyometrik Analizi
Öz

Çalışmanın amacı probleme dayalı öğrenme (PDÖ) konu alanında yayımlanan bilimsel araştırmaların bibliyometrik analizini gerçekleştirmektir. Bu kapsamda, PDÖ alanında 1980-2020 yılları arasında yayımlanan 3522 bilimsel çalışma bibliyometrik olarak analiz edilmiş, son 40 yıldaki eğilim ortaya çıkarılmıştır. Web of Science Core Collection veri tabanında "Probleme Dayalı Öğrenme" konu başlığında tarama yapılmış ve çalışmalara ait bibliyometrik veriler elde edilmiştir. Çalışmalar; yıllara göre yayın sayıları, yayın türleri, ülke ve kurum iş-birliktelikleri, yayın ve yazar atıf ağları, araştırma alanları ve kullanılan anahtar kelimeler alt başlıklarında incelenmiştir. Ayrıca PDÖ alanında yayımlanan araştırmalarda kullanılan anahtar kavramların belirlenmesi için kelime analizi gerçekleştirilmiştir. Anahtar kelimelerin görselleştirilmesi için WordSift yazılımı tercih edilmiştir. Analizler sonucunda ulaşılan sonuçlar bilişsel haritalar şeklinde görselleştirilmiştir. PDÖ ye ilişkin çalışmaların yarısından çoğunun son on yılda yayımlandığı, konuya ilişkin en çok makalenin yayımlanmış olduğu, en çok ABD'ni ülke iş birliğinin olduğu, kurum iş birliğinin en çok olduğu kurum Maastrciht Üniversitesi ortaya çıkmıştır. Ayrıca en çok atıf alan kaynağın yazarın Hmelo-Silver (2004) olduğu, en çok atıf alan araştırmacının Howard S. Barrows, en çok eğitim araştırmalarında PDÖ kullanıldığı ve en sık kullanılan anahtar kelimenin probleme dayalı öğrenme olduğu belirlenmiştir. Araştırma sonuçlarının probleme dayalı öğrenmeyle araştırma yapacaklara rehber olacağı düşünülmektedir. Farklı araştırmalarda eğitimin farklı alanlarında yapılan çalışmaların bibliyometrik analizi yapılarak daha detaylı bilgiler sunulabilir.

Anahtar kelimeler: Bibliyometrik analiz, probleme dayalı öğrenme, Web of Science Core Collection.

INTRODUCTION

Education in the 21st century requires dealing with real-world problems, and problem solving skill is one of the most important skills of this century (Erden & Yalçın, 2021; Tan, 2021). Along with the fact that students start to learn subjects and concepts formally or informally, the knowledge and skills they acquire while they encounter problem situations related to subjects and concepts and actively participate in the process of producing solutions for these problems extend to pre-school periods (Karamustafaoğlu et al., 2018). Problem-based learning is one of the methods that can be used to convey the knowledge and skills that students have gained in daily life and to display different perspectives on each problem they encounter (Kaptan & Korkmaz, 2001). The fact that education is continuous and present in all areas of individuals' lives (Hun & Değirmençay, 2020) reveals the importance of education in problem-based learning. Problem-based learning has a long history in experience-based education. Problem-based learning (PBL) is a teaching method in which students learn by problem solving (Hmelo-Silver, 2004), and it was developed by educators at McMaster University in the 1960s in response to the problems faced by medical students in traditional methods and to prepare students for clinical practice (Thorndahl & Stentoft, 2020). In Turkey, with the renewed curriculum studies in education, PBL first started to take place in the curriculum in 2006 (Ministry of National Education, 2006). In the updated final version of the science curriculum, PBL is implemented by being supported with scenarios inspired by daily life to provide students in the learning environment with problem-solving skills (Ministry of National Education, 2018).

PBL a method based on the constructivist approach, which aims to enable students to take responsibility for their learning, in other words, to gain the skill of "learning to learn" and to increase their learning capacity (Kılınç, 2007). In learning environments where the constructivist approach is based, students are at the center of the learning process, while teachers are involved in the process as a guide in the stages of accessing information, not giving the necessary information, but encouraging the student (Balım et al., 2012). In science courses where the constructivist approach is at the forefront, students gain many knowledge and skills that they can transfer to daily life (Yıldız & Beşoluk, 2019). What is expected from students in PBL is to introduce the problem through scenarios prepared by teachers for daily life problems and to acquire knowledge and skills around the problems (Ahmed & Kannaiah, 2018). In the process of producing solutions to the given problem scenarios, taking into account the individual differences of the students; questioning and critical thinking, decision making, social skills, communication and collaborative learning skills, independent learning skills, and thus high-level thinking skills develop (Puspasari & Puspasari, 2019; Temel, Şen & Yılmaz, 2014; Tosun & Yaşar, 2013). The main tool used in PBL environments is problem scenarios (Deniş-Çeliker, 2021). Well-structured problem scenarios allow students to trigger their learning by enabling them to define the problem, analyze the problem, form hypotheses, and identify learning problems. In the face of problem scenarios, students first define the problems individually and then interact with the problem scenarios they encounter in small groups and reach their learning goals through teacher-guided discussion (Kaptan & Korkmaz, 2001; Tan, 2002; Wood, 2003; Wulandari, 2018). In addition, the problem scenarios presented in the PBL method lead students to think about different possible solutions instead of directing them to a single correct answer (Mutlu & Aydoğmuş, 2019). Integration of science and technology with education, PBL is a promising learning process that helps students understand various social, economic and environmental problems (Thakur et al., 2021).

The increasing importance of problem-based learning in the education system and as a research topic with an important area in the relevant literature, it appears as a teaching method that is increasingly used around the world (Mutlu & Aydoğmuş, 2019; Temel, Şen & Yılmaz, 2014). It was determined that these studies on PBL examined the effects of PBL on various variables (academic achievement, attitude, thinking skills, collaborative working skills, problem solving skills, etc.) in various fields (science education, physics education, chemistry education, mathematics education, medical education etc.) (Ceylan & Umdu Topsakal, 2023; Divarcı & Saltan, 2017; Gül & Konu, 2018; Kim, Vicentini & Belland, 2022; Liu & Pásztor, 2022; Phungsuk, Viriyavejakul, & Ratanaolarn, 2017; Siagan, Saragih & Sinaga, 2019; Trullàs, Blay, Sarri & Pujol, 2022; Wahyudiati, 2022). Additionally, when the studies in the field of PBL are examined, the trend, content and context studies on the subject are frequently encountered in the literature (Çakıcı et al., 2020; Gao et al., 2020; Kim et al., 2017; Leary, Walker, Shelton & Fitt, 2013; Özturan et al., 2020; Yıldırım & Say, 2020). When the analyses of problem-based learning studies are explored; it has been determined that these studies differentiate according to the fields they are studied such as science education, chemistry education, medical education, and mathematics education. It was determined that similar analysis studies such as content-analysis, meta-analysis, literature analysis and bibliometric analysis were carried out (Arıcı, 2022; Ghani, Rahim, Yusoff & Hadie, 2021; Juandi & Tamur, 2021;

Leary, Walker, Lefler & Kuo, 2019; Temel, Şen & Yılmaz, 2014; Tosun, Şenocak & Taşkesenligil, 2021; Zakaria, Maat & Khalid, 2019; Zhang, Wang, Bai. & Zhang, 2022).

Although many compilation and analysis studies have been published in the domain of problem-based learning in recent years, it can be said that analysis studies covering all fields are limited. The increase in interest and studies in PBL reveals the necessity of summarizing the results of these studies. Therefore, in the current study, answers to the following questions were sought in the studies carried out in the field of problem-based learning between 1980 and 2020 in the Web of Science database:

1. What is the distribution of problem-based learning studies by years?
2. What are the publication types of problem-based learning studies?
3. How are countries collaborations in problem-based learning studies?
4. What are the institutional collaborations like in problem-based learning studies?
5. What are the most cited studies in problem-based learning studies?
6. Who are the most cited authors in problem-based learning studies?
7. How are problem-based learning studies distributed according to research areas?
8. What are the most used keywords in problem-based learning studies?

METHOD

Design Model

Bibliometric analysis method was used in the analysis of studies on PBL. Bibliometrics can be defined as the process of quantifying content analysis (Böyükyılmaz & Oktay, 2020). However, unlike content analysis, bibliometrics is a method that provides information about the activities of scientific publications, analysis of certain features of publications (joint citations, journals in which they are published, keywords, cooperation between countries and institutions, etc.), and statistically visualizing the trends specific to the researched domain (Al, 2008; Al & Çoştur, 2007; Özkaya, 2019). Findings obtained from bibliometric analyses can be shown and classified with percentage and frequency tables used in content analysis (Böyükyılmaz & Oktay, 2020). Intercalarily these tables, cross-country collaborations and common citation networks can be visualized by using social network analysis in bibliometric studies (Güzeller & Çeliker, 2017). Social network analysis is a form of analysis that includes various analysis and measurement tools to analyze and understand interrelated data within a social structure, enabling the visualization of the obtained information and thus showing the important factors in the researched area (Karagöz & Yüncü, 2013). Bibliometric methods are used to provide quantitative analysis of written publications (Ellegaard & Wallin, 2015) and to improve access to information and learn more about the structure of information (Carter-Templeton et al., 2018). To reveal the data, bibliometric methods based on content or citation analysis are used (Wallin, 2005).

Collection of Data

Scientific documents whose bibliometric analyzes were performed were accessed from the Web of Science database by typing the keyword "problem-based learning". The documents obtained are limited to the 1980–2020 year range. Consequently, the scanning carried out in Web of Science, a total of 3522 documents were reached. All document types were analyzed without any restrictions on document types. Analyzes were carried out through the social network analysis program CiteSpace II. CiteSpace II program; It is an open-access Java application that can be used to visualize and analyze trends and changes emerging in the literature (Chen et al., 2010). In order to perform analyzes on the documents, the data has been converted into a format that can be processed in the CiteSpace II program.

In the current study, 3522 publications; detailed information about publication year, publication type, abstract, author's name, number of citations, keywords and bibliography were obtained. Within the scope of the analysis, first of all, the distribution of scientific documents published in the PBL subject area in the Web of Science database by years and the frequency values for the types of publications were determined, and the periods in which the publications in the PBL field were concentrated and the most used document types were determined. The author co-citation network was determined by analyzing the authors most cited by the studies and important authors working in the field of PBL education were determined. Within the scope of the research, the determination of the key concepts used in the studies published in the field of PBL and included in the data set was also carried out by word analysis. WordSift (word cloud software) was used to visualize key concepts. In studies conducted in the field of PBL; Social network analysis and frequency tables were used to identify country and institution

collaborations, publication common citation network, in which fields they were studied and the most cited authors, and to visualize the related relations. The number of citations obtained from the citation sources obtained as a result of the analyses, their collaborations and their position in the network were evaluated according to the "centrality betweenness". The betweenness centrality value is defined for each node in a network. In betweenness centrality, Each node in the network shows the analyzed variable, and each link shows the relationships between those variables. As the number of connections between the variables increases, the connections between the nodes also thicken (Ukşul, 2016).

FINDINGS

Within the scope of the study, the number of publications by years, publication types, country collaborations, links of institutions, fields of study, common citation networks and key concepts were examined, and the following findings were reached. Key concepts, collaborations, connections and relationship patterns are visualized in the form of cognitive maps.

1. Number of PBL Publications by Years

Distribution of 3522 studies published in the PBL subject area between 1980 and 2020 is examined. The results obtained are given in Table 1.

Table 1. Distribution of Publications on PBL by Years

Years	Frequency (f)	Percent (%)
1980-1990	41	1
1991-2000	516	15
2001-2010	1026	29
2011-2020	1939	55
Total	3522	100

It is seen that most research in the subject area was published between 2011 and 2020 (n=1939). According to the Table 1, although there were a total of 557 publications in the field of PBL in the 20 years from 1980 to 2000, it is seen that academic research in this field has increased more since 2000. In addition, it has been stated that the studies in the field of PBL have accelerated in the last 10 years, and the publication rate between 2011-2020 constitutes 55% of the total publications.

2. Publication Types

Secondly, the types of publications made in the domain of problem-based learning were analyzed in the research. Analysis results are given below. (See Table 2).

Table 2. Distribution of Publications on PBL by Publication Types

Publication Types	Frequency (f)	Percent (%)
Article	1906	51,5
Paper	1017	27,5
Summary	245	6,6
Editorial Material	144	3,9
Book Section	100	2,7
Cover Letter	92	2,5
Compilation	81	2,2
Book Review	52	1,4
News Items	23	0,6
Studies in Publication Stage	17	0,5
Note	12	0,3
Correction	9	0,2
Book	4	0,1
Software Review	1	0,0
Total	3703	100%

When Table 2 is examined, publications related to PBL were carried out in 14 different ways (Article, Paper, Abstract, Editorial Material, Book Chapter, Cover Letter, Review, Book Review, News Items, Studies in the Publication Stage, Note, Correction, Book and Software Review). It was concluded that the studies on PBL between 1980 and 2020 were mostly published in Article type (n=1906) and Paper type (n=1017). These publications are respectively Editorial Materials (n=144), Book Chapters (n=100), Cover Letters (n=92), Reviews (n=81), Book Reviews (n=52), News Items (n=23). Studies in Publication (n=17), Notes (n=12), Revisions (n=9), Books (n=4) and Software Review (n=1).

3. Country Collaborations of Publications on PBL

In studies conducted in the field of PBL, determining the collaborations of researchers according to their countries; social network analysis and frequency values were determined. The 10 countries that have the most cooperation with other countries are presented in Figure1 and Table 3.
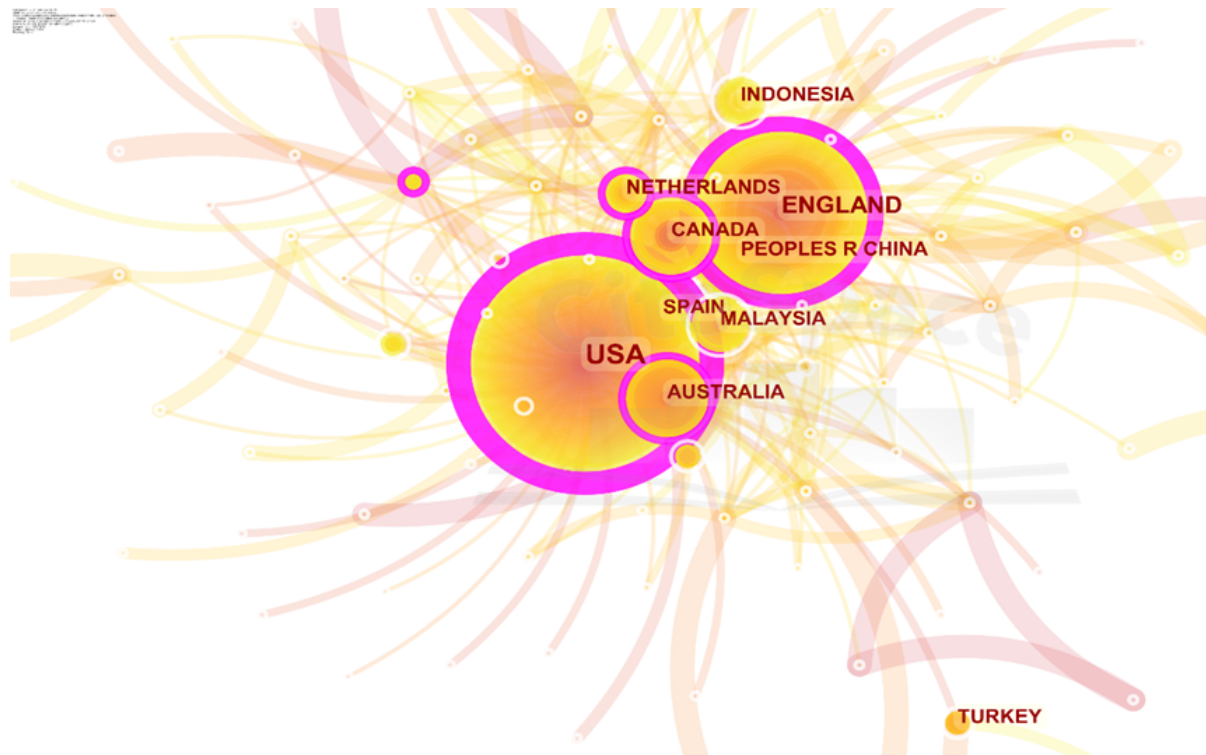
Figure 1. *Country Collaborations of Publications on PBL*

Table 3. Country Collaborations, Degrees of Centrality and Years

Countries	Frequency (f)	Centrality	Year
USA	809	0.46	1982
England	249	0.25	1993
Indonesia	227	0.04	2000
Canada	184	0.12	1987
Australia	171	0.15	1989
China	165	0.04	1992
Spain	151	0.09	2005
Netherlands	138	0.11	1992
Malaysia	134	0.03	1998
Turkey	105	0.04	1995

Each node in the network represents a country, and each link represents cooperation between countries. Colorings in the network show the years of collaborations. The thickness and size of the purple circle around the nodes indicate that the centrality degrees of the nodes are high (Ukşul, 2016).

According to the findings in Table 3 and Figure 1, it is seen that the USA is the country that cooperates most with other countries (n=809). In the network analysis in Figure 1, the USA is the country with the highest

degree of centrality. According to this finding, it can be stated that the USA plays a crucial function in the establishment and continuation of cooperation between countries in the field of PBL. It has been concluded that the countries with high cooperation with other countries are England, Indonesia, Canada, Australia, China, Spain, Netherlands, Malaysia and Turkey.

4. Institutional Collaborations of Studies on PBL

In the analyzed studies, in determining the collaborations carried out by the researchers according to the universities they are affiliated with; In the field of PBL, it is aimed to determine which university researchers collaborate with researchers from other universities the most.

According to the findings obtained from the social network analysis, the two large nodes in the network belong to Maastricht University and McMaster University. This finding shows that Maastricht University and McMaster University are the institutions that work the most in the field of PBL with other institutions (See Figure 2).
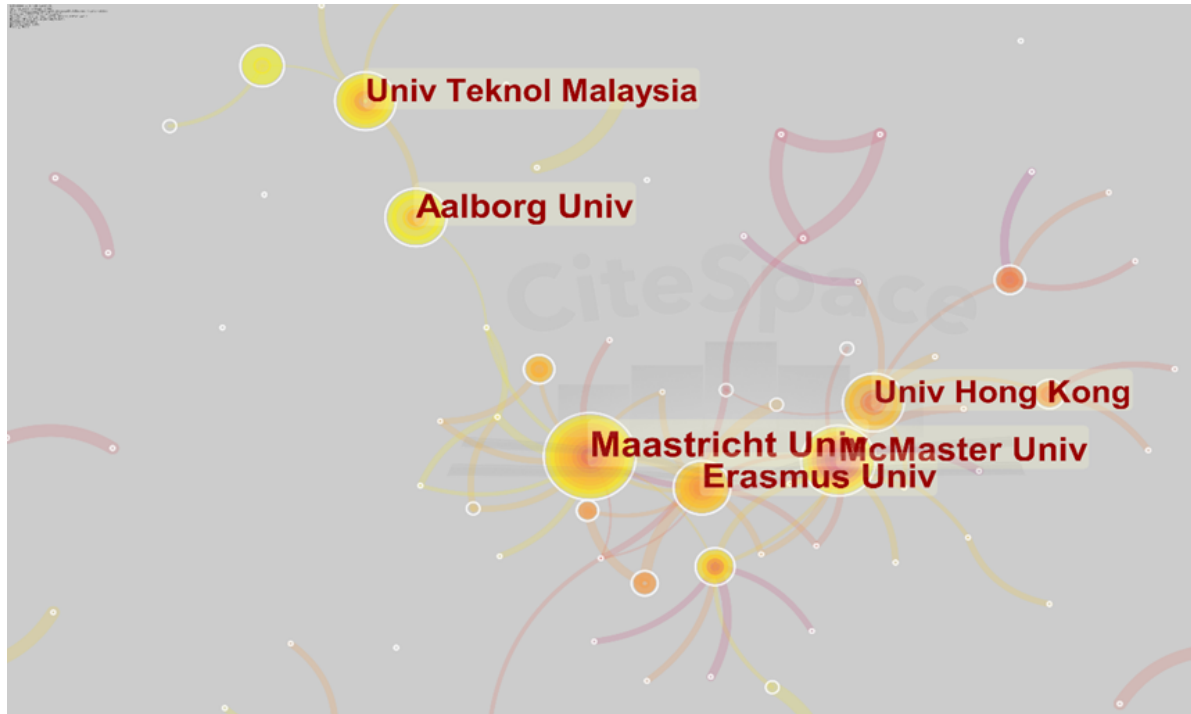
Figure 2. *Institutional Collaborations of Studies on PBL*

As a result of the analysis, the top 10 universities with high cooperation rates with other universities were determined and presented in Table 4.

Table 4. Frequency Distributions of Institutional Collaborations

Institution	Frequency (f)
Maastricht University	54
McMaster University	42
Aalborg University	38
Erasmus University	35
Malaysian University of Technology	32
University of Hong Kong	31
Indonesian University of Education	29
Indiana University	20
University of Delaware	20
Negeri Malang University	19

When Table 4 is examined, after Maastricht University (n=54) and McMaster University (n=42), Aalborg University (n=38), Erasmus University (n=35), Malaysian University of Technology (n=32), Hong Kong

University (n=31), Indonesia Education University (n=29), Indiana University (n=20), University of Delaware (n=20), and Negeri Malang University (n=19) are the most collaborating institutions in the field of PBL. universities have been identified.

5. Publication Common Citation Network

The 10 most cited articles in the studies published in the PBL subject area were analyzed in the CiteSpace II program, and their publication information and citation numbers are given in Table 5.

Table 5. Most Cited Articles

Article Information	Citation
Hmelo-Silver, C. E. (2004). Problem-Based Learning: What and How Do Students Learn?	1585
Albanese M.A. & Mitchell S. (1993). Problem-based learning: A review of literature on its outcomes and implementation issues.	1348
Norman G.R. & Schmidt H.G. (1992). The psychological basis of problem-based learning: a review of the evidence.	838
Vernon, D.T.A. & Blake, R.L. (1993). Does problem-based learning work? A meta-analysis of evaluative research.	760
Dochy, F., Segers, M., Van den Bossche, P., & Gijbels, D. (2003). Effects of Problem-Based Learning: A Meta-Analysis.	722
Colliver J.A. (2000). Effectiveness of problem-based learning curricula: research and theory	539
Wood, D.F. (2003). Problem based learning.	450
Kolodner, J. L., Camp, P. J., Crismond, D., Fasse, B., Gray, J., Holbrook, J. et al. (2003). Problem-Based Learning Meets Case-Based Reasoning in the Middle-School Science Classroom: Putting Learning by DesignTM into Practice. Journal of the Learning Sciences.	440
Norman, G.R. (2000). Effectiveness of problem-based learning curricula: Theory, practice and paper darts.	384
Dolmans, D. (2005). Problem-based learning: Future challenges for educational practice and research.	360
Gijbels, D., Dochy, F., Van den Bossche, P., & Segers, M. (2005). Effects of problem-based learning: A meta-analysis from the angle of assessment.	359
Yew, E.H.J. & Schmidt, H.G. (2011). What Students Learn in Problem-Based Learning: A Process Analysis.	287

When Table 5 is examined, the sources with the highest number of citations in the studies in the field of PBL are, in order, the Albanese M.A. & Mitchell S. they appear to be articles published in 1993. These studies are common reference sources that guide the field of PBL.

6. Author Co-Citation Network

The 10 most cited researchers in the field of PBL were determined as a consequence of the analysis are presented in Table 6 and Figure 3.

Table 6. Author Co-Citation Analysis and Years

Authors	Citation	Year
Henk G Schmidt	632	1983
Howard S. Barrows	620-608-235	1981-1985-1986
Mark A Albanese	502	1993
Cindy Hmelo-Silver	432	2006
Geoffrey Norman	417	1989
Diana Dolmans	365	1994
David Boud	315	1986
David T.A. Vernon	304	1993
Maggi Savin-Baden	239	2001
John R. Savery	232	1998
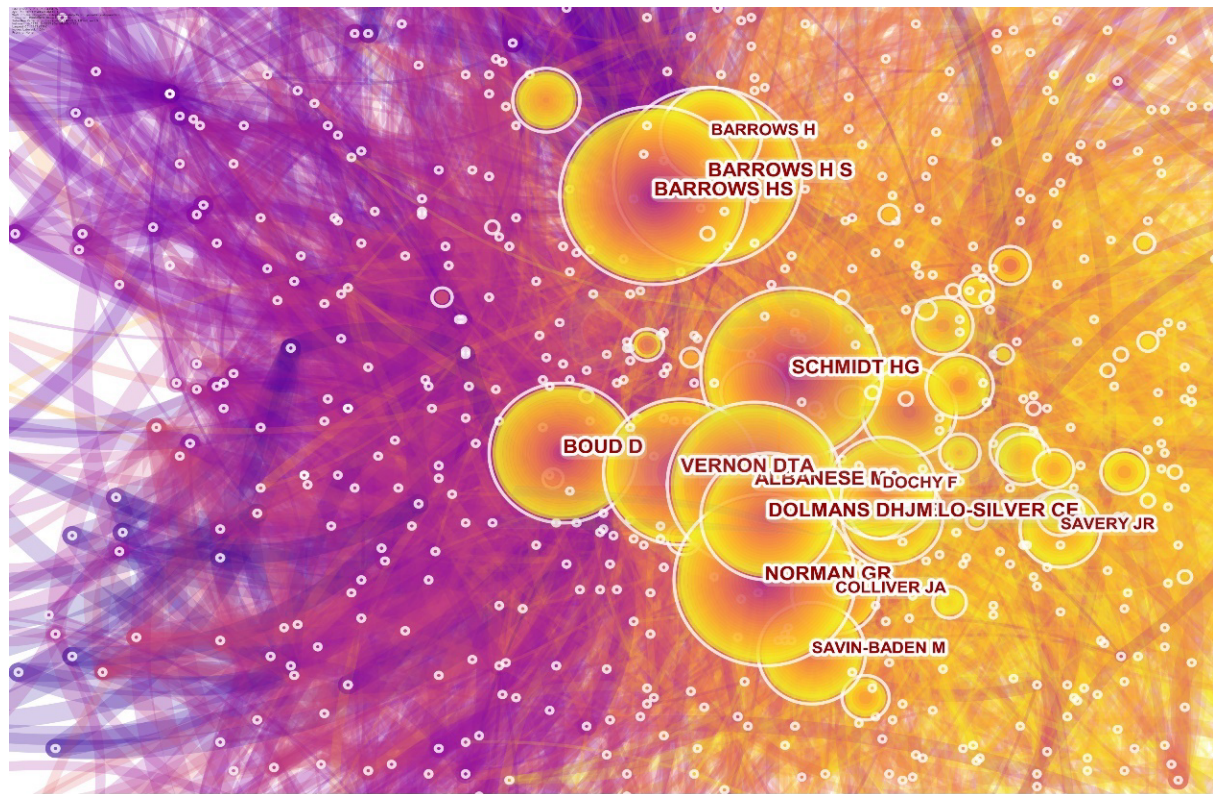
Figure 3. *Author Co-Citation Network*

It was concluded that the most cited researcher in the field of PBL was Howard S. Barrows (n=620, 1981; n=608, 1985; n=235, 1986). Henk G Schmidt (n=632) was identified as another researcher with a high number of common citations in studies conducted in the literature. Authors with a high number of citations in studies conducted within the scope of PBL; Mark A Albanese (n=502), Cindy Hmelo-Silver (n=432), Geoffrey Norman (n=417), Diana Dolmans (n=365), David Boud (n=315), David T.A. Vernon (n=304), Maggi Savin-Baden (n=239) and John R. Savery (n=232).

7. PBL Method Research Areas

The results of the analysis performed to determine in which areas the PBL method is most studied are presented in Table 7 and Figure 4.

Table 1. Demographic Information Regarding Pre-school Teachers Who Have Participated in the Research

Research Area	Frequency (f)	Centrality	Year
Educational Research	2150	0.71	1981
Educational and Scientific Discipline Studies	1141	0.15	1981
Health Sciences and Services	471	0.03	1981
Engineering	315	0.25	1994
Computer Science	281	0.08	1994
General Medicine and Internal Medicine	186	0.09	1987
Medicine, General & Internal Medicine	180	0.03	1987
Engineering Discipline	151	0.01	1998
Computer Science and Interdisciplinary Practice	145	0.02	1994
Nursing	145	0.14	1992

Figure 4. *Research Areas*

The findings show that the PBL method is used in different disciplines. According to the analysis results, PBL is mostly used in educational research (n=2150). After education, PBL was mostly used in health services (n=471), medical education (n=186 and n=180) and nursing (n=145), engineering (n=315 and n=151), and computer science (n=281) and (n=145) as a research topic.

8. Analysis of Keywords

The frequencies of the 100 most used keywords in the studies conducted in the field of PBL were calculated through the CiteSpace II program. WordSift software was used to visualize the words and it is given in Figure 5.

Figure 5. *Keywords Written in PBL Studies*

The most used keywords as a result of the calculations; "problem-based learning (n=1071), education (n=377), student (n=347), curriculum (n=249), medical education (n=164), outcome (n=111), knowledge (n= 96), skill (n=92), performance (n=88), and critical thinking (n=86). WordSift software was used to visualize the words. Figure 1 shows the 100 most used key concepts in the studies conducted in the field of PBL between 1980 and 2020.

DISCUSSION & CONCLUSION

The current study examined the bibliometric features of 3522 studies published in the international citation index Web of Science between 1980 and 2020 in the domain of problem-based learning and the findings showed an increase in the number of publications was observed according to the years when the distribution of publications was examined, and there was a dramatic increase in the studies on PBL, especially since the year 2000. In the period from 1980 to 2020, it has been determined that the studies on the subject have increased every year. Temel et al., (2014) analyzed the content of PBL studies conducted in the field of science teaching in Turkey and they stated in their research that there was an increase and decrease in the number of studies conducted since 2001, and that the number of studies was the highest in 2010. When the theses on problem-based learning in Turkey were researched, it was stated that the most thesis on the subject was written in 2011 (Erdogan, 2015).

When the studies published within the scope of PBL were examined according to their types, it was seen that they were carried out in 14 different publication types and the most publications were in the article type (51.5%). It has been determined that 79% of the total publications are articles and papers.

When country collaborations are examined, it has been determined that the USA cooperates most with other countries in the field of PBL. It has been seen that after the USA, England and Indonesia are the countries that have more cooperation with other countries in the field of PBL. It has been determined that Turkey has started to make its name known internationally in the field of PBL and interacts with other countries in scientific communication. Beddoes et al. (2010) identified few studies on the use of PBL in engineering education research. In the bibliometric analysis of PBL studies in health sciences and engineering, it was determined that there were studies in 84 different countries (Li et al., 2018). According to the findings obtained from the study of Azer (2017), the countries that have the most cooperation with other countries in the studies on PBL in the Science Citation Index and Google Scholar databases are the United States, the Netherlands, the United Kingdom and Canada. In addition, among the 3 most cited articles, "Problem-based learning: a review of literature on its outcomes and implementation issues (Academic Medicine)" and "Problem-based learning: what and how do students learn?" It was observed that the inclusion of the articles was similar to the current study findings.

In the analysis carried out to determine the interaction between institutions in the field of PBL, it was concluded that Maastricht University and McMaster University are the two universities that cooperate the most with other institutions and play a key role in scientific communication. PBL researchers who share similar interests rarely cooperate (Xian & Madhavan, 2013).

According to the findings of the analysis conducted to determine the most cited publications in the article type in the studies, the common reference sources that guide the field of PBL are "Problem-Based Learning: What and How Do Students Learn?" conducted by Hmelo-Silver, C. E. in 2004 and it is seen that there are articles named "Problem-based learning: A review of literature on its outcomes and implementation issues" by Albanese M.A. & Mitchell S. in 1993.

According to the findings of the analysis conducted to determine the most cited publications in the article type in the studies, the common reference sources that guide the field of PBL are "Problem-Based Learning: What and How Do Students Learn?" written by Hmelo-Silver, C. E. in 2004 and it has been determined that studies on PBL and PBL are mostly used in educational research. After the educational researches, it was determined that PBL was mostly chosen as a research topic in health services and medical education. It has been determined that studies on PBL in Turkey are mostly written in the fields of natural sciences and social sciences (Alper et al., 2014).

In the study, it was seen that the most cited author among the authors was Howard S. Barrows. It can be said that the author named Henk G Schmidt is one of the most cited authors and that the works of Howard S. Barrows and Henk G Schmidt are the most basic reference sources referenced in studies in the field. In their study, Azer (2017) presented the citations in the journals searched in SCI and Google Scholar in two separate tables. While Barrows was the fifth most cited name within the scope of SCI, it was seen as the third most cited name in Google Scholar. Schmidt, on the other hand, ranks seventh in both databases. Although the rankings are different, it is seen that the names in the top ten are similar. This difference may be due to the effect of citations used by published studies on PBL since 2017. It may be due to the differences in the databases examined. Considering Howard Barrows' contributions to PBL research, Scientometric large-scale data and visualization-based analysis of his work has also been the subject of an article in itself (Xian & Madhavan, 2013). The findings of the most cited authors in the study are similar to the findings of Hallinger's (2020) study. In this study, the most cited authors in the field were determined by examining the common citation networks of studies on PBL published in the

Scopus database between 1974 and 2019. According to the findings obtained as a result of the study, the 4 most cited authors in the field of PBL were determined as Henk Schmidt, Howard Barrows, Cies van der Vleuten, and Geoffrey Norman.

Most cited articles and authors can be described as the dissemination and discussion of scientific knowledge in the field of research and the names and articles that shape the field (Ioannidis et al., 2014). In addition, articles with a high number of citations are also important in terms of being articles that generally reveal new ideas in the research area or offer solutions to long-standing problems (Azer, 2017). For these reasons, it is thought that it is important to determine the authors and their studies that guide the studies in the field of PBL.

When the most frequently used keywords in studies on PBL are examined, the most up-to-date concepts are; it was determined that "problem-based learning, education, student, curriculum, medical education, outcome, knowledge, skills, performance and critical thinking" It has been determined that this finding supports the way PBL is applied, its content, and the fields in which it is studied. In addition, Azer (2017) determined the most used keywords in studies conducted in the field of PBL as "problem-based learning, PBL education, student, PBL program, evaluation".

Since the PBL method is a method studied in various fields, it is thought that the results of this study will guide researchers who will conduct research on PBL. More detailed information can be presented by bibliometric analysis of studies conducted in different fields of education and related to different teaching methods and techniques in different studies.

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A Panoramic View on International Higher Education Studies from a Global Perspective

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Abstract

With globalization, international education has become much more accessible to more people around the world. International higher education (IHE) has been among the most studied topics in higher education in recent years. In this context, the present study aims to investigate the studies conducted on IHE through a systematic literature review by analyzing studies published between 1965 and 2021 and employs social network analysis (SNA) and text-mining techniques. All these findings show that global, national, and institutional strategies are effective in the increase of interest in international education and especially in the increase of research. In this connection, this study provides an overview of trends; academic production in IHE has been researched with the data mining and analytics approaches, bibliometric method and the analysis of social networks. Thus, a better understanding and interpretation of the leading themes in the literature of internationalization in higher education is possible to achieve a better understanding of the field of intellectual scientific knowledge in the literature on globalization and IHE.

Keywords: International higher education, global higher education, internationalization, globalization, bibliometric analysis.

Küresel Perspektiften Uluslararası Yükseköğretim Çalışmalarına Panoramik Bir Bakış
Öz

Küreselleşme ile uluslararası eğitim dünya çapında daha fazla insan için çok daha erişilebilir hale gelmiştir. Bu perspektifte uluslararası yükseköğretim, son yıllarda yükseköğretimde en çok çalışılan konular arasında yer almaktadır. Bu bağlamda, 1965-2021 yılları arasında yayınlanan çalışmaları analiz ederek sistematik bir literatür taraması yoluyla uluslararası yükseköğretim ile ilgili yapılan çalışmaları incelemeyi amaçlayan bu çalışma, sosyal ağ analizi ve metin madenciliği tekniklerini kullanmaktadır. Tüm bu bulgular, uluslararası eğitime ilginin artmasında ve özellikle araştırmaların artmasında küresel, ulusal ve kurumsal stratejilerin etkili olduğunu göstermektedir. Uluslararası araştırma fonları, yayınlar ve alıntılardaki büyüme, küresel araştırma ekiplerinin güçlendirilmesini gerektirir. Bu bağlamda, bu çalışmada trendlere genel bir bakış sunulmuştur; uluslararası yükseköğretimde akademik üretim bibliyometrik yöntemle ve sosyal ağların analizi ile araştırılmıştır. Böylece, yükseköğretimde uluslararasılaşma literatüründe öne çıkan temaların daha iyi anlaşılması ve yorumlanması, küreselleşme ve uluslararası yükseköğretim ile ilgili literatüre ilişkin entelektüel bilimsel bilgi alanı hakkında daha iyi bir anlayışa ulaşmak mümkün olacaktır.

Anahtar kelimeler: Uluslararası yükseköğretim, küresel yükseköğretim, uluslararasılaşma, küreselleşme, bibliyometrik analiz.

INTRODUCTION

More recently, with globalization, international education has become much more accessible to more people around the world. International Higher Education (IHE) has been among the most studied topics in higher education and research on IHE has increased (Thondhlana et al., 2021) and has become a priority in recent years, more specifically in the new millennium. According to many researchers, international education and especially internationalization is a response to globalization (Altbach et al., 2010; de Wit, 2011). In this context, Altbach and Knight (2007) underline the following:

> Globalization and internationalization are related but not the same thing. Globalization is the context of economic and academic trends that are part of the reality of the 21st century. Internationalization includes the policies and practices undertaken by academic systems and institutions – and even individuals – to cope with the global academic environment. (p. 290)

Indeed, globalization has led to increased marketing and, in particular, the commercialization of education. Many researchers have criticized the fact of education becoming a commodity (Knight, 2008; Welch, 2012). One of the discourses that has emerged with globalization is that of a knowledge-based economy (Powell & Snellman, 2004), which has been embedded in the discourses of global players. In this context, the discourse of a knowledge-based economy, which has an obvious effect on IHE, leads to a restructuring of the higher education system. Additionally, with the discourse of a knowledge-based economy, international education opportunities have drawn masses to developed countries. This intellectual ability of academic migrant has been commoditized and has even led to a brain drain in certain countries. In addition, Welch (2012) emphasizes the idea of global cultural capitalism. As can be seen, global cultural capitalism also makes internationalization, which is increasingly driven by the forces of global capital, a forceful argument.

Furthermore, there has been an increase in the scope, volume, and complexity of internationalization activities in higher education institutions since 1990 (Altbach & Knight, 2007), and IHE has become a significant policy and research topic. Recently, research on the patterns of IHE and the dynamics that determine these patterns have been dominated by Western-centric studies, discourses, and approaches (Kondakci et al., 2018; Lipura & Collins, 2020) and by academic capitalism (Kim, 2016). IHE has also been established as a global phenomenon, especially in English-speaking countries (Ball, 2012; Phan, 2018). However, only a limited number of studies investigated IHE through a systematic review approach (Barnett et al., 2016; Gümüş et al., 2020; Kondakci et al., 2018; Kwiek, 2015).

Overall, almost none of these studies provided a comprehensive view or presented a holistic perspective of studies on IHE. Globalization requires a more holistic institutional approach to internationalization, and higher education institutions around the world increasingly recognize the need for internationalization (Hudzik & McCarthy, 2012). It is important to keep in mind that researchers publish more than 200 new studies focused on the terms of globalization or internationalization each year (Tight, 2021). Therefore, the present study aims to fill the gap in the literature through a systematic review of previous studies on globalization and IHE. In this context, the present study aims to analyze studies published between 1965 and 2021.

Research Model

When the historical background of universities is examined, it can be seen that they have had an international mission and character since the first university was founded (Maringe, 2012). Particularly, after the Cold War came to an end, the effects of globalization led to a merger between what is global, local, and institutional or national and international. Globalization is a process aiming to improve global connections; therefore, globalization has served as a catalyst for the internationalization of higher education. These connections do not only include the whole system, but they also include all the elements in the system and they are not limited to regional and national interactions but also include global interactions (Heywood, 2013). Thus, IHE and internationalization complement each other, and globalization strengthens the implementation of strategic partnerships (de Wit, 2011). In this context, it can be argued that IHE continues to shape existing higher education institutions worldwide, encourages global connections, and strengthens academic leadership.

Technology is an increasingly important element of globalization (Dahlman, 2007). Due to globalization, the spread of knowledge is accelerated through information and communication technologies (ICT), leading to the emergence of the issue of restructuring the higher education system based on the new development of practices for institutional internalization (van der Wende, 2007) and the mobility of students internationally (Courtois, 2020) on national, regional, and local scales. The educational policies of the Organisation for Economic Co-operation

and Development (OECD) have affected higher education (Altbach & Knight, 2007) and international student mobility (Courtois, 2020) on national, regional, and local scales.

The significance of international education increased in the late 1980s (Brandenburg & de Wit, 2011), and IHE proliferated after the Bologna Declaration was signed in 1999 (de Wit, 2011). During the first quarter of the 2000s, internationalization has become an important element of change in higher education in developed and developing countries (de Wit, 2020). In this connection, it was observed that especially English-speaking countries have become dominant in internationalization in higher education (Porfortforio, 2012).

In parallel with these developments, the increasing interest in IHE has led to an interest among researchers and both theoretical and empirical studies have been conducted. The fact that internationalization in higher education includes multidimensional components has led to the development of subfields in internationalization in higher education. Some of the existing research has focused on theoretical justifications, policies, and strategies; student mobility; internationalization at home; curriculum; and international student decisions on mobility, motivations, and experiences (Bolsmann & Miller, 2008; Knight, 2013; Leask, 2015; Li & Bray, 2007). Other studies have focused on the ethical aspect of internationalization in higher education (de Wit, 2020), Foucauldian discourse analysis (Deuel, 2021), international collaboration (Kwiek, 2015), inequalities of opportunity (Glass et al., 2019; Taşçı, 2021), and radicalization and spaces of exclusion in IHE (Jiang, 2021).

As detailed above, IHE has been the main focus of internationalization (de Wit, 2020). Thus, it is considered important to systematically investigate the studies on IHE, both to understand the research trends and to present a general review of the past studies for future studies. IHE continues to shape existing higher education institutions worldwide and encourages global connections and strengthens academic leadership. While there have been earlier systematic reviews or bibliometric studies, their scope was limited and, thus, this study intends to provide a broader, more focused and in-depth analysis of the publications on IHE. In this regard, the main purpose of the current study is to reveal and identify the research trends and patterns on IHE by benefiting from data-mining and analytic approaches.

This study intends to provide a broader, more focused, and in-depth analysis of the publication on IHE with a systematic review approach (1965-2021) utilizing social network analysis (SNA) and text-mining approaches. In this regard, this study seeks answers for the following research questions:

1. What are the bibliometric publication trends?
2. What are the thematic patterns in the titles, abstracts, and keywords of the sampled publications?
3. What are the patterns in citation networks of the publications included in the research corpus?

METHOD

Considering the sheer volume of the publications included in the research corpus, this study adopted data-mining and analytic approaches (Fayyad et al., 2002). In this regard, to visualize and identify research trends and patterns, the study used descriptive statistics (Field, 2013), SNA (Hansen et al., 2010), and text mining (Aggarwal & Zhai, 2012). By using multiple approaches, the researchers could triangulate the data analyzed and therefore increase the validity and reliability of the study (Thurmond, 2001).

Sample and Inclusion Criteria

Correspondingly, the following search terms ("global" OR "international" AND "higher education") were used to conduct a search in the Scopus database and as a result, a total of 2,276 publications were found. Publications in other languages and in different genres (editorials, books, book chapters, proceedings, etc.) were excluded and thus the final corpus to be used for research was determined to be consisted of 1,456 publications. The sampling process followed on the basis of the PRISMA guidelines is outlined as follows:

PRISMA

● Identification

o Scopus: (TITLE ("global*" OR "international*") AND TITLE ("higher education*")

o 2,276 document results

● Screening

o Limited to articles (editorials, books, book chapters, proceedings, etc.; excluded: $n = 796$)

o Limited to scholarly journals (magazine, trade journals, etc.: excluded: $n = 24$)

- Included
  - A total of 1,456 documents included in the final research corpus.

Data Analysis Procedures

In descriptive analysis, in the identification of the time trend, subject areas, and countrywide distribution, frequencies and percentages were employed. In text mining, lexical analysis was used in the analysis of the large corpus of textual data.

In order to gain a better understanding of the data, only the titles of the publications were subjected to the analysis in the first round. This analysis produced visual analytic outputs based on relative frequencies such as scatter plot. In the second round, textual data were modified in the form of sentences so that titles and abstracts could be analyzed according to their lexical relationships. Through this analysis, it became possible to construct a concept map to help researchers to come up with research themes in studies focused on IHE. In the third and final round, SNA was used to analyze the keywords defined by the authors. Each keyword was defined as a node and their co-occurrences were used to determine the relationships between them. At this stage, in the identification of the keywords having the capacity to bridge other keywords and accordingly having strategic positions in the network, betweenness centrality (BC) and degree centrality (DC) metrics were used. For the purpose of benchmarking, it is reported that in the analysis of the crawled data, Leximancer for text-mining analysis and NodeXL and Gephi for SNA are used.

Strengths and Limitations of the Study

The strength of this study offers the employment of an objective perspective. Through the analytical approach used, it is a factor increasing the reliability and validity of the research both in terms of methodology and content. In addition, the number of comprehensive, analytical, and systematic studies on IHE is very small and it is thought that the current study can yield insights that can be useful for further research. The current study has some strengths, but it has also some limitations. First, Scopus, which is the most scanned database in the world, was preferred, but it is a limitation that other databases were not included in the study. The second limitation is that the research only focused on publications written in English.

FINDINGS & DISCUSSION

This section reports the bibliometric trends for time, subject area, and territorial distribution. These analyses are followed by SNA and a concept map.

1. Patterns: Descriptive Statistics

In the present study, the distribution of global and IHE literature was analyzed based on publication date. As seen in Figure 1, the data collected from the Scopus database demonstrates that the first study on IHE in our research corpus was Brickman's "Selected Bibliography of the History of International Relations in Higher Education," which was published in 1965.
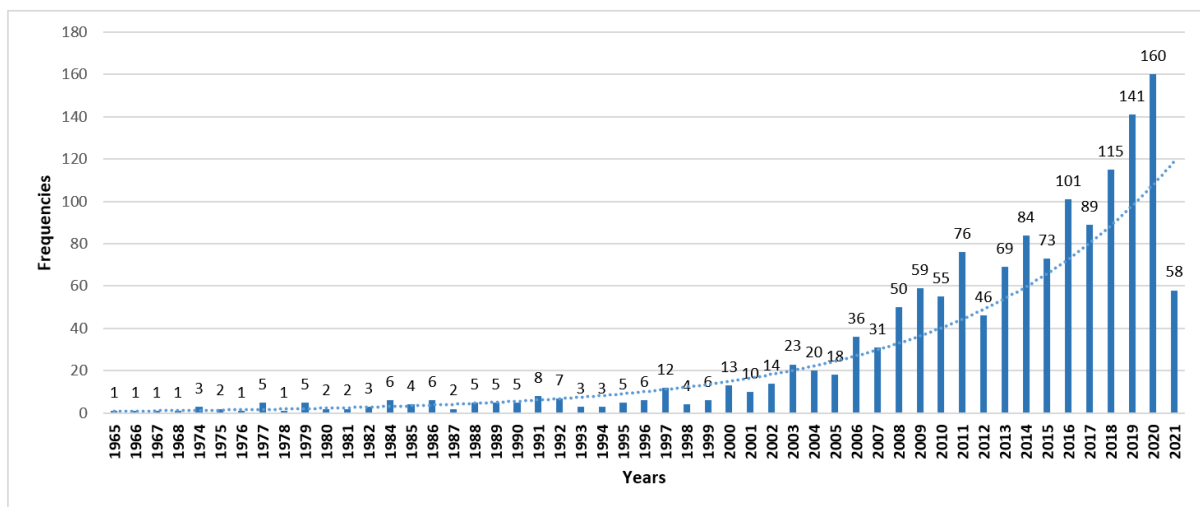
Figure 1. *Time Trend*

After 1999, many factors have affected the increase of publications on international education, such as massification, the global knowledge economy, reputation, rankings, and political climate (de Wit & Altbach,

2021). Especially since the early years of the 2000s, a steady increase has been observed in the number of studies. When the reasons for the increase in the number of the publications in this field after 1999 are examined, the Bologna Process is seen to be a turning point in the internationalization of higher education (Teichler, 2012). The September 11 attacks, the 2008 economic crisis in Europe, and the 2016 Brexit policies (Choudaha, 2017) are among the important events affecting the direction of IHE. As the European Union seeks its new future, there have always been fluctuations including attempts made to broaden the borders of Europe, increasing tensions because of the power struggles and Brexit challenges. However, up to 2019, the production of research on IHE reached its peak. This finding shows that interest in research on IHE has increased over time.

Furthermore, with the advent of the new millennium, there is an increasing trend that can be associated with the possibilities provided by online technologies such as online distance education and virtual mobility. As a result, as de Wit and Altbach (2021) stated, the results of this study are verified by the popularization and increasing significance of higher education and research studies about the global knowledge economy, policy, and technology.

Subject area

In the second step, the topics of IHE literature were analyzed based on the categories in the Scopus database. As seen in Figure 2, most studies were conducted in social sciences (68.4%), followed by business, management, and accounting (8.6%) and arts and humanities (6.6%).

Furthermore, it was found that articles were published in economics, finance, and computers. These findings clearly demonstrate that the social sciences were the leading field in IHE studies. (see Figure 2).
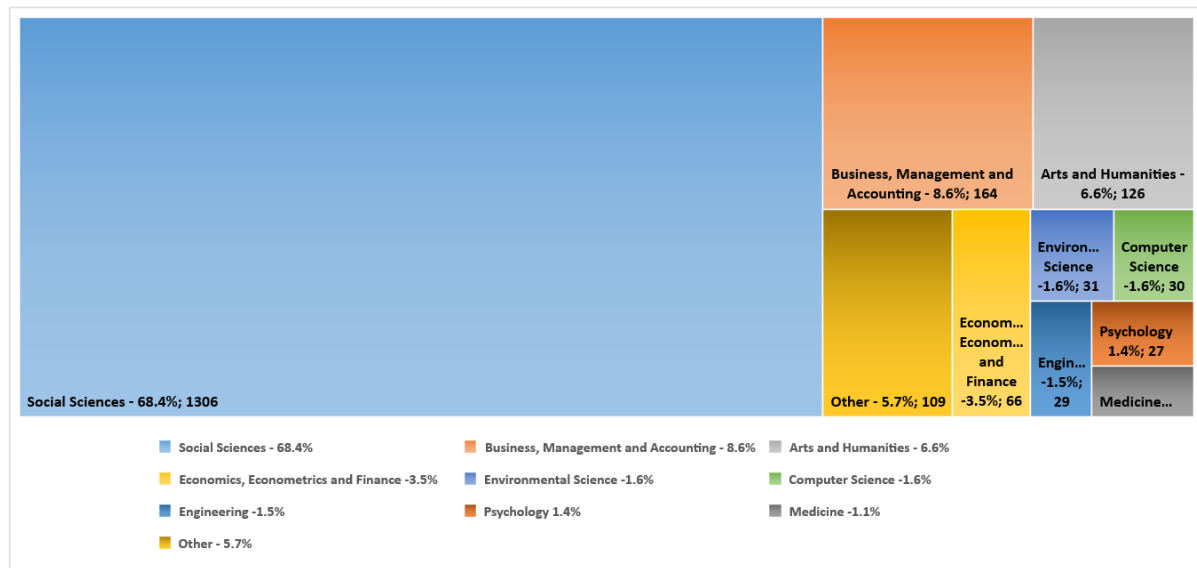
Figure 2. *Subject Area*

Regional distribution

In the third step, the regional distribution of IHE literature was analyzed based on the Scopus data. The highest number of articles was published in the three countries with the highest demand in IHE. As seen in Figure 3, the highest number of articles was published in the US, followed by the UK, Australia, China, and Canada. Recipient countries at the top of the list are not much different from the main sending countries.
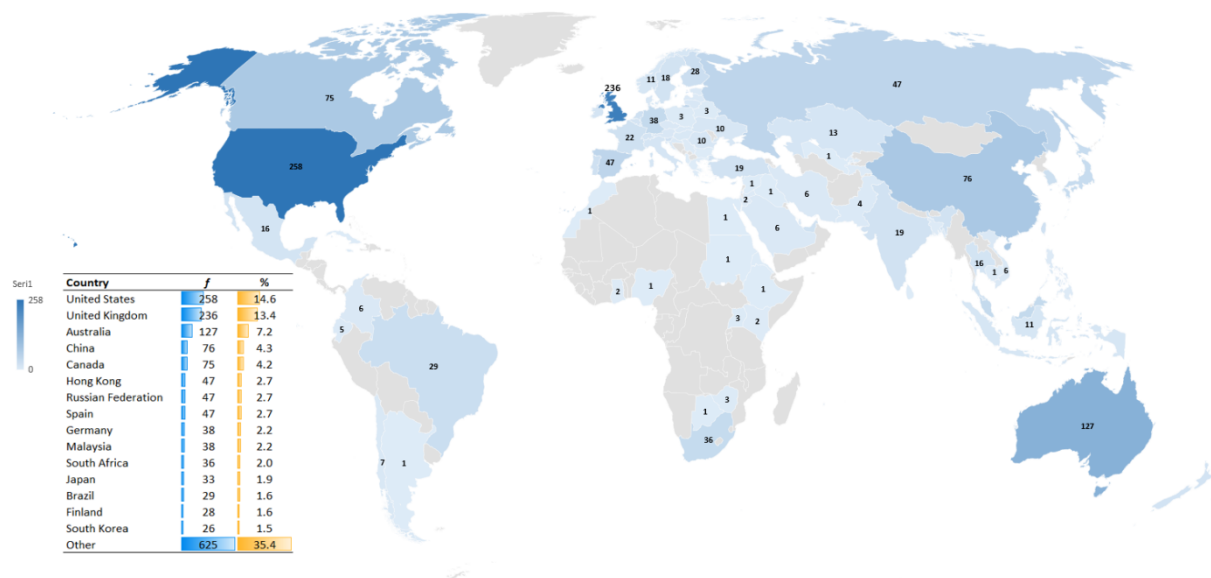
Figure 3. *Regional Distribution*

First, this shows that English-speaking countries are in an advantageous position. The dominance of English in the scientific world is a well-known fact. English is the prominent language in higher education institutions, which strengthens the internationalization of these institutions. Historically, mobility has been in the form of diploma mobility from East to West or from developed countries to developing economies. There is a flow especially from east Asia to English-speaking (Anglophone) destinations (US, UK, Australia, New Zealand) and China, Malaysia, and Hong Kong have improved their education systems (Woodfield, 2012). The fact that English language is considered to be the only option in IHE has been widely criticized. With the acceptance of English as a universal language in IHE, discussions on the commodification of education continue. Most international students make mobility decisions to learn and improve their English. This explains why most of the articles have been published in the countries identified in the current study. As a matter of fact, Anglo-American academic hegemony continues to be questioned in the academic field (Marginson & Xu, 2021) and it looks like it will be a topic of discussion for a long while.

Second, the internationalization reforms in IHE in China evidenced these findings. The dream of moving from an underdeveloped to a developed country played a significant role in the migration decisions of students (Li & Bray, 2007), especially in Nordic countries. In fact, an important finding in the present study was about China and Chinese students. The result was not a surprise due to the reforms and policies implemented by the fourth-ranking country of China on IHE. Mobility was mostly from North to North (such as developed countries), in the next 20 years, the direction of this mobility changed and became from South (such as developing countries) to North, and in 1985 China became the country sending the highest number of students out of the country for education (de Wit & Altbach, 2021). However, since 2016, China has been one of the countries receiving a high number of international students (UNESCO, 2018). In another vein, the idea of "soft power" (as a capacity to attract and the attraction to shape the preferences of others) that was first defined by Nye (2004) and diplomacy policies adopted by China could be explained by the high levels of international education mobility observed among the Chinese and improvements to their higher education system (Woodfield, 2012). This finding indicated that China is in both collaboration and competition with English-speaking countries. As Knight (2006) mentioned, and "international marketing campaign" has driven internationalization policies.

The other expected finding was about the ranking of Canada since it is an English-speaking Western country. On the other hand, in countries such as Hong Kong, the Russian Federation, Spain, Germany, Malaysia, South Africa, Japan, Brazil, Finland, and South Korea, fewer articles were published. It was further interesting that Finland, Russia, and South Africa were among the top 15 countries. The Scopus database data demonstrated that IHE literature was produced more in English-speaking countries (Gümüş et al., 2020). Thus, internationalization in higher education in English as the lingua franca was commodified by the global North as a global cultural capital (Kim, 2016).

Finally, the growth in the number of research universities and in the amount of research support and scholarships, and the increasing cooperation among universities and institutes around the world with the English language becoming the language of science, have increased the competition and collaboration between universities (Taşçı, 2022). Most international students make mobility decisions to learn and improve their English. Also, the increase in the number of international students and academics and joint international publications provided the justification for national and institutional internationalization plans (de Wit & Altbach, 2021).

2. Patterns: SNA and Text Mining

This section reports the findings based on SNA of the keywords; text mining of the titles, abstracts, and keywords of the sampled publications; and SNA of the references cited in the publications that are included in the research corpus (see Figure 4.).

SNA of the keywords and text mining of the titles, abstracts, and keywords

Of the 2,963 keywords, those with a minimum occurrence of three were included in the SNA. In this context, keywords and 1,983 connections among them are identified, analyzed, and depicted in Figure 4. At this stage, we used SNA to triangulate the data and text-mining analysis to discover and visualize connections. In SNA, keywords are defined and visualized as nodes in the sociogram, and their relationships were defined as arcs.
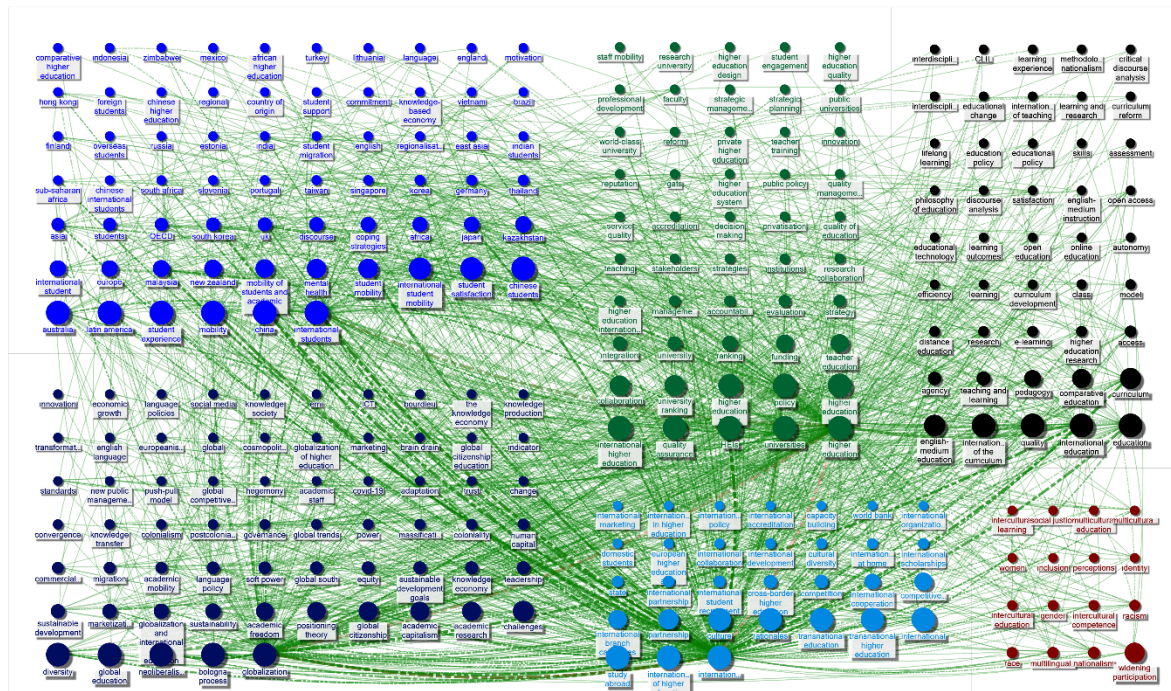
Figure 4. *SNA of the Keywords*

In the next step, we analyzed the conceptual structure of IHE literature based on the co-occurrence and lexical relationships of the textual data. The result of this analysis is presented in Figure 5 as a concept map.
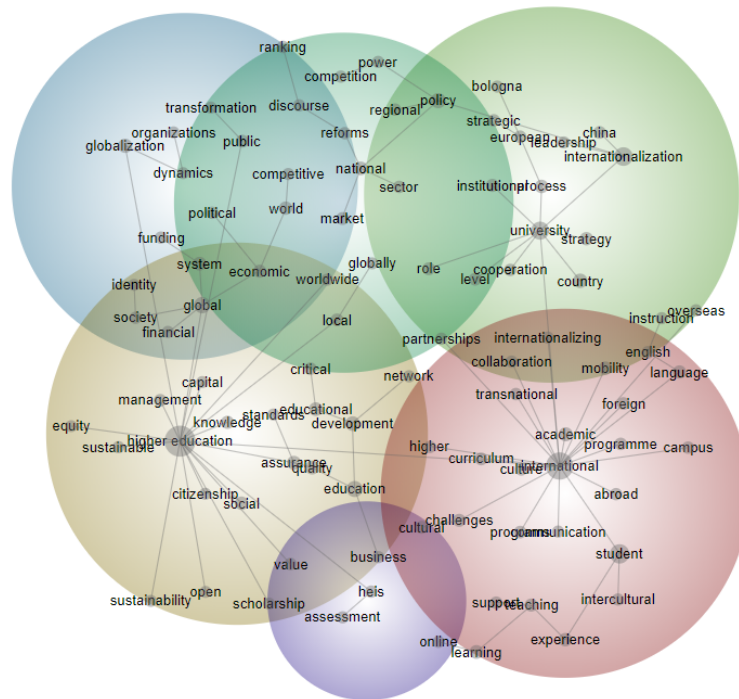
Figure 5. *Text Mining of the Titles, Abstracts, and Keywords*

The highest number of articles was published in the four themes with the highest demand in IHE. The text mining and SNA assisted the researchers to identify the following themes:

IHE for Global Engagement

IHE is reflected in global policies such as globalization, higher education policy, higher education reform, internationalization policy, soft power, strategy, and so forth (see Figure 4 and Figure 5). An increasing number of publications have focused on the prioritization of internationalization in strategic plans developed by the first-tier states in the global stage at the macro level and by the universities at the micro level. The removal of borders due to globalization prioritized internationalization policies of both the governments and universities. Particularly, the reflections of the Bologna Declaration could be considered as the driving force behind IHE, more specifically in the European landscape. Thus, globalization in higher education led to certain changes in IHE.

Political and ideological factors have been influential in international student mobility as well as in global relations. The trend toward Western countries and the flow from underdeveloped to developed countries are also among the indicators of international student mobility. Therefore, international education is used within the framework of "knowledge diplomacy" to ensure the international understanding and mutual benefits of countries (Knight, 2020).

The researchers, who reflected this process in their publications, discussed these changes in higher education based on various ideas. For example, in the postcolonial age, international education was considered as an important mediator of economic migration (Maringe & Foskett, 2012). For example, the emphasis on soft power emerging in this work is important. Thus, soft power is influenced by a country's diplomatic network and therefore by its superpower, its cultural attractiveness, the structure and equipment of its higher education institutions, its digital networks, and the economic model it implements (McClory, 2017). Therefore, the IHE that emerged in this study affects the soft power discourse and supports its spread in the international arena.

There is a soft power race between countries and IHE has been one of the instruments used to gain advantage in this race. As a result of this competition for soft power, a translocalist approach has been adopted by states and this resulted in universities becoming just one of the national institutions of nation-states rather than being more international and universal (Gürüz, 2011). With more and more countries making large investments in public diplomacy channels, one of which is IHE, in the soft power competition, the structure of the international education sector has changed to a great extent. The emergence and inclusion of new countries investing heavily in public diplomacy channels, including IHE, in the soft power competition had a very interesting response in the international education sector.

On the other hand, it was also observed that certain authors (see Li & Bray, 2007; Nye, 2004) argued the process based on migration and soft power theories, while others discussed the effects of international education

in association with globalization. Furthermore, it was observed that recent studies criticized the main factor behind the problems in international education based on global North-South polarization, hegemony, and global competitiveness. Thus, the political reflections of IHE and globalization have been included in academic studies.

The Marketization of IHE and Reflections on IHE as Academic Capitalism

IHE is reflected in marketization and academic capitalism channels such as funding, human capital, commercialization, knowledge-based economy, and business (see Figure 4 and Figure 5). Currently, universities are at the forefront of marketization, which changes the nature, social functions, educational objectives, and production processes in universities, and legitimates knowledge and therefore power relations (Giroux, 1999). For example, Bretton Woods played a key role in the beginning of the global political economy (Deuel, 2021). At the same time, as Altbach and Reisberg (2013) noted, "The motivations of countries and universities recruiting international students are equally complex and increasingly commercial" (pp. 2–4).

Similarly, IHE has been increasingly commercialized and commodified in recent years. It was observed that the knowledge-based economic philosophy and the policies to attract international students at local and international levels were developed due to financial concerns. In fact, internationalization has been considered as an important source of revenue by several universities (Rumbley et al., 2012). Moreover, the international role of academic institutions has been affected to a large extent by the trends related to globalization such as diversification, expansion, and privatization (Altbach & Teichler, 2001). In the 1990s, education became more commercialized and commoditized and English was adopted as the common language in academic circles, and as a result of these developments, new markets were created for capitalist states to sell educational products. For example, language education is marketed (mostly the English language) by language schools (Altbach & Knight, 2010). Also, commercialization leads to the university ranking system and competition among international students. The information networks obtained from the Scopus database demonstrated that marketization was prevalent in IHE.

Furthermore, it is important to note that most of the criticism of international education, and especially internationalization, should be linked to economic globalization (Beck, 2012; Brandenburg & de Wit, 2011; Welch, 2012). Moreover, IHE marketing has been the focus of studies that criticized marketing where students are perceived as consumers and higher education institutions as manufacturers. While economists defended the emerging market model, social scientists criticized education as a market in their studies. However, the truth is that, as Giroux (2006) pointed out, higher education institutions could lose their traditional social status as centers of knowledge production and lecturers as the symbols of wisdom. Thus, the commodification of international education leads to the loss of the basic philosophy and aim of IHE and increases the inequality of opportunity.

On this theme, one of the debates about IHE is academic capitalism, which in its simplest sense is, as Rhoades and Slaughter (2004) noted, "the involvement of colleges and universities in market-like behaviors" (p. 37). Therefore, it also points to the instrumentalization of international education (de Wit, 2011). Critical researchers (Appe, 2020; Jessop, 2018; Kauppinen & Cantwell, 2014; Rhoades & Slaughter, 2004) underline that academic capitalism becomes more competitive as universities continue to adopt market values to carry out their core functions. Therefore, academic capitalism affects higher education economically and politically. In recent years, there have been many criticisms of higher education institutions operating like a capitalist organization (Appe, 2020; Jessop, 2018; Kauppinen & Cantwell, 2014; Rhoades & Slaughter, 2004). Regarding the relationship between IHE and academic capitalism, there are criticisms that faculty dealing with international partnerships may adopt the marketization discourse and even exhibit market-like behaviors. The efforts of higher education institutions to attract international students by means of ranking, reputation, and promotion, in other words, transforming the academic field into an "international marketing campaign" (Knight, 2013), are among the most discussed topics. It is also important to note that, as Kauppinen and Cantwell (2014) point out, universities have entered into capitalist knowledge production in partnership with other countries; "academic capitalism has entered a transnational phase" (p. 143).

The Emphasis on Academic and Cultural Integrity in Internationalization in Higher Education

IHE has an emphasis on academic and cultural integrity in internationalization in higher education such as global citizenship, integration, cultural diversity, multilingualism, adaptation, racism, intercultural competence, intercultural education, studying abroad, international student mobility, internationalization of the curriculum, cross-border higher education, academic mobility, transnational higher education, internationalization at home, sustainability, and so forth (see Figure 4 and Figure 5). International engagement universities are those that are operating in international arenas such as student mobility, collaboration, curriculum, and so forth (Foskett, 2012).

The most mentioned factors included enhancement of quality, international learning, comparative learning, internationalization of the curricula, internationalization at home, faculty and student mobility, and improvement of the quality of education. In addition to the aforementioned issues, IHE is a key driver for recognition, global collaboration, and competition. Foskett (2012), for instance, points out that "Universities in all countries have responded to the increased transnational mobility of students through strategies overseas campuses and the establishment of student mobility partnership" (p. 35).

Another key aspect of IHE is emphasis on cultural adaptation (Ebuchi, 1989), cultural competence (Daerdorff & Jones, 2012) and cultural understanding (Knight, 2006). Globalist researchers agree that intercultural understanding and cooperation between international institutions should be fostered by national education. The importance of IHE and intercultural diversity on campuses has been emphasized by several studies (Daerdorff & Jones, 2012; Thom, 2010). Based on the text-mining findings, it was determined that several studies were conducted on the problem of cultural adaptation especially as experienced by international students. Similarly, cultural differences and cross-cultural approaches were studied, while the emphasis was on the improvement of cultural homogenization.

SNA of the references

Finally, we also analyzed a total of 59,050 references that were derived from the publications included in the research corpus. Those with at least three occurrences were included in the analysis. The pivotal contributions that shape and inspire the field are as follows (see Figure 6):

As can be seen above, "The Internationalization of Higher Education: Motivations and Realities" by Altbach and Knight (2007) is one of the most cited works. Similarly, one of the most cited studies is "Internationalization Remodeled: Definition, Approaches, and Rationales" by Knight (2004). Interestingly, most of the literature on globalization and IHE has been produced by Western authors. This finding, as Maringe (2012) points out, seems to indicate that dominance of Western authors still continues in the IHE literature both in theory and practice.
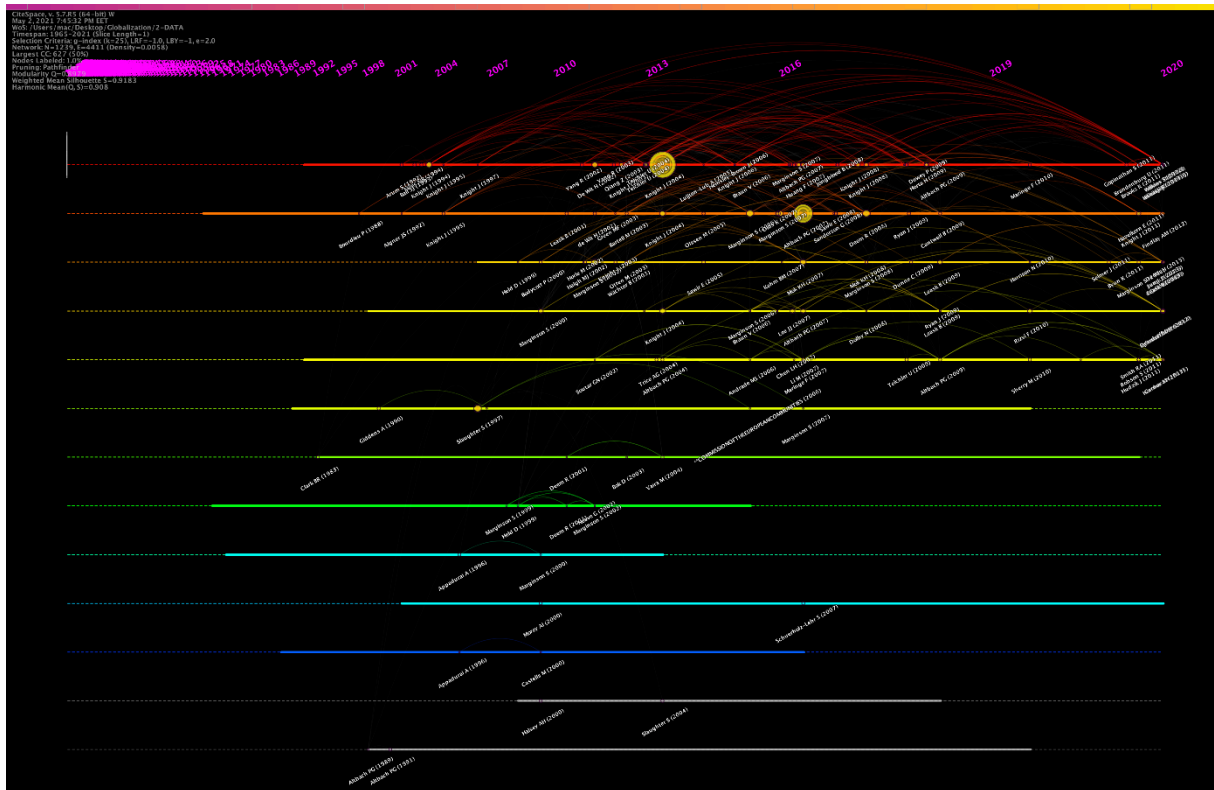
Figure 6. *SNA of the References*

When Figure 6 is examined, it is understood that different authors from different continents of the world have influenced the IHE literature and its intellectual conceptual framework in higher education and have been a source of inspiration for the literature. Moreover, the increase in the number of international publications by international academics reveals that it is mostly intellectuals in English-speaking countries who lead the field and shape the scholarly contributions to IHE.

CONCLUSION

This study investigated the studies conducted on IHE through a systematic literature review approach (1965–2021) and employed SNA and text-mining techniques. The findings show that global, national, and institutional strategies are effective in the increase of interest in international education and especially in the increase of research. In this connection, in the present study, bibliometric analysis provided evidence of increased scientific archetypes in the international community.

As the researchers have discussed in this article, different studies of IHE tend to be produced more in the West and within certain peripherals. However, at the same time, these different approaches to IHE studies seem to both facilitate the understanding of the breadth and diversity of IHE, while constraining the polarized field of view experiences. Of course, many factors such as English language, academic networks, come into play. Also, the findings of this paper lead to a critique of the hegemonic discourses currently at play in policy on widening IHE and the ways these might serve to perpetuate academic practices.

In this study, four key reflections that attract attention are important: First, we noted that there is excessive emphasis on the conceptualizations of global political capitalism. Political capitalism refers to a form of capitalism where economic power is closely intertwined with political power, resulting in the use of political influence to maintain and expand economic interests. In the context of higher education, political capitalism can manifest itself in various ways, such as through the allocation of research funds to politically connected universities or through the use of political power to shape university policies and priorities. There are a number of ways in which political capitalism and internationalization intersect in the context of higher education. For example, politically connected universities may have an advantage in developing international partnerships and attracting international students, as they may have greater access to government resources and networks. Additionally, internationalization can be used as a way for politically connected universities to expand their influence and reach, both domestically and internationally. The prominent emphasis on political capitalism is seen to affect countries and local universities and students, primarily with political, geographical, and economic (such as the Bologna Declaration and Brexit) policies such as soft power of political actors.

Second, we noticed an emphasis on a conceptualization of global economic capitalism. Economic capitalism and internationalization in higher education are two interconnected phenomena that have significant implications for the future of higher education. Economic capitalism refers to the economic system in which the means of production, distribution, and exchange are owned and controlled by private individuals or corporations, with the goal of maximizing profits. Internationalization in higher education refers to the process of universities and colleges becoming more globally oriented in their operations, research, and teaching. The impact of economic capitalism on higher education has been significant. Universities are increasingly being viewed as businesses that need to compete for students, research grants, and funding. This has led to a focus on metrics such as rankings, enrollments, and research output, which can be used to measure the success of an institution in the marketplace. Additionally, there has been a trend towards the commercialization of research, with universities partnering with corporations to develop and market new technologies. Internationalization in higher education has also been driven by economic factors. Globalization has led to increased competition for talent, research funding, and international students. Universities have responded by becoming more globally focused on their operations, offering programs in multiple languages, recruiting international students and faculty, and establishing partnerships with institutions in other countries. However, the impact of economic capitalism and internationalization on higher education is not without its challenges. For example, the marketization of IHE education is one of the indicators of this. For this purpose, considering and commodifying international students as language and diploma markets can be given as examples. We have observed an incomplete narrative that often emerges from research framing Western, world-class universities as simultaneously desired and problematic.

Third, we noticed an emphasis on a conceptualization of global cultural capitalism. Cultural capitalism refers to the ways in which cultural production and consumption have become commodified in the global marketplace, while internationalization in higher education refers to the growing trend of globalization and internationalization in universities. The concept of cultural capitalism was first introduced by Arjun Appadurai in his 1996 book "Modernity at Large: Cultural Dimensions of Globalization". Appadurai (1996) argues that the globalization of culture has led to the commodification of cultural products, including higher education, resulting in the emergence of a global cultural market. Also, Bourdieu's (1977) concept of cultural capital has been examined, as having different approaches adopted by various researchers in this field. This overview shows that cultural capital is seen as an indicator of social class and position in the social hierarchy (Lareau & Weininger,

2003). Internationalization in higher education has become increasingly important for universities, with a focus on expanding global partnerships and collaborations, attracting international students, and developing cross-cultural competencies among students and faculty. Critics argue that these trends can lead to the homogenization of culture, the commodification of knowledge, and the exploitation of international students. Proponents of cultural capitalism and internationalization in higher education argue that they can bring benefits, such as increased funding for universities, greater access to knowledge and expertise, and the promotion of cultural diversity and understanding. This includes European citizenship, European identity, the superiority of English, students' dreams of Europe and America, and the associated implicit symbols.

Finally, we noticed that universities at the macro level and faculty members at the micro level place an emphasis on a conceptualization of global academic capitalism, which is clear from the universities that are trying to adopt market values to fulfil their basic functions, making academic capitalism more competitive. English language, on the other hand, is the dominant language used in academia for publishing research and communicating with scholars worldwide. There is a growing concern that academic capitalism and the dominance of English language may have negative consequences on higher education. Similarly, the dominance of English language may have negative implications for non-native speakers who may face barriers in publishing their research and communicating their ideas Some argue that academic capitalism may lead to a focus on commercialize research rather than knowledge for the public good. Overall, while academic capitalism and the dominance of English language have both advantages and disadvantages, it is important for universities and scholars to consider the potential consequences and strive for a balance between commercial interests and academic pursuits, as well as linguistic diversity and inclusivity.

Globalization will continue to affect IHE, politically, economically, academically, and culturally. Therefore, these are more interconnected than ever (Altbach, 2004; Knight, 2006). In addition, the aforementioned points show that global policies affect the direction and content of IHE both in theory and practice. And also, it is understood that global forces in particular are shaping IHE. This variance, ranging from northern countries to English dominance, from developed countries to underdeveloped countries, drives IHE in various ways and directions.

From this perspective, it can be argued that globalization is a force to be recognized and without the theory of globalization, international education is difficult to understand, a point which was also articulated by Larsen (2016). However, given that globalization and IHE are mechanisms that affect each other, there is no doubt that the outcomes will also affect this process. While these intended goals are seeing a growth in internationalization worldwide in higher education institutions, IHE is still a new area of interest to many researchers in higher education. Therefore, there is a need for more thinking in the field of IHE from a more global perspective.

As a result, the study has provided an overview of trends; academic production in IHE has been researched with the bibliometric method and the analysis of social networks. Studies on scientific analysis of published articles provide a better understanding of the development of the theme of IHE. Thus, a more comprehensive understanding and interpretation of the prominent themes in the related literature on internationalization in higher education will enable a deeper insight into the field of intellectual scientific knowledge concerning globalization and its impact on IHE.

Conflict of Interest

There is no conflict of interest for this study.

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An Examination of Preschool Teachers' Use of Interactive Book Reading

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Abstract

This mixed methods study aims to examine the use of interactive book reading of preschool teachers. While the participants of the quantitative dimension consisted of 51 preschool teachers selected by convenience sampling method from preschool teachers working in different provinces and districts of Turkey, among these teachers, 36 preschool teachers who volunteered to participate in the qualitative dimension of the research were made up of the study group of the qualitative dimension. Quantitative data were collected through a 22-item questionnaire developed by the researchers and frequency percentage, arithmetic mean and standard deviation values of each item were calculated. Qualitative data were collected through semi-structured interviews and analyzed with the content analysis. Results suggested that while the item "I show the cover of the book to the children before reading it" has the highest percentage (f=%100) in terms of "always agree", the item "I use images to explain the words in the book that I think the children do not know" has the lowest percentage (f=%21,6). On the other hand, it was concluded that teachers included reading activities in the daily education flow, but they did not have enough information about the interactive book reading and did not adequately apply the steps of the interactive book reading. Therefore, it is suggested that interactive book reading should be included in the preschool education programs and that preschool teachers should follow the steps of the techniques so that they can spend their book reading activities more efficiently.

Keywords: Interactive book reading, preschool teachers, survey method, content analysis.

Okul Öncesi Öğretmenlerinin Duygu Düzenleme Becerileri ile Bilişsel Esneklik Düzeylerinin Sınıf Yönetimine Etkisi

Öz

Bu karma yöntem araştırması, okul öncesi öğretmenlerinin etkileşimli kitap okumayı kullanma durumlarını incelemeyi amaçlamaktadır. Araştırmanın nicel boyutunda yer alan katılımcılar Türkiye'nin farklı il ve ilçelerinde görev yapan okul öncesi öğretmenlerinden uygun örnekleme yöntemiyle seçilen 51 okul öncesi öğretmeninden oluşurken, bu öğretmenlerden gönüllü olarak katılmak isteyen 36 okulöncesi öğretmen ise nitel boyutun çalışma grubunu oluşturmuştur. Nicel veriler, araştırmacılar tarafından geliştirilen 22 maddelik bir anket aracılığıyla toplanmış ve her bir maddenin frekans, yüzde, aritmetik ortalama ve standart sapma değerleri hesaplanmıştır. Nitel veriler yarı yapılandırılmış görüşmeler yoluyla toplanmış ve içerik analizi ile analiz edilmiştir. Elde edilen bulgular doğrultusunda, " Kitabı okumadan önce kitabın kapağını çocuklara gösteririm" maddesi "her zaman katılıyorum" derecelendirmesi açısından en yüksek yüzdeye (f=%100) sahip iken, " Kitapta geçen çocukların bilmediğin düşündüğüm kelimeleri açıklamak için görseller kullanırım" maddesinin en düşük yüzdeye sahip (f=%21,6) olduğu ortaya çıkmıştır. Öte yandan öğretmenlerin günlük eğitim akışında okuma etkinliklerine yer verdikleri ancak etkileşimli kitap okuma hakkında yeterli bilgiye sahip olmadıkları ve etkileşimli kitap okuma adımlarını yeterince uygulamadıkları sonucuna ulaşılmıştır. Bu nedenle, okul öncesi eğitim programlarında etkileşimli kitap okumaya yer verilmesi ve okul öncesi öğretmenlerinin kitap okuma etkinliklerini daha verimli geçirebilmeleri için etkileşimli kitap okuma içerisinde yer alan tekniklerin aşamalarını takip etmeleri önerilmektedir.

Anahtar kelimeler: Etkileşimli kitap okuma, okul öncesi öğretmenleri, anket yöntemi, içerik analizi.

INTRODUCTION

Supporting the development and learning of children in the preschool period is essential. Providing an enriched learning environment not only increases their readiness but also enables them to make sense of life. While creating this environment, different methods and materials can be used. According to Eliason and Jenkins (2003), those who are responsible for the education of preschoolers should know how to use their potential at the highest level by offering quality activities and tools to children. One of these tools is books. Books greatly affect the developmental level of the child (Yavuzer, 2003). Introducing children to books at an early age helps enrich their experience (Konar, 2004). The first interaction with the book of preschool children who have not yet learned to read and write occurs when a literate parent or sibling reads a book to them (Parlakyıldız & Yıldızbaş, 2004). Picture books are important tools that make children love books from early ages, support language development and prepare a substructure by offering them different perspectives (Raikes et al., 2006; Luo, Tamis-LaMonda, Kuchirko, Ng & Liang, 2014). However, reading a book alone is not enough, it should be supported the ability to grasp the main idea in the book, as well as to understand the event and the properties of the characters in the book (Snow, Tabors, & Dickinson, 2001). Thus, the dialogue with the adult gains importance. The performance of the adult while reading the book is effective in the child's understanding of the book and listening with interest. In this process, the effective interaction between the adult and the child causes the process to be more efficient and the learning to be permanent (Sawyer, 2009). The main purpose of reading a book is to enable the child to gain concepts and skills, to give the child the opportunity to communicate and to keep the child's attention during reading. In addition to the high level of interaction with children who meet these goals, it is clear that the interactive book reading technique is the most effective reading (Whitehurst, Epstein, Angell, Payne, Crone, & Fischel, 1994).

Interactive book reading is a method in which the reader is an active listener and at the same time asks questions to children to become active participants rather than passive listeners (Flynn, 2011). In other words, it is a planned book reading method that is designed by Whitehurst et al. in 1988. Children are informed about the words they have not heard before, the meaning of which is unknown, they are encouraged to share their ideas and their answers are expanded (Whitehurst & Lonigan, 1998). In addition, children are asked to complete an event in the story, to describe what is told with pictures, to predict events, and to make a connection between the event in the story and their own experiences (Justice & Pullen, 2003; Whitehurst et al., 1994). In this regard, the main purpose of this method is to encourage the child to talk about the story in the book, to ensure his active participation, and ultimately to support the child's ability to tell the story from the pictures of the book (Whitehurst et al., 1994).

Interactive reading supports the listener to affiliate with the reading process and reinforces the excitement of reading by ensuring perpetual feedback (Morgan & Meier, 2008; Pillinger & Wood, 2014). The interactive reading process allows students to talk, make detailed descriptions and interpret what they see. Therefore, preventing students from being passive in the reading process reinforces students' desire to read and increases their curiosity (Ganotice, Downing, Mak, Chan & Lee, 2017). Thus, children find out that reading is a fun and enjoyable way of learning (Er, 2016). This process assists students to expand their vocabulary and enhance their reading comprehension skills (Beschorner & Hutchison, 2016; Mol, Bus, de Jong & Smeets, 2008; Sperling & Head, 2002). The reader asks the children questions, gives hints and additional information, so interactive reading is provided (Işıtan, 2015). The adult guides the child to tell the story using certain questioning techniques. The child, on the other hand, can cease to be the listener of the story and become the narrator of the story. The answers given by the child are again expanded within a systematic framework. In this process, words with unknown meanings are emphasized, and children are informed by explaining these words (Whitehurst & Lonigan, 1998). The adult reassures, supports, accompanies and motivates the child while ensuring the active participation of the child. During reading, the child is given time to answer the questions asked and make comments, and unknown words are defined in a way that the child can understand (Er, 2016; Schaughency, Riordan, Reese, Derby& Gillon, 2020).

Interactive book reading is based on three basic practice methods that aim to develop children's receptive and expressive language skills. These are getting the child to participate in the reading activity, giving feedback to the child about what he/she is talking about, and selecting the books that are relevant to the child's interest and determining the topics to be discussed (Hargrave & Senechal, 2000; Justice & Ezell, 2002; Justice & Pullen, 2003; Morgan & Meier, 2008). These applications support children's interest in stories, listening comprehension, vocabulary development and language development. The adult uses different techniques to enable the child to

participate actively in the reading activity. It is recommended to use the techniques identified by Whitehurst et al. (1994) as CROWD (Completion - Recall Open ended -Wh-questions- Distancing) and PEER (Prompt- Evaluate-Expand - Repeat) in order to ensure active participation of children in interactive book reading activities and to initiate and maintain their conversations. CROWD: consists of asking children to complete a statement or sentence in the story (C); asking children about the characters and events in the story (R); asking children open-ended questions about the event described in the picture or making predictions about what might happen next (O); asking 5Wh questions about the characters and events in the pictures (W); asking the child to associate the story with himself (D). PEER, which refers to techniques such as giving constructive feedback to the child and expanding their answers, includes adult behaviors: It includes starting the conversation (P); assessing the accuracy of the children's answers (E); asking the child to repeat the corrected and expanded responses (R). According to Dolunay Sarıca (2016), "the techniques expressed as CROWD and PEER should be used by adults in three stages of reading the story: before reading, during reading, after reading" (p.11). Some examples of conversation techniques used in the interactive book reading are given in Table 1 (Akoğlu, 2016).

Table 1. Conversation Techniques Used During Interactive Reading

Starting the Conversation Techniques	How is it applied?	Example	Effect
Completion	The child is asked to complete a sentence or phrase in the story.	Adult: "The mouse ….. to catch the apple on the branch" Child: "Jumped"	Supports child's listening comprehension and language skills
Recall	The child is asked questions about the events in the story and the characters in the book.	Adult: "When the mouse couldn't catch the apple, who did he first ask for help?" Child: "From the Rabbit"	It increases the child's interest in the story and makes her/him pay attention to details
Opened-Ended questions	For example, the child is asked to describe the picture in the book.	Adult: "Why did he take the stick?" Child: "To reach the apple on the branch."	It gives the child an opportunity to express herself
Wh-questions	The child is asked to name an object or event in the picture.	Adult: "What season is this happening in?"	It supports vocabulary
Distancing	The child is asked to associate the event in the story with events from her/his own life.	Adult: "What are you doing to get something you can't stretch out on?"	It enables the child to establish a connection between her/his own life and the story and to express herself/ himself

As seen in Table 1, with the starting conversation techniques used during interactive reading, children's ability to understand what they listen to and use the language, their interest in the story, their ability to notice details and their vocabulary are supported, and they are provided with the opportunity to use the language. In addition, it is ensured that they establish a connection between the story in the story and their own lives. Conversation maintenance techniques used during interactive reading are given in Table 2.

Table 2. Conversation Maintenance Techniques Used During Interactive Reading

Conversation Maintenance Techniques	How is it applied?	Example	Effect
Prompt	The child is asked to name what s/he sees in the picture, or a question is asked about the character	Adult: "What is this?" Child: "Octopus"	It increases the child's attention and vocabulary. It makes him interested in the story.
Evaluate	The child's response is evaluated. If it is not correct, the information to be given in order to teach the appropriate word is considered	The adult thinks about the child's response and thinks about new words s/he might add	The adult gives feedback on the child's response and encourages him/her to add more information.
Expand	The child's response is expanded by adding new words	Adult: "Yes, an eight-armed purple octopus"	Encourages the child to say a little more than they can
Repeat	The child is asked to repeat his/her answer	Child: "Eight-armed purple octopus"	It supports the language development of the child

As shown in Table 2, with the conversation maintenance techniques used during interactive reading, children's knowledge of the story, their vocabulary knowledge and an increase in their interest are provided. The adult gives feedback on the child's response and encourages him/her to expand his/her response. Thus, children are encouraged to say more than they want to say, and their language use skills are supported.

The interactive book reading practice was evaluated by Akoğlu (2016) in three separate steps: before reading, during reading and after reading. In order for the interactive book reading practice to be successful at the desired level, it is important to do the pre-reading steps appropriately: These are: (a) The first of the pre-reading practices is the selection of a qualified children's picture book in which adults can practice interactive book reading. It is of great importance to choose books that are suitable for the developmental level of the child and that match the age group of the children in terms of form and content features. It is important to pay attention to include words that children have not learned yet, as well as words that children have just learned in the specified books. (b) The second step is to determine the target words and phonemes. The selection of target words and phonemes should be determined by considering the developmental characteristics of the child and/or child group as well as the calendar age. The number of words aimed to be learned in the selected book should be determined by considering the learning capacity. The person who will do the application should plan the emphasis on phonemes, the explanations s/he will make about the target words and the questions s/he will ask during the interactive book reading before reading the story to the children. The rehearsal of the plan will facilitate the implementation. (c) The last step before the application is to plan the layout of the children during reading. During interactive book reading practices, children should sit in a comfortable position and can easily see the pictures of the book.

During the interactive reading practice, child-friendly terms should be used while explaining the meanings of the unknown words in the story. The targeted words should be supported with pictures or different materials. It has been summarized as: (a) giving examples that will enable children to make connections between target words and their own lives, (b) associating newly acquired information with children's own lives, (c) repeating the meanings of target words, (d) supporting the content of the story and target words with past experiences, (e) supporting phonological awareness by emphasizing the targeted phoneme, (f) asking open-ended questions and Wh questions, (g) repeating and expanding the answers of the children and, (h) completing the sentence.

After reading steps are summarized as (a) asking open-ended questions that would enable them to use the target words and phonemes with their information about the flow and outcome of the story, and (b) ensuring the permanence of the achievements with different activities.

This study aims to examine the use of interactive book reading technique of preschool teachers. There is an increase in studies on interactive book reading in Turkey (i.e., Akoğlu, Ergül & Duman, 2014; Yıldız Bıçakçı, Er &Aral, 2017; Çelebi Öncü, 2016; Ergül, Akoğlu, Sarıca & Karaman, 2017; Gölcük, Okur & Berument, 2015; Kotaman, 2008; Acar Şengül, 2019; Yurtbakan, 2020). The results of these studies have revealed the contribution of interactive book reading to many areas. For example, in the study conducted by Kotaman (2008), the interactive

book reading practice of the parents was included for 7 weeks and it was revealed that there was a significant increase in children's receptive language vocabulary and positive attitudes towards interactive reading in parents. Gölcük et al. (2015) aimed to develop receptive language and story comprehension skills of socio-economically disadvantaged children attending pre-school education. For this purpose, an interactive book reading practice was applied to 6 children in line with the intervention program for 5 weeks. As a result, it was concluded that the book reading intervention program was effective in increasing the language development of children. In the study conducted by Akoğlu et al. (2014), an interactive book reading program was applied for six weeks to children aged 4-5 years in need of protection and it was found that interactive book reading was effective on children's expressive language skills. The study by Acar Şengül (2019) was carried out with 13 children with developmental language retardation. The interactive book reading was applied to the children in the experimental group and the result of the study yielded an increase in the expressive vocabulary acquisition of the children in the experimental group. In the study of Yıldız Bıçakçı et al. (2018), mothers were given a seminar on interactive book reading and in line with the information obtained from the seminar, they read 27 books, 3 books a week, in 9 weeks. As a result of the study, it was concluded that the process carried out with the interactive book reading had a positive effect on the development of children and the interactive book reading skills of the mother. With the results of these studies, the importance of placing interactive book reading practices especially in preschool education programs becomes more evident. Therefore, this study is also important in terms of revealing a conceptual framework related to interactive book reading by preschool teachers and contributing to the field with the findings.

Research Questions

Within the scope of the research, the question "To what extent do preschool teachers use the interactive book reading?" has been addressed. The following questions were also included:

1. How often do preschool teachers include interactive book reading in their book reading activities?
2. What are the views of preschool teachers about the interactive book reading?

METHOD

In this mixed-methods study, both quantitative and qualitative methods were employed to reveal preschool teachers' interactive book reading. In the quantitative dimension, due to "its practicableness and high level of representability" (Polit & Beck 2004, p.50), the survey method was employed. On the other hand, in the qualitative dimension, a case study design that allows the "investigation of a phenomenon in depth and in real life with a holistic approach" (Yin, 2009, p.18) was used. Illustrative case study that relies on interpreting data about the situation used to provide information about a situation, especially if there is a reason to believe the reader has little knowledge of a program (Davey, 2009) was included for the qualitative part.

Participants

The participants of the quantitative dimension consisted of preschool teachers (N =51) selected by convenience sampling method, one of purposive sampling methods, from preschool teachers working in different provinces and districts of Turkey (See Table 3). Among these teachers, preschool teachers (N =36) who volunteered to participate in the qualitative dimension of the research were made up of the study group of the qualitative dimension within the framework of the convenience sampling method.

Table 3. Descriptive Data of the Participants

Variables		N	%	Variables		N	%
Gender	Male	-			1-5 years	10	19.6
	Female	51	100		6-10 years	7	13.7
Age	20-25	6	11.8	Seniority	11-15 years	31	60.8
	26-30	7	13.7		16-20 years	3	5.9
	31-35	23	45.1		21 and upper	-	
	36-40	10	19.6		36-48 months	5	9.8
	41 and above	5	9.8		16-20	18	36
Age group	49-60 months	25	48	Class size	21-25	6	12
	61-69 months	21	48.1		26 and upper	1	2
	5-10	7	14	Total		51	100
	11-15	18	36				

As given in Table 3, all the participants were female. With regard to age variable, it was observed that 11.28% of the preschool teachers were between the ages of 20-25; 13.7% were between 26-31; 19.6% were between 31-40 and; 9.8% were at the age of 41 and over. In terms of professional seniority, 19.6% of the participants had 1-5 years of seniority; 13.7% had 6-10 years; 60.8% had 11-15 years and; 5.9% had 15- 20 years of seniority. In terms of the age group they teach, 9.8% were 36-48 months; 49% were 48-60 months and; 49.1% were 60-69 months. Regarding the class size, 14% were between 5-10; 36% were between 11-15; 36% were between 16-20; 12% were between 21-25 and; 2% were 25 or more sizes.

Data Collection

A 22-item "Interactive Book Reading Questionnaire" was developed by the researchers based on the literature review and expert opinions (2 Associate Professors and 1Assistant Professor of Preschool Education, 3 Pre-school teachers). After required changes were made, a pilot study was conducted on a small group of volunteers (N=15 preschool teachers). They were asked to revise all items and, if possible, re-word, shorten or discard all unnecessary, difficult or ambiguous items that would not be answered as expected. After piloting, the final form of the questionnaire was obtained in three dimensions as Before Reading (N= 6 items), During Reading (N= 14 items), and After Reading (N= 2 items). Content validity ratios (CVRs) of the items are given in Table 4.

Table 4. Questionnaire Items with Content Validity Ratios (CVR)

Item No			NR	CVR	CVI
Before Reading	1	I select books that are appropriate for the developmental level of children	10	1.00	0.83
	2	I select books by paying attention to the interests of children	10	1.00	
	3	Before reading the book, I choose target words from the book that I think the children have not heard before	8	0.6	
	4	I show the cover of the book to the children before reading it	10	1.00	
	5	I give information to children about the author, illustrator and publisher of the book	8	0.6	
	6	I listen to children's opinions about the subject of the book	9	0.8	
During Reading	7	I read the title of the book aloud			0.84
	8	When I read the title of the book, I go over the words with my finger	9	0.8	
	9	I read by holding the pages of the book in a way that children can see	9	0.8	
	10	I read the book with intonation so that children can hear	10	1.00	
	11	I read the book by paying attention to the punctuation marks	10	1.00	
	12	I use different materials to attract children's attention while reading a book	8	0.6	
	13	I explain the words in the book that I think the children do not know	10	1.00	
	14	I use images to explain the words in the book that I think the children do not know	9	0.8	
	15	I ask questions that will connect the story in the book with their own experiences	10	1.00	
	16	I ask Wh questions while reading a book	10	1.00	
	17	I ask open-ended questions while reading a book	10	1.00	
	18	While reading a book, I leave some sentences unfinished and let the children complete them	10	1.00	
	19	While reading a book, I do some exercises to help children gain phonological awareness skills	9	0.8	
	20	When answering children's questions about the book, I explain with child-friendly words	10	1.00	
After Reading	21	After reading the book, I want the children to summarize the story	10	1.00	0.80
	22	After reading the book, I plan different activities about the words in the book	8	0.6	

Number of Expert: 10   NR: The number of expert to say *Required*

Content Validity Ratio (CVR): 0.62   Content Validity Index (CVI): 0.836

[(0.83>0.62) CVI> CVR]

Content Validity Ratios (CVR), developed by Lawshe (1975) are "factors that reveal the content or construct validity of a measurement tool" (cited in Yurdugül, 2005, p.2). Each item in the questionnaire used within the scope of the study was evaluated in accordance with expert opinions (N = 10) in terms of whether it measures the targeted structure or whether it is unnecessary. The formula used to calculate the CVRs was CVR = (Ne – N / 2) / (N / 2). "Ne" is the number of experts specifying what is "primary" and "N" indicates the total number of experts. According to the content validity criteria table of Veneziano and Hooper (1997), the statistical significance of the obtained CVRs was tested. The Content Validity Index (0.84) calculated for the items was compared with this value (0.62). In this regard, it is implicated that the questionnaire is statistically significant [(0.84>0.62) CVI> CVR]. On the other hand, a 5-point Likert-type rating scale identified as 1- 1.80 (Never); 1.81-2.60 (Rarely); 2.61- 3.40 (Sometimes) 3.41- 4.20 (Frequently); and; 4.21-5 (Always) was used in the questionnaire.

In the qualitative part, data were collected through a semi-structured interview form. The semi-structured interview allows the participants to answer the questions as broadly as they want and to examine the research in depth (Yıldırım & Şimşek, 2011). Three preschool teachers and two academicians working in preschool education department were consulted for the draft form. Following expert opinions, a pilot study was conducted with 5 preschool teachers and after piloting, the final form was developed. Some of the questions in the form are as follows:

- What do you usually pay attention to when selecting a book for reading activities? Why?
- What kind of methods do you use in book reading activities? Why?
- How do you evaluate book reading activities in preschool education?
- What do you say about the aims of book reading activities in preschool education?
- What are the most important characteristics that you think are necessary for preschool teachers to carry out effective book reading activities? Why?
- What kind of suggestions would you like to make for more efficient book reading activities? Why?

The validity and reliability criteria of Guba and Lincoln (1986) were used as a base. In this regard, for internal validity, the strategy of member checking was applied. For this, some participants for whom data were provided or interviewed were contacted a second time and asked whether the study findings accurately reflect their own thoughts to provide feedback. For external validity, as stated by Guba and Lincoln (1986), purposive sampling method was employed in this study. In addition, for transferability of the results to situations in similar participants and environments, direct quotations of the participants were included. The purpose of transferability is to help the readers of the study apply the results in their own work by describing the experiences of the participants in detail (Guba &Lincoln, 1986). For, dependability, both quantitative and qualitative data were included. Furthermore, two researchers took part in the collection, analysis and interpretation of the data. For confirmability, the methods and stages used in the research were defined clearly and in detail, and the raw data of the research were stored in a way that could be examined by others.

Research Ethics

Ethics committee approval was obtained for the study. The participants were included in the study on a volunteering basis, and they were ensured that their names and data would be kept confidential. They were informed about the purpose and stages of the study. It was also explained that the research findings could be shared with them, and they could provide feedback if they wanted to.

Data Analysis

Quantitative and qualitative data were analyzed separately. Frequency, percentage, arithmetic mean and standard deviation were used in the statistical analysis of the data obtained from the Interactive Book Reading Questionnaire. In the qualitative part of the study, each participant's answer was coded as P1-T (P: Participant; 1: Participant No; T: Preschool Teacher). The codes and themes obtained from the data were generated by using the content analysis that involves "interpreting similar data by bringing them together within certain concepts and themes and arranging them in a way that the reader can understand" (Yıldırım & Şimşek, 2011, p. 227).

FINDINGS

Quantitative Findings

The arithmetic mean, standard deviation, frequency and percentages for the interactive book reading questionnaire items were calculated and given below.

Table 5. Arithmetic Mean, Standard Deviation, Frequency and Percent Values Obtained from the Items in the "Before Reading" Sub-dimension of the Interactive Book Reading Questionnaire

Items	Mean	SD	A f %	F f %	S f %	R f %	N f %
1.I select books that are appropriate for the developmental level of children	4.73	.451	37 72.5	14 27.5	-	-	-
2.I select books by paying attention to the interests of children	4.51	.612	29 56.9	19 37.2	3 5.9	-	-
3.Before reading the book, I choose target words from the book that I think the children have not heard before	3.88	.816	12 23.5	24 47.1	12 23.5	3 5.9	-
4.I show the cover of the book to the children before reading it	5.00	.000	51 100	-	-	-	-
5.I give information to children about the author, illustrator and publisher of the book	3.69	1.41	21 41.2	10 10.6	10 10.6	5 9.8	5 9.8
6.I listen to children's opinions about the subject of the book	4.57	.575	31 60.8	18 35.3	2 3.9	-	-

A: Always; F: Frequently; S: Sometimes; R: Rarely; N: Never

As given in Table 5, in terms of the "Always" range, while the item with the highest percentage was " I show the cover of the book to the children before reading it" (f=51;100%), the item with the lowest percentage was: "Before reading the book, I choose target words from the book that I think the children have not heard before" (f=12; 23.5%). In terms of the "Never" range, only the item "I give information to children about the author, illustrator and publisher of the book" (f=5; 9.8%) were scored in this part of the questionnaire by the participants.

The items with the highest mean were the items "I show the cover of the book to the children before reading it" (Mean=5.00; SD=000), "I select books that are appropriate for the developmental level of children" (Mean=4.73; SD=.451), "I listen to children's opinions about the subject of the book" (Mean=4.57; SD=.575) and, "I select books by paying attention to the interests of children" (Mean=4.51; SD=.612) respectively while the items with the lowest mean were "I give information to children about the author, illustrator and publisher of the book" (Mean=3.69; SD=1.41) and, "Before reading the book, I choose target words from the book that I think the children have not heard before" (Mean=3.88; SD=.816).

Table 6. Arithmetic Mean, Standard Deviation, Frequency and Percent Values Obtained from the Items in the "During Reading" Sub-dimension of the Interactive Book Reading Questionnaire

Items	Mean	SD	A f %	F f %	S f %	R f %	N f %
7.I read the title of the book aloud	4.82	.518	45 88.2	3 5.9	3 5.9	-	-
8.When I read the title of the book, I go over the words with my finger	3.51	1.50	21 41.2	8 15.7	8 15.7	7 13.7	7 13.7
9.I read by holding the pages of the book in a way that children can see	4.86	.401	45 88.2	5 9.8	1 2	-	-
10.I read the book with intonation so that children can hear	4.88	.325	45 88.2	6 11.8	-	-	-
11.I read the book by paying attention to the punctuation marks	4.76	.473	40 78.4	10 19.6	1 2	-	-
12.I use different materials to attract children's attention while reading a book	3.80	.980	14 27.5	18 35.3	15 29.4	3 5.9	1 2
13.I explain the words in the book that I think the children do not know	4.43	.700	27 52.9	20 39.2	3 5.9	1 2	-
14.I use images to explain the words in the book that I think the children do not know	3.49	1.01	11 21.6	10 19.6	24 47.1	5 9.8	1 2
15.I ask questions that will connect the story in the book with their own experiences	4.31	.735	24 47.1	18 35.3	9 17.6	-	-
16.I ask Wh questions while reading a book	4.12	.683	15 29.4	27 52.9	9 17.6	-	-
17.I ask open-ended questions while reading a book	4.27	.666	20 39.2	25 49	6 11.8	-	-
18.While reading a book, I leave some sentences unfinished and let the children complete them	3.55	.966	10 19.6	14 27.5	22 43.1	4 7.8	1 2
19.While reading a book, I do some exercises to help children gain phonological awareness skills	3.86	.960	16 31.3	15 29.4	18 35.3	1 2	1 2
20.When answering children's questions about the book, I explain with child-friendly words	4.25	.796	21 41.2	21 41.2	8 15.7	1 2	-

A: Always; F: Frequently; S: Sometimes; R: Rarely; N: Never

Table 6 indicates that with respect to the "Always" range, while the items "I read the title of the book aloud", "I read by holding the pages of the book in a way that children can see and, "I read the book with intonation so that children can hear" had the items with the highest percentages (f=45; 88.2%), the items "While reading a book, I leave some sentences unfinished and let the children complete them" (f=10; 19.6%) and " I use images to explain the words in the book that I think the children do not know" (f=11; 21.6%) had the lowest ones. The item "When I read the title of the book, I go over the words with my finger" had the highest percentage (f=7; 13.7%) scored by the participants at the "Never" range while the items "I use different materials to attract children's attention while reading a book", "I use images to explain the words in the book that I think the children do not know", "While reading a book, I leave some sentences unfinished and let the children complete them" and, "While reading a book, I do some exercises to help children gain phonological awareness skills" had the lowest percentages (f=1; 2%).

In terms of arithmetic mean, while the items with the highest mean were "I read the book with intonation so that children can hear" (Mean=4.88; *SD*=.325), "I read by holding the pages of the book in a way that children can see" (Mean=4.86; SD=.401) and, "I read the title of the book aloud" (Mean=4.82; SD=.518), those with the lowest mean were "I use images to explain the words in the book that I think the children do not know"

(Mean=3.49; *SD*=1.01), "When I read the title of the book, I go over the words with my finger" (Mean=3.51; *SD*=.1.50) and, "While reading a book, I leave some sentences unfinished and let the children complete them" (Mean=3.55; *SD*=.966).

Table 7. Arithmetic Mean, Standard Deviation, Frequency and Percent Values Obtained from the Items in the "After Reading" Sub-dimension of the Interactive Book Reading Questionnaire

Items	Mean	SD	A	F	S	R	N
			f %	f %	f %	f %	f %
21.After reading the book, I want the children to summarize the story	3.82	.910	13 25.5	19 37.5	17 33.3	1 2	1 2
22.After reading the book, I plan different activities about the words in the book	3.61	.896	10 19.6	16 31.3	23 45.1	5 9.8	-

A: Always; F: Frequently; S: Sometimes; R: Rarely; N: Never

As seen in Table 7, the item with the highest percentage (f=45; 88.2%), was "After reading the book, I want the children to summarize the story" in terms of the "Always" range, the same item was also scored at the "Never" range (f=45; 88.2%). None of the participants scored the "Never" range for the item "After reading the book, I plan different activities about the words in the book." On the other hand, the arithmetic mean of both items was "Often" at Likert rating level.

Qualitative Findings

The emerging themes were "Book Selection", "Method" and, "Suggestions" from the analysis of qualitative data. The relevant codes took part under these themes.

According to the results obtained from the opinions of the participants, the theme "Book selection" and the codes under this theme were given in Figure 1.
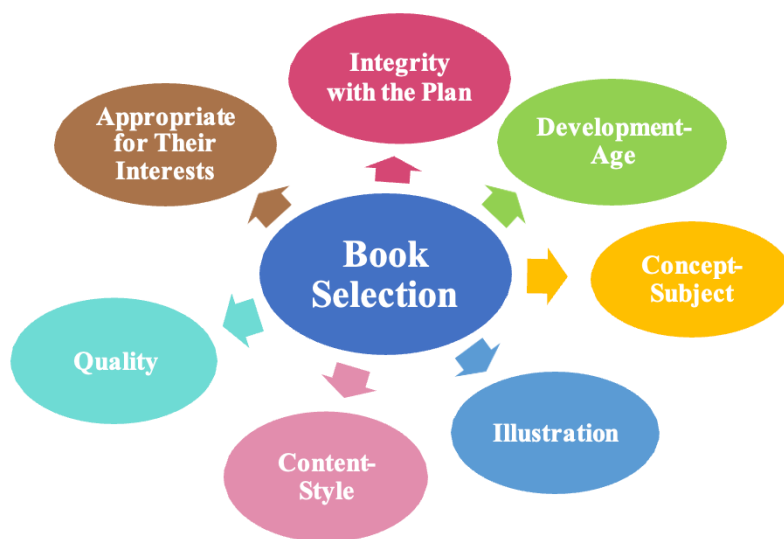
Figure 1. *Views of Participants on Book Selection for Reading Activities*

As given in Figure 1, when the data obtained from participants' views were analyzed, the codes emerging in the "Book Selection" theme were *Development-Age", "Quality", "Concept-Subject", "Illustration", "Content and Style" and, "Appropriate for interests."* Some direct quotations of the participants were given below:

I pay attention to the concept to be taught during the day, whether this concept is suitable for the age level, the flow of events and its illustration. It is necessary for their development, and important in terms of endearing the book to children (P4).

I pay attention to the integration of the book I selected with the plan, because I think that the subject we learned is better understood with the book (P5).

In order to attract more attention of the children and to reinforce the subject of that day, I make sure that it is appropriate for the age level of the children, that it is relevant to the topic of the day and that is of interested to children (P9).

I review which concept I will teach in which month, whether it is suitable for the developmental level of the children and I make sure that the pictures of the book are too much and the texts are less. I examine the book to see if I can obtain activities such as drama, art activity or music activity and I do a reading activity by integrating these review criteria (P30).

Most of the participants stated that the quality of the book is important. Some of these views were:

I pay attention to the quality of the paper, whether the pictures match the subject, the colors, whether the language used is appropriate, and whether the sentences match the content. Since children are illiterate, they read visually, so I pay attention to the details I mentioned. The style should also be age-appropriate (P11).

I pay attention to the quality of the book, its pictures, whether it is suitable for the level of children, whether the book contains insults or not (P12).

I check that there are no signs of neglect and abuse, that they are thought-provoking, that the content and pictures are compatible (P24).

I try to choose quality books. Thus, the subjects I want to give to the children and the process are very enjoyable (P31).

I pay attention to the author, the illustrator, the cover design and the quality of the paper. In the book I selected, there should be less text and more pictures. The traces it will leave on us and the children should be high. That's why a quality book is important (P29).

I pay attention to their quality because there are a lot of children's books, but sometimes the content can be very wrong and ridiculous (32).

Considering the opinions of the participants, they stated that they have selected books for reading activities according to the age and developmental level of children, and they have also preferred quality children's books because there are too many children's books and some of them have not suitable contents. They also stated that the children are illiterate yet. Because of children's doing visual reading, they have paid attention to the illustrations of the books and whether the subject and the illustration overlap. The participants also stated that they paid attention to the fact that the selected book was related to the concept and the topic to be given during the day, and that the book could be integrated with different activities. Some of the other factors that the participants paid attention to in the selection of the book were that the style used in the book was suitable for the age level of the children, did not contain insults, and there was no evidence of neglect and abuse.

In line with the views of the participants, the "Method" theme was generated as the second theme and the codes under this theme were given in Figure 2.
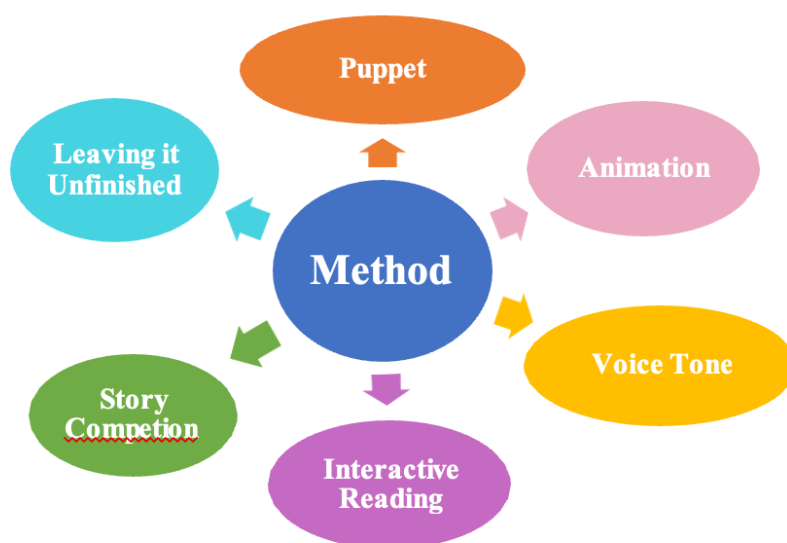
Figure 2. *Views of Participants on the Methods They Use in Book Reading Activities*

Figure 2 illustrates the codes that emerged in the "Method" theme. They were "Animation", "Puppet", "Interactive reading", "Voice tone", "Leaving unfinished" and, "Story completion." Some views of the participants were given below:

I use interactive book reading because it is much more effective on children (P3).

I choose puppets, changing the voice tone, books that include a lot of visuals in order to attract the attention and interest of children more (P9).

I pay attention to doing interactive book reading activities because the class dynamics and my students form the center and core of my studies in my teaching (P15).

I use voice changes to keep their attention alive (P17).

I use methods such as puppets, voice tone changing, story completion, animation and leaving it unfinished and I try to involve children actively by asking questions while reading (P28).

I pay attention to my vocalizations so that it can be a more effective expression, and sometimes we do animations. Furthermore, I use my facial expressions to attract the attention of children (P32).

In line with the views of the participants, it was revealed that they chose the methods used in the book reading activities to attract the attention of the children. In this direction, they stated that they have used interactive book reading activities, changed their voice tones, used puppets, and animated the books they read.

Considering the opinions of the teachers, they stated that they used interactive book reading to attract children's attention, changed the tones of voice, used puppets, and animated the book as the methods they used in book reading activities.

The suggestions given by the participants to make their reading activities more productive took place under the theme of "Suggestion". The codes of this theme were "Integrated Activity", "Short Story", "Ritual", "Eye contact", "Reading by Imitation", "Selecting Short Stories" and, "Tone of Voice" (See Figure 3).

Figure 3. *Views of Participants on Making Book Reading Activities More Efficient*

The theme of "Suggestions" given in Figure 3 was formed from the analysis of the data attained from the views of the participants on making the book reading activities more efficient. Some views of the participants under this theme were given below:

It is absolutely necessary to make eye contact with children, to pay attention to the tone of voice, gestures and facial expressions while telling or reading a story, and to support the integration of children with the story (P3).

Integrated activities should be used to make learning more efficient (P13).

I suggest choosing the right book and method suitable for the age of the student, determining a ritual to make the reading hours special (I close the curtains and say a nursery rhyme while doing this), giving parents an interactive book reading seminar to support reading at home and reading a book at least 3 times (P16).

The priority should be the selection of qualified books, the children should get out of the monotonous narrative and participate actively in the reading moment, and books should be integrated with the activities (P27)

Long stories should not be preferred; they can get bored quickly (P30).

I think pre- and post-reading rituals work, and doing different activities related to the book increases the interest in the book-reading process (P31).

Using the tone of voice well and reading by imitation attract the attention of children more (P33).

In line with the views of the participants, it was emphasized that short stories should be preferred so that the book reading activities would be more efficient and the children would not get bored quickly. The tone of voice should be used efficiently to attract the attention of the children. Rituals should be generated for the book reading activities and the activities integrated with the book should be planned.

DISCUSSION

This research was carried out with the aim of determining the preschool teachers' use of interactive book reading. It was concluded that the preschool teachers participated in the current study included book reading activities in their daily education flow, they have used the interactive book reading to increase the attention of the children and to reinforce the desired concept, but they did not have enough knowledge about the interactive book reading and did not apply the steps of the interactive book reading sufficiently.

According to the quantitative results, it is noteworthy that while all of the participants always show the cover of the book to children before reading the book, there were preschool teachers (f= 45; 88.2%) who stated that they always hold the pages of the book in a way that children can see while reading a book. However, it was expected that all preschool teachers would respond to this item at the "Always" range. In a study conducted by Işıkoğlu Erdoğan et al. (2016), it was yielded that the child's seeing the pictures, hearing the text and speaking during reading has supported the permanence of learning. In this study, most of the participants (N=24) stated that they always ask questions that can establish a connection between the story in the book and the child's own experience. However, Ward (2007) stated in his study that how different characters solve similar problems in different environments can guide children and adults in finding a solution to a problem they face. In the results of the research, the item with the highest frequency of "Never" option (f= 7; 13.7%) was the item "When I read the title of the book, I go over the words with my finger." It was concluded that the teachers did not implement one of the important steps of interactive book reading efficiently. Ezell and Justice (2000) in their study to increase print awareness, found that children's awareness of writing concepts, letters, words, and the relationship between writing and speech increased by enabling adults to point to writing in different ways while reading a book. Ün Başaran (2006) stated that if children are active, it increases the permanence of learning. While most of the participants chose target words before reading the book, it was concluded that the number of teachers who stated that they always used visuals while explaining these words decreased (f= 11; 21. 6%). However, it has been remarked that concepts can be learned more easily with definitions, visuals and conversations (Cameron, 2001). In a study that argued that there was a significant increase in children's understanding of the story with the book reading intervention program, an increase was observed between the answers given by the children to the questions asked about the book and the ability to sort the story arc according to the order in which the book that was read (Gölcük et al., 2015). In this regard, the majority of the participants stated that they wanted the children to summarize the story after the book reading activity.

Considering the qualitative results, it was stated that the participants have selected the books for reading activities according to the age and developmental level of the children. They also stated that there were too many children's books. However, they tried to prefer qualified children's books. In parallel with the findings of the study, Yükselen, Yumuş, and Işık (2016) conducted a study on the criteria of preschool teachers for selecting children's books and stated that preschool teachers have a high awareness of the physical characteristics of the books and their suitability for children's development when selecting children's books. As another finding, it was found that the participants paid attention to whether the subject and the illustration overlap in the selection of the book due to the fact that children do visual reading because they are not literate yet. In the study by Kılınçcı (2019) in which the effects of interactive and traditional book reading methods on the storytelling and illustration skills of children in the preschool period were examined, an improvement was observed in the use of figures in space, expression-story skills, shape-form and color use in illustration skills after the interactive book reading and it was observed that the children used the paper surface in a more planned way while drawing. Vukelich, Christie, and Enz (2014) emphasized that facial expressions, tone of voice, gestures and mimics should be adjusted while reading the text for qualified interaction. Parallel to this result, the participants of the current study stated that they used interactive book reading to attract children's attention as the method they used in book reading activities, and they changed their tones of voice. The participants stated that they have used puppets to attract the attention of the children and

that they have done the animation of the book. Aktaş (2021) stated that the dramatization, playing games and art activities after book reading may have facilitated the better understanding of the plots in the book by the children. According to Önder (2002), children perceive animation as a game. Animation activities allow children to enjoy the process and have fun (Gasparro & Bernadette, 1994).

CONCLUSION

It This study addressed to reveal preservice teachers' use of interactive book reading. The findings yielded that although preschool teachers have given importance to the selection of books in terms of content, suitability for age and child development level, they have not used interactive book reading efficiently. Especially, they are unable to put into practice the stages of effective book reading.

This study has some limitations. First, the number of the participants for the quantitative part of the study was small. Although the questionnaire was delivered to many preschool teachers, several of them did not complete and send the questionnaire back. However, studies with a broader scope and with a larger number of participants will provide more precise results. Second, a questionnaire was employed as a data collection tool developed by the researchers. However, a more robust quantitative evaluation requires studies using multidimensional analyzes of interactive reading across different variables. Last, in the qualitative part of the study, the data were collected through a semi-structured interview form. Data triangulation was not possible due to the COVID-19 process. However, data triangulation is important in increasing the internal validity of a study. Including observations as well as interviews makes the results stronger. In this regard, the current study employed both qualitative and quantitative methods together to increase internal validity and complementary findings were reached.

In line with the findings and limitations of the study, it is suggested that future researchers employ multiple data collection tools, conduct research on more samples, and include different methods in their research. It is also suggested to include interactive book reading in preschool education programs, and to organize interactive book reading seminars for preschool teachers and parents.

Acknowledgment

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Statements of Publication Ethics

Sivas Cumhuriyet University Ethics Committee issued a certificate of approval for the current research with the decision no. 27 on 03 February 2022 (E-60263016-050.06.04-136514)

Conflict of Interest

The authors of the current article declare that there is not conflict of interest.

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Rethinking the Practicum after the COVID-19 Crisis: Insights from Pre-service EFL Teachers

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Abstract

This qualitative study aims to investigate the insights of Turkish pre-service EFL teachers about their school practicum experiences after the pandemic. To achieve this aim, fourteen pre-service EFL teachers at a university in Turkey shared their experiences and observations for two semesters in the process of their school practicum. The relevant data was collected via weekly reflection papers and semi-structured face-to-face interviews. The results put forward that pre-service EFL teachers feel themselves unready and stressed after spending two years with online education and having fewer teaching practices. Also, this study indicates the changing classroom practices after returning to face-to-face education and the need to redesign school practicum in accordance with these alterations. Additionally, this study aims to make contributions to the relevant literature by giving place to the suggestions made by pre-service teachers in the post-pandemic era. The findings of this study also have implications for teacher education programs in terms of preparing pre-service EFL teachers for unexpected changes in education.

Keywords: School practicum, pandemic, pre-service teacher, pre-service EFL teachers.

COVID-19 Krizinin Ardından Öğretmenlik Uygulaması Deneyimi Üzerine Yeniden Düşünme: Hizmet Öncesi İngilizce Öğretmenlerinin Görüşleri

Öz

Bu nitel çalışma, Türkiye'deki hizmet öncesi İngilizce öğretmenlerinin COVID-19 pandemisi sonrasındaki öğretmenlik uygulaması deneyimlerine dair iç görülerini anlamayı amaçlamaktadır. Bu amaç doğrultusunda, Türkiye'deki bir üniversitedeki İngilizce öğretmenliği bölümünde öğrenim gören on dört hizmet öncesi İngilizce öğretmeninin iki dönem boyunca edindikleri tecrübeler ve yaptıkları gözlemler veri olarak kullanılmıştır. Veriler, haftalık yansıtma yazıları ve yarı-yapılandırılmış yüz yüze görüşmeler ile toplanmıştır. Çalışmada elde edilen bulgular, öğretmen adaylarının, iki sene süren çevrimiçi eğitim sonrasında kendilerini öğretmenlik uygulaması için yetersiz ve stresli hissettiklerini ortaya koymuştur. Bunun başlıca nedeninin, Eğitim fakültesindeki çevrimiçi derslerdeki yetersiz öğretim aktiviteleri olduğu belirlenmiştir. Buna ek olarak, katılımcılar, çevrimiçi eğitim sonrasında değişen sınıf içi pratikleri ve bu doğrultuda ortaya çıkan öğretmenlik uygulaması dersini yeniden tasarlama ihtiyacını dile getirmişlerdir. Öğretmen adaylarının bu konulara getirdiklerini öneriler sayesinde bu çalışmanın pandemi sonrası dönem için alan yazına katkı sunacağı öngörülmektedir. Son olarak, bu çalışmanın bulguları, öğretmen adaylarını eğitim alanındaki beklenmeyen gelişmelere hazırlayabilmek adına kullanılabilir.

Anahtar kelimeler: öğretmenlik uygulaması, pandemi, hizmet öncesi öğretmen, hizmet öncesi İngilizce öğretmenleri.

INTRODUCTION

Providing initial teaching practices in a real classroom atmosphere, teaching practicum plays a critical role in teacher training where pre-service teachers go through the process of thinking about teaching and the teaching profession (Yuan & Lee, 2014). During the practicum, pre-service teachers have opportunities to improve their teaching skills, enhance their pedagogical content knowledge, and apply strategies for classroom management under the supervision of mentor teachers (Farrell, 2008). Also, thanks to the practicum experience, pre-service teachers construct insights into being a teacher and how their practices affect learning in the classroom (Erduran & Kaya, 2018). Practicum relies on a collaboration among mentor teachers, student teachers and teacher educators to help pre-service teachers have positive experiences about the teaching profession and internalize what it means to be a teacher (Trent, 2013). On the other hand, practicum experience is sometimes challenging and complicated for pre-service teachers in terms of struggling with lack of confidence and shifting from student life to the professional arena (Moore, 2003). The COVID-19 pandemic has led to that type of a challenging process for teacher education as it affected both teaching and learning activities (Kidd & Murray, 2020). As one of the important components in EFL teacher education programs, school practicum was modified in various forms in order to address the requirements of the pandemic period (Kosar, 2021; Krishnapatria, 2020; Robinson & Rusznyak, 2020).

The COVID-19 pandemic has caused drastic changes in education in Turkey, as it has all over the world. After the explosion of COVID-19 cases in Turkey, both K-12 lessons and university level courses started to be delivered online (MoNE, 2020; YÖK, 2020). During the following term, teachers carried out lessons online besides very limited face-to-face sessions (MoNE, 2021a). At the beginning of 2021 Fall Semester, it was officially announced that universities would decide on their own education modalities by considering the latest status of the pandemic; therefore, while some universities were still pursuing undergraduate and graduate studies online, some of them were trying to implement hybrid education (YÖK, 2021a). Also, pre-service teachers completed their school practicum through virtual classrooms until September 2021 (YÖK, 2021b). As a result of the controlled normalization process after vaccination and hygiene precautions, pre-service teachers started their school practicum face-to-face in October 2021 (MoNE, 2021b). On the other hand, pre-service teachers who had a chance to attend face-to-face practicum sessions had had to take pedagogical content and content knowledge courses online when they were sophomores and juniors. Thus, pre-service EFL teachers might have had struggles while readjusting to face-to-face education after almost two years of remote learning (Mavuru & Pila, 2022).

This study is significant since it will hopefully make contributions to the discussion of post-COVID-19 teaching-learning practices of pre-service teachers. In the shade of the COVID-19 pandemic, the new era of education is described with a more inclusive and flexible mindset to teaching and learning; therefore, investigating insights of pre-service EFL teachers may lead to new ways of rethinking teacher education and school practicum. This study aims to put forward the present situation of pre-service EFL teachers at a practicum school. There are studies focusing on views of pre-service teachers about practicum in the course of the COVID-19 pandemic (e.g., Donitsa-Schmidt & Ramot, 2020; Kurtdede-Fidan & Yıldırım, 2022; Tekel et al., 2022) investigating online teaching readiness of university students and pre-service teachers (e.g., Ersin et al., 2020; Kidd & Murray, 2020; Yüksel & Basaran-Uysal, 2021), examining the cooperation among student teachers, mentors, and supervisors during online practicum (e.g., Babanoglu, 2021; Çoban & Vardar, 2021), and analyzing perceptions of teacher candidates on distance education in the course of the pandemic (e.g., König et al., 2020; Tatlı et al., 2022). Since very few studies (e.g., Guerra-Reyes et al., 2023; İlya & Daloğlu, 2023) have focused on insights of pre-service teachers about post-COVID-19 school practicum experiences, there is a research gap that will help teacher educators redesign school practicum components effectively. In light of these considerations, this study addresses the following research questions:

1. What insights do Turkish pre-service EFL teachers have on post-COVID-19 school practicum?
2. What are the suggestions of pre-service EFL teachers about school practicum after COVID-19 outbreak?

Literature Review

During the pandemic, the transition from face-to-face education to online learning brought forth new difficulties for teacher education programs in terms of keeping teacher candidates motivated and providing them with opportunities for professional development (Fernández et al., 2022). Karataş and Tuncer (2020) conducted a study to investigate the impact of distance education on language skills of pre-service English language teachers. The results showed that distance education affected their speaking skills negatively since speaking activities were ignored during online courses while writing was used as a new medium of communication. In parallel with this

study, Sayan (2020) examined views of instructors on distance education during the pandemic and the results showed that instructors found practice-based courses inefficient because of their limited communication with students and low motivation of students towards online practice. A study by Karatepe et al. (2020) found that student teachers showed a negative attitude towards online courses at education faculties. According to the participants, curricula of teacher education programs include both theoretical and practical courses; therefore, not every course is suitable for distance education. They especially drew attention to the fact that even practice-based courses were turned into theoretical sessions in distance education. In a similar vein, Tatlı et al. (2022) surveyed the views of teacher candidates on distance education in the course of the pandemic. It was found that teacher candidates showed low motivation towards distance education and mentioned their dissatisfaction with practice-based teacher education courses.

As an integral part of teacher education programs, the main goal of the practicum is to provide pre-service teachers with first-hand experience in teacher education programs (Graves, 2010). Thanks to the classroom activities, pre-service teachers blend theory and practices which allows them to identify their strengths and weaknesses (Schulz, 2005). Experiencing the real school context helps pre-service teachers have more realistic expectations and develop strategies in professional settings (Farrell, 2008). A study by Çoban and Vardar (2021) evaluated distance English language teaching education during the COVID-19 pandemic by investigating perspectives of student teachers and their instructors. The results showed that student EFL teachers and the instructors have both positive and negative experiences about online school practicum; however, they did not have negative opinions about online theoretical courses. In the Chilean context, Sepulveda-Escobar and Morrison (2020) conducted a study to unveil the challenges and advantages of online practicum. The study showed that student teachers had negative experiences during online practicum because of lack of immersion into a real classroom context. Likewise, Assunçao Flores and Gago (2020) investigated the school shutdowns in Portugal and reported the decrease in student engagement and lack of sufficient teaching practice opportunities for pre-service teachers.

During the controlled normalization process, schools were reopened with strict precautions amid COVID-19. After coming together in the shade of pandemic, both classroom practices and materials have been changed (Oranga & Matere, 2022). It is asserted that school closures and online education have made a negative effect on student achievement in primary and secondary education in terms of causing unwillingness to do homework and participate in lessons during the post-covid era (Hammerstein et al., 2021). Dimitrova (2022) investigated teaching pronunciation to middle school students during the controlled normalization process. She concluded in her study that unlike reading and writing, pronunciation is a very physical activity including using speech organs; therefore, pronunciation activities were mostly neglected when the students and the teacher wore face masks. In a similar vein, classroom materials have been changed during this process since teachers tended to use more technology-mediated and audio-visual tools in order to increase student engagement after a long time of computer-aided remote learning (Donham et al., 2022). According to Krishnapatria (2020), both teachers and students indicated that they were still in an adaptation process to the post-covid era at the time of her study. She concluded that switching to face-to-face education from online education during the new normal brought along the change in the entire learning experience, such as increase in the anxiety and boredom of students, classroom discipline problems, and technology addiction. In parallel with this study, Basinger et al. (2020) put forth that uncertainties emerged after unexpected cases, such as pandemic, results in student dissatisfaction, negative emotions, boredom, and stress in the classroom.

Yi and Jang (2020) examined the process of reopening of schools during the new normal in South Korea. They put forth that all stakeholders should take into consideration the potential long-term impact of remote learning on students and online teaching on teachers during the post-pandemic education. In the South African context, Nel et al. (2021) investigated the post-covid practices in practicum. Their study put forth that the way teaching and learning happened at practicum schools have been changed forever after the pandemic. It was found in the study that distance education revealed the urgent need for more practice-based components to teacher education programs in order to tolerate the semesters lost during online education. According to the study, the pandemic unveiled the vital importance of face-to-face classroom experiences during practicum and the need for developing practice-based activities hand-in-hand with the theoretical knowledge before school practicum.

In the Turkish context, school practicum is conducted via theoretical and practical components during the fourth year of EFL teacher education program. Pre-service teachers spend 14 weeks per semester, and they are placed at state or private schools where they conduct classroom observations and deliver lessons under the supervision of mentor teachers and university supervisors. Pre-service teachers complete pre-assigned observation

tasks and write weekly reflective papers as requirements of the practicum course. Also, they attend sessions with university supervisors to discuss theoretical and critical aspects of practicum experiences every week. As an integral and challenging part of teacher education programs (Smith & Lev-Ari, 2005), research studies on practicum were conducted in the Turkish context during and after the practicum. Tekel et al. (2022) investigated the policies on school practicum in different countries including Turkey. They mentioned that online school practicum caused significant problems because of limited access to schools, lack of opportunities to observe and teach lessons, and insufficient feedback sessions. A very recent study conducted by Polat (2022) found that after reopening the schools, pre-service teachers struggled with classroom management as a result of lack of practice opportunities because of online education. According to the study, pre-service teachers experienced individual and environmental uncertainties in the classroom after a long period of remote learning. Also, pre-service teachers mentioned the changing habits of young learners and the communication problems they experienced in the classroom. Finally, İlya and Daloğlu (2023) conducted a research study to explore the strengths, weaknesses, opportunities, and threats of adaptation of school practicum in an EFL pre-service teacher education program. They found that online components should become an integral part of face-to-face school practicum in the digital world we live in. Moreover, they concluded that teacher education curricula and school practicum should be redesigned during the post-covid process in order to be prepared when it is inevitable to make a shift to online education again.

METHOD

Research Design

This study uncovered insights of pre-service EFL teachers studying at a university in Turkey while taking a school practicum course after the COVID-19 outbreak. Another aim of this study was proposing suggestions for practicum experiences after the pandemic. To achieve this aim, this study was designed as a case study. Since case studies focus on real people in real environments, they offer a detailed and rich description of the situation examined (Cohen et al., 2007; Nunan & Bailey, 2009).

Participants and Sampling

Participants in this research were fourteen pre-service English language teachers studying at a university in Turkey. Their ages ranged between 22 and 24. During this study, the participants were taking both hybrid courses at a teacher education program and doing practicum face-to-face at a middle school in Istanbul, Turkey. All participants took teaching skills courses online when they were juniors. For the current study, purposeful sampling was employed in order to choose participants. All participants were senior year students who could provide in-depth and detailed information about the research topic (Creswell, 2013). In fact, there were nineteen pre-service teachers taking the practicum courses under the supervision of the university instructor. However, five of the students were excluded from this study because of the following reasons: one of them had repeat courses at the time when this study was conducted, one of them had taken the practicum course before and failed, and three of them did not write the reflection paper after their first two visits to the practicum school. The university and the practicum school have been cooperating for three years. The school assigned four mentor teachers to train and support pre-service EFL teachers. At the time of this study, all mentor teachers had at least ten years of teaching experience. Pre-service teachers spend eight hours a day for 24 weeks at this school under the guidance of their mentor teachers and university supervisors for two semesters. The participants were pre-service EFL teachers since this study aimed to investigate post-covid experiences of pre-service teachers with a long-term study.

Data Collection Tools

Yin (2003) suggests the following data collection tools for case studies: documents, interviews, archival records, observation, and physical artifacts. Thus, the relevant data were collected by means of reflection papers and semi-structured interviews throughout two semesters. Firstly, reflection papers were collected on weekly basis from the beginning of the first semester until the end of the academic year. The participants wrote the first set of reflection papers to share their opinions about teaching in general and jot down first impressions of the practicum school. The rest of the reflection papers were about their classroom observations and teaching experiences. Secondly, semi-structured interviews were conducted with five volunteer participants at the end of the second semester to learn their insights about face-to-face practicum experience after the COVID-19 outbreak. During the interviews, the participants were asked questions related to their face-to-face practicum experiences after a long time of online and hybrid learning at the teacher education program due to pandemic. In addition, they were asked

to share their observations about the impact of post-covid condition on classroom practices at the practicum school. All interviews were conducted individually and lasted 15-20 minutes.

Data Analysis

In data analysis process, stages suggested by Wellington (2000) were utilized in order to follow a systematic order. In a general sense, this process involves taking all the data in, taking them apart in accordance with the relevancy, and then putting them together again to have a fuller picture of the case being studied. The first step starts with reading and rereading the data. Then, the researcher stands back and reflects upon the data underlined. In the third stage, the data is categorized by using chunks. Before finalizing the data analysis process, similar categories are combined, and large categories are divided into two parts, if necessary. Then, similarities and contrasts are found while synthesizing the emerged categories. As a final step, the data is compared to the similar records in the literature. Throughout this process, the researcher goes back to reflect upon the data for the missing parts.

In this study, semi-structured interviews were transcribed verbatim. The researcher read all transcripts to group responses according to interview questions. In order to eliminate the unconnected data, most salient themes were selected and marked. Then, the data were reread to generate overall categories. After reflecting on the categories emerged, similar categories were merged. During this process, categories came from interview questions, vignettes of participants, and interpretations of the researcher. Presenting viewpoints of participants was very crucial to synthesize the data. To achieve this aim, different views were chosen on the same matter. Finally, the whole data were checked again to control whether there were any parts missed or not. A similar procedure was employed for the analysis of reflection papers written by the participants. The process of reading and rereading documents, underlining relevant parts, reflection upon them, revealing categories, and synthesizing different views was followed. After completing two stages of data analysis, interpretations of the meaning of the case are presented, which is also called *lessons learned* (Lincoln & Guba, 1985).

In qualitative studies, certain measures should be taken to ensure that findings and interpretations are trustworthy (Miles & Huberman, 1994). To this end, strategies suggested by Lincoln & Guba (1985) were adopted in this study. The first strategy used in this study was triangulation to facilitate validation of data by using more than one data collection tools. In addition, credibility was provided through member checking. Finally, the researcher coded the raw data twice to ensure dependability of this study.

Research Ethics

It is confirmed that this study followed the academic research ethics. Firstly, the research proposal was submitted to the social sciences scientific research ethics committee of the institution where the participants were studying. After receiving the approval, the researcher gave informed consent forms to the participants. The informed consent form included aim of the study, procedures, potential risks, and benefits of the study. The participants were also informed that participation in this study was voluntary. Additionally, all participants were given numbers (P1, P2 and so on) to ensure the anonymity.

FINDINGS

This part presents the findings of this study under three themes that emerged after the data analysis process. The themes can be listed as follows: *Classroom Management Issues after the Pandemic*, *Adjusting to the New Normal*, and *Redesigning English Language Classes*.

Classroom Management Issues After the Pandemic

The participants in this study declared that students could not stop using their mobile phones during the face-to-face lessons as a result of overuse of tablets and mobile phones in the course of online education. One of the pre-service teachers shared her observations with the following words:

> [P1] Because of the pandemic, students have spent too much time with their phones and tablets. This is the reason why students get distracted in the classes more easily. Our mentor teacher always walks around the classroom to monitor her students and make them focus on the classroom activities. I think that classroom management is harder than before (Reflection paper, October 2021).

According to the participants, classroom management issues stemmed from changing habits of students in consequence of the pandemic lockdown. It was mentioned by one of the participants that the pandemic increased individualism among students and caused classroom discipline problems during face-to-face education.

[P14] As students sat down alone in their homes during online education, they have difficulties in learning in a social environment and following classroom rules after the pandemic. They want to act alone, they do not want to come to the school, and they get bored very quickly. Sometimes our mentor teacher spends half of the lesson to maintain discipline (Reflection paper, October 2021).

They also stated that the mismatch between theory and practice in classroom management created need to develop new strategies after an unexpected pandemic and compulsory online education process.

[P7] So far, we have learnt many classroom management theories at the university. All of them were written for moderate classrooms. I do not think that the writers consider unexpected events that have downsides. Even our mentor teacher has difficulties with keeping their students on track because they spent their last two years seated in front of their computers. Should we still try to use the theories we have learnt? (Reflection paper, October 2021).

One of the participants shared that teachers have changed their classroom material preferences after the pandemic in order to maintain classroom discipline. According to her, students got used to learn by means of audio-visual materials during online education; therefore, teachers were trying to integrate technology more into the classroom. She wrote:

[P8] Visual materials became more important during online education. As far as I observed, teachers are trying to use more auditory and visual materials after the pandemic. For example, our mentor teacher starts her lesson with a web-based game. She told me that she had started to use this strategy to draw attention to her lessons during online education. Then, it became a classroom routine for them. I will use technology in my future classrooms; otherwise, it is difficult to draw their attention (Reflection paper, December 2021).

Two of the participants referred to their own teaching experiences while sharing their thoughts about classroom management issues after the pandemic. The excerpts of both participants implied that they felt anxious while teaching and keeping the classroom focused. According to them, the first reason for their anxiety was having fewer speaking opportunities during online education. They said:

[P3] We spent last year taking online courses. I did not even open my mouth during some online courses throughout the semester. We took even teaching skills courses online. So, it is very normal for me to feel stressed while teaching and managing the classroom (Interview, May 2022).

[P9] I wrote a lot last year, but I did not speak. Most of our courses were theoretical, even the practical ones. I did not feel myself ready to teach because I spent almost two years with online education. I was lucky that my mentor teacher was very supportive; however, I got stuck from time to time when I could not remember even very simple words in English. When my students felt my anxiety, they became noisier (Interview, May 2022).

In summary, students' changing habits and discipline issues arisen because the compulsory online education period created a need to alter classroom management strategies and classroom materials. Also, pre-service teachers felt themselves stressed and unready to teach face-to-face due to the fact that they took teaching skills courses online which resulted in having less teaching practices. Finally, it was summarized by pre-service teachers that traditional classroom management theories should be enriched with new techniques and strategies to address students who experienced long term online education.

Adjusting to the New Normal

After the COVID-19 pandemic, schools are still trying to adapt to the new normal process, which includes redesigning school life by taking precautions and designating new classroom routines due to changes brought by the pandemic. One of the participants indicated that students were unwilling to participate in lessons, and she shared her observations related to the uneasiness of students. Although she was happy with experiencing face-to-face practicum rather than e-practicum, she still had concerns about her own practicum experience. She said:

[P4] Students were extremely unwilling to participate in lessons. They first met with their teachers and classmates via Zoom because of quarantine. Even though it has been six weeks since the school started, most of them got used to neither their classmates nor their teachers. They were shy and afraid of making mistakes. Adaptation to the new normal is a big struggle for us as well because we were instructed online for two years (Reflection paper, November 2021).

Two of the participants indicated that returning to face-to-face education has made students leave their comfort zones. The participants observed that students feel pressure while doing tasks and they do not want to do

group work activities. One of the participants mentioned that although pair and group work activities were suggested in the courses at teacher education programs, the emerging situation created a need to design individual tasks. He said:

[P11] In my opinion, students feel uncomfortable. They want to sit alone while doing group work activities, which is not possible. I think instead of insisting on having group work activities, we should change our perspectives. We ignore the changing world. It is not rational to go on with traditional pre-pandemic theories. If our classrooms need a shift, we should do it (Interview, May 2022).

Finally, two of the participants stated during the interviews that students were unwilling to do homework as a result of experiencing difficulties in readapting themselves to the idea of having responsibilities. He shared his opinions as follows:

[P14] Students see doing homework as a burden. Teachers make photocopies and distribute them to their students as homework; however, we went through an online process for two years and students did their homework via online platforms. So, I think we should continue to use online platforms to give homework (Interview, May 2022).

In brief, pre-service teachers observed that students experience adaptation problems in new normal conditions. They also identified themselves with the students at the practicum school in terms of being instructed online for two years and feeling unready for face-to-face education. After a long time of online education, both pre-service teachers and students were struggling with adapting to altered classroom atmosphere.

Redesigning English Language Classes

Because of the precautions taken for the pandemic, cluster seating style was not recommended. The participants implied that row seating style was preferred; however, this arrangement inhibited classroom interaction and student engagement in the classroom. [P7] mentioned this with the following words: "I am at the end of my practicum experience; I have never seen a group-work or a pair-work activity. Neither parents nor students question this because of the pandemic. I can totally understand the reasons behind this, but English classes need interaction" (Interview, May 2022). Two of participants shared their experiences as follows:

[P2] We need horseshoe seating style for discussions while we need clusters for group work activities. As far as I observed, teachers use only row seating style. The thing we should question is whether the pandemic becomes an excuse in order not to do interactive and effort-needed activities in English classes. (Reflection paper, December 2021).

[P8] Unfortunately, I could not find a place to implement what I learnt from my instructors at the university. When I wanted to design group work activities or games during practicum, my mentor teacher warned me about the health measures (Interview, May 2022).

The last issue mentioned by the participants is the drawback of teaching pronunciation with a face mask. Language teachers generally ask students questions such as "*What's the position of my tongue?*", "*Did you watch my lips?*", "*Is my mouth open or closed?*"; however, teachers are now struggling to visualize pronunciation that their masks hide. The participants observed that teaching pronunciation is neglected with the *new normal* of teaching behind a face mask. One of the participants said:

[P6] It is very difficult to pronounce words with a face mask because students cannot see their teachers while pronouncing. When my mentor teacher cannot hear or understand her students because of face masks, she asks them to repeat themselves. This situation violates the course flow (Interview, May 2022).

Another participant mentioned the same issue and she also puts forth a suggestion for teaching practices after the pandemic. She expressed herself as follows:

[P7] When teachers pronounce a word, students cannot see their faces. Our practicum school is equipped with technological facilities, so teachers can use the projector for pronunciation practices. They can open a website to show her students word stresses and intonation. Also, there are videos recorded by English language teachers pronouncing different words. They can watch videos in the classroom (Interview, May 2022).

Likewise, it is asserted that pronunciation parts are skipped by teachers. Reading parts became the focus of English lessons due to the fact that reading activities are mostly done individually. She said:

[P8] Students must learn the correct pronunciation from their teachers. Nowadays, wearing a mask is an obstacle. Sometimes teachers lower their masks to show their mouths while pronouncing; however, they do not let their students lower their masks. So, they cannot check if they pronounce correct or not. I think

the best solution for that is using a tool for pronunciation tasks. Teachers can ask their students audio-record themselves on their phones and then email the recording to them (Interview, May 2022).

In a nutshell, modifying classroom seating with the demands of classroom activities is of vital importance to maximize classroom interaction and student engagement. According to the participants, even though there was a need to push students away from each other because of pandemic precautions, teachers should find a way to keep classrooms active and dynamic. It was mentioned by the participants that pronunciation activities were neglected most of the time because of wearing face masks. The participants suggested that teachers should benefit from technology-mediated learning and adapt themselves to approach teaching with a new perspective.

DISCUSSION & CONCLUSION

This study aimed to reveal the insights of fourteen Turkish pre-service EFL teachers about school practicum they experienced during the post-covid era. Also, their concerns and suggestions were examined in the current study. Since online education brought along technology addiction and the habit of individual learning among students, classroom practices have been changed after returning to face-to-face education. This finding was also found by Hammerstein et al. (2021) and Oranga and Matere (2022) to assert that school closures and online education have made a negative effect on students and led to changing classroom routines. The participants indicated that students have difficulties in learning in a social environment and following classroom rules after spending two years alone in front of their computers. The findings suggest that pre-service EFL teachers observed and experienced classroom management problems after reopening of the schools. Along with this, they observed that students get bored quickly and seek for the technology-mediated part of the lesson. Basinger et al. (2020) found similar results indicating the increase of boredom and anxiety of students after reopening of the schools. To this end, according to the participants of the current study, pre-service teachers need to learn new classroom management strategies to use in unexpected and challenging situations like pandemic and lockdown. Both the current study and the research conducted by Yi and Jang (2020) drew attention to the potential long-term impact of online education on teachers and students and the need to have a new perspective about this issue. In this sense, the participants also added that classroom management theories and strategies they learnt at teacher education faculties were written for moderate classrooms and should be reconsidered. Besides, it was found that as a result of remote learning, classroom materials were changed and became more technology-based after reopening the schools. In line with this finding, Donham et al. (2022) remarked that teachers preferred to use more technology-mediated and audio-visual materials in order to increase student motivation after a long time of remote learning.

With the reopening of schools, both students and pre-service teachers were still trying to adapt to the new normalization process (Krishnapatria, 2020). Pre-service EFL teachers felt unprepared, stressed, and anxious because of having very few teaching practices and speaking opportunities. This finding is in line with the research conducted by Polat (2022) indicating pre-service teachers' struggles with classroom management issues at the practicum school after the pandemic. Pre-service teachers shared that they experienced remote learning for two years as the students they taught in practicum school. To this end, they could totally understand students' unwillingness to participate in lessons. They also mentioned that although pair and group work activities were neglected because of health precautions, students were not offered interactive and collaborative activities instead of them. It was also concluded that using online platforms and computer-aided materials should be continued to use in order to make a smooth shift from remote learning to face-to-face education. In parallel with this, İlya and Daloğlu (2023) highlighted that online components should become an integral part of face-to-face practicum in a changing digital world and school practicum should be redesigned to prepare student teachers technologically for unexpected shifts to online education. Although the participants expressed their dissatisfaction about taking teaching skills courses online, they shared their contentedness to complete school practicum face-to-face. This finding is important since the study conducted by Tekel et al. (2022) revealed that online practicum resulted in lack of opportunities to observe and teach lessons and insufficient feedback sessions. However, the participants of the current study also mentioned that during the school practicum, they could not find a place to implement what they learnt at the teacher education program. In a similar vein, Karataş and Tuncer (2020) and Sayan (2020) put forward that online education affected pre-service teacher education negatively in terms of lack of speaking opportunities and having very few teaching practices. Moreover, although pre-service teachers did not mention their dissatisfaction with taking theoretical courses online (Çoban & Vardar, 2021; Sepulveda- Escobar & Morrison, 2020), both the current study and studies conducted by Karatepe et al. (2020), Tatlı et al. (2022) and

Assunçao Flores and Gago (2020) put forth pre-service teachers' dissatisfaction with taking practice-based courses online and their negative impact on their face-to-face school practicum. The current study presented a crucial finding that pre-service teachers who took teaching skills and pedagogy courses online when they were sophomores and juniors needed more practice opportunities and guidance to decrease their anxiety during face-to-face practicum. This finding is in line with the research conducted by Nel et al. (2021).

Since it is of vital importance to maximize classroom interaction in English classes, the participants indicated that teachers design more dynamic lessons in order to make their students engaged in the classroom after a challenging pandemic process. They also mentioned that pre-service teachers should be prepared and supervised in accordance with this need. In addition to this, it is suggested to benefit from technology in the classroom in order to decrease the classroom discipline issues, students' adaptation problems to the new normal, and also to create opportunities for activities which are neglected because of pandemic, such as pronunciation practices. In parallel with the current study, Dimitrova (2022) asserted that pronunciation activities were skipped because of wearing face masks. At this point, the current study put forward an important suggestion made by pre-service EFL teachers that students should be offered online platforms or technological tools to overcome the drawbacks of pandemic, such as asking students audio-record themselves and send the recording to their teachers for pronunciation practices.

In conclusion, the focus of the current study is two-fold: pre-service teachers started their school practicum in classrooms filled with students who spent their last two years with remote learning in front of their computers, and pre-service teachers who participated in face-to-face school practicum spent their last two years with online education and took teaching skills courses online. The findings revealed worthy concluding remarks about adapting the teacher education curricula to respond the unexpected changes and challenges in learning and teaching. Also, since the pandemic has reshaped many aspects of teaching and learning, this study makes contributions to the literature thanks to the suggestions made by pre-service EFL teachers. Finally, this study has the following limitations. First, fourteen pre-service EFL teachers participated in this study. To this end, the findings reflect insights from a group of pre-service teachers. So, this study can be expanded by reaching more participants. Besides, quantitative, or mixed-methods research studies may report views of larger groups. Lastly, this is a small-scale research study hence the findings of this study are not generalizable. Perceptions of mentor teachers can be added to the future studies in order to give a voice to their experiences, thus, to have more generalizable findings.

Statements of Publication Ethics

I declare that this study strictly followed the academic research ethics. Approval of ethics committee was taken from Istanbul Medipol University with the following document number: E-43037191-604.01.01-72787 on December 13, 2021.

Conflict of Interest

This study has no conflict of interest.

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The Relationship Between English Proficiency and EFL Students' Perceptions of ELF

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Abstract

A shift in the paradigm of English language instruction is proposed, driven by the recognition of English as a global language of communication (ELF). This acknowledgment makes it increasingly pragmatic for EFL students to prioritize the cultivation of effective global communication skills over the pursuit of *native* English language proficiency. Consequently, the examination of EFL students' perceptions assumes a pivotal role in understanding and addressing this shift. This study delves into the perceptions of EFL students regarding the use of English as a global language of communication and its educational implications. The participant pool comprised 570 students enrolled in the English preparatory program of a foundation university. Employing a quantitative research approach, a five-point Likert-scale questionnaire was utilized to systematically gather data. The results unveiled a consistent pattern across students' conceptions of English as a global language of communication and its instructional impacts, irrespective of their English proficiency levels. However, notable distinctions emerged upon closer scrutiny of the sub-dimensions, particularly concerning "English varieties" and "English teachers." It was discerned that as students progressed in their English proficiency, they exhibited an increased awareness of language varieties. Additionally, a preference for *native* English-speaking teachers over non-*native* counterparts became more pronounced. In the final section of this study, these findings are meticulously explored within the established framework. Subsequent to this exploration, comprehensive conclusions and pragmatic recommendations are presented.

Keywords: EFL students, English as lingua franca (ELF), English proficiency, Pedagogical implications.

İngilizce Yeterliliği ile Öğrencilerin İngilizcenin Ortak İletişim Dili Olmasına Dair Algıları Arasındaki İlişki

Öz

İngilizcenin küresel iletişimde oynadığı rol, İngilizce öğretim paradigmasında kaçınılmaz bir değişikliği beraberinde getirmektedir. Bu kabul, İngilizce öğrenen öğrencilerin artık sadece ana dili İngilizce seviyesinde dil becerisi hedeflemek yerine, etkili küresel iletişim becerilerini geliştirmeye öncelik vermelerini gerektirmektedir. Bu bağlamda, İngilizceyi yabancı dil olarak öğrenen öğrencilerin algılarının anlaşılması, bu değişimin etkilerini kavramada ve ele alınmasında önemli bir role sahiptir. Bu çalışma, İngilizceyi yabancı dil olarak öğrenen öğrencilerin, İngilizcenin küresel bir iletişim dili olma ve bu durumun eğitimsel etkilerine dair algılarını incelemektedir. Katılımcı havuz, bir vakıf üniversitesinin İngilizce hazırlık programına kayıtlı 570 öğrenciden oluşmaktadır. Beş noktalı Likert ölçekli bir anket aracılığıyla yapılan nicel araştırma, sistemli bir veri toplama yöntemi olarak kullanılmıştır. Sonuçlar, öğrencilerin İngilizcenin küresel iletişim dili olma ve bunun öğretimsel etkilere dair algıları konusunda, İngilizce yeterlilik düzeyleri gözetilmeksizin tutarlı bir model ortaya koymaktadır. Ancak, alt boyutlara daha yakından bakıldığında, özellikle "İngilizce çeşitleri" ve "İngilizce öğretmenleri" konularında belirgin farklılıklar ortaya çıkmaktadır. Öğrencilerin İngilizce yeterlilikleri ilerledikçe dil çeşitlerine ilişkin farkındalıklarının arttığı gözlemlenmiştir. Ayrıca, ana dili İngilizce olan öğretmenlere olan tercihin, dil öğretiminde daha belirgin hale geldiği tespit edilmiştir. Çalışmanın son bölümünde, elde edilen bulgular titizlikle ele alınarak kapsamlı sonuçlar ve pragmatik öneriler sunulmaktadır.

Anahtar kelimeler: İngilizce'yi yabancı dil olarak öğrenen öğrenciler, ortak iletişim dili olarak İngilizce, İngilizce yeterliliği, pedagojik çıkarımlar.

INTRODUCTION

English has wielded a profound global influence on nations where it is not the *native* language. Recent technological advancements and the forces of globalization have facilitated increased interaction among individuals from diverse linguistic and cultural backgrounds (Mrak, 2000; Friedman, 2005). English, in this context, serves as the common language of communication (Kesgin & Arslan, 2015), leading to the phenomenon known as English as a Lingua Franca (ELF) (Jenkins, 2006). The prominence of English in international communication underscores the need to stay abreast of evolving trends in education and the changing perceptions of the language worldwide. Simultaneously, the proliferation of English-medium departments in higher education has elevated the significance of studying English, with students recognizing its importance for academic success and enhanced future employment prospects (Doğançay-Aktuna & Kızıltepe, 2005). Consequently, substantial efforts are required to equip learners with the necessary language skills and enhance their ability to communicate effectively in the ever-expanding global arena.

In numerous countries, English is mandated as a compulsory school subject (Gómez Burgos & Pérez, 2015). However, traditional English Language Teaching (ELT) pedagogy, particularly in countries where English is taught as a foreign language, has become outdated and unresponsive to learners' needs, largely due to its adherence to *native* speaker ideology. This ideology, rooted in American and British English, posits that *native* English speakers serve as the ultimate role models and language instructors, given their connection to societies shaping *native* English standards and teaching practices. However, the current status of English as a global lingua franca necessitates a reevaluation of long-standing beliefs about English language pedagogy by both EFL students and teachers to align with present realities. This shift is evident in the prevalent emphasis on *native* English language and culture as a teaching strategy in Turkey's English as a Foreign Language (EFL) classes (Coskun, 2011; Atay, 2005), indicating a preference for *native* English speakers and their cultural norms in teaching strategies, curriculum, and standards. It is imperative to communicate the contemporary status of English as an International Lingua Franca (ELF) to students, providing them with the knowledge to make informed decisions on when and how to use English in diverse international contexts. Developing the ability to handle international relations with confidence and cultural sensitivity requires learners to make informed judgments, considering the complexities of ELF, adapting communication tactics based on cultural settings, and acknowledging the dynamic nature of the language.

Against this backdrop, the objective of this study was to assess the perspectives of tertiary-level Turkish EFL students regarding ELF and its instructional implications based on their proficiency levels (A1, A2, B1, and B2) as determined by the CEFR. The CEFR categorizes A1-A2 as basic users, B1-B2 as independent users, and C1-C2 as skilled users. Choosing tertiary-level English preparatory school students as the focus group stemmed from a gap in prior research, which had not thoroughly explored their viewpoints on how English is evolving as a lingua franca in foreign interactions, especially at the English preparatory school level. The perspectives of EFL students are crucial as they play a pivotal role in shaping language programs, and initiating change requires an understanding of their genuine sentiments. Consequently, language policymakers should scrutinize their opinions to make informed long-term decisions. In summary, this study aimed to contribute to the existing literature and the development of an English language teaching and learning program at the higher education level by examining the perspectives of tertiary-level English preparation program students.

Literature Review

In the Turkish context, English is crucial and widely used in industries such as technology, commerce, and tourism (Bektaş Çetinkaya, 2009). Consequently, English is the most often taught foreign language in Turkish schools (Karahan, 2007; Nilay, 2018; Şentürk, 2019). Moreover, English language training is mandatory from the second grade of elementary school through the university years. However, while some ELF research has been conducted in the Turkish setting with EFL students (Bayyurt et al., 2019; Griffiths & Soruç, 2019; Karakaş et al., 2016; Sönmez & Akyel, 2014; Kanık, 2013; Coşkun, 2011; Kaypak & Ortactepe, 2014), it is still far from sufficient. Similar to international studies, existing Turkish research consistently demonstrates that students, despite their understanding of English's function as the global lingua franca, do not choose to renounce their preference for *native* English standards.

The loyalty of EFL students to *native* English speakers and the teachers who teach their standards endures despite recent shifts in the position of English as a global language of communication (Buckingham, 2014). Functional characteristics based on real English usages in daily life are frequently subordinated to systemic

features based on *native* English norms, such as grammar rules and pronunciation standards, in English education, resulting in a focus on formal language acquisition rather than useful communication skills. Although one may be more essential than the other at various times, these accuracy features compatible with *native* English models can be divided into two categories: pronunciation (Waniek-Klimczak, 2015) and structural features (Leong & Ahmadi, 2017; Shahzadi & Janjua, 2016). The degree to which an individual's English ability matches that of a *native* speaker is used as a criterion for assessing their English proficiency due to the persistent emphasis on *native* English standards in industry and education. Hence, obtaining *native* English norms becomes a particularly pressing issue at school as well as in the business world in order to succeed (Almaqrn & Alshabeb, 2017). As a result, students dedicate a significant amount of time over their academic years to master *native*-like English.

Given the high proportion of non-*native* English speakers, there is a good likelihood that more English users will utilize it as a lingua franca in international contacts (De Meerleer, 2012). This highlights the issue of English language ownership, which grants non-*native* speakers the same rights as *native* speakers. In this context, English programs should teach students how to interact with varied English users throughout the world (Kirkpatrick, 2007), as well as how to communicate with non-*native* English speakers (Mansfield & Poppi, 2012). ELT stakeholders must respect ELF research recommendations due to shifting ownership and requirements (Coşkun, 2011). Though not comprehensive, ELF research has improved English teaching by fostering an awareness of the various linguistic and cultural settings in which English is used across the world (Calvo-Benzies, 2017). ELF research promotes an inclusive, flexible approach to teaching English that emphasizes successful communication and intercultural proficiency, as opposed to strict *native*-speaker requirements. These results underline the significance of continuous progress by opening the door for a more sophisticated English curriculum.

The outcomes of international research that have looked at how EFL students currently perceive ELF have been in favor of *native* English models. Since ELT industry places a value on *native* English-based grammatical accuracy (Shahzadi & Janjua, 2016), students place a higher importance on learning English grammar than on enhancing their communicative abilities (Nguyen & Lo, 2022; Umo-Udofia & Andera, 2018; Shahzadi & Janjua, 2016). Likewise, EFL students' preferences for *native* English speakers and their norms have been revealed in a variety of worldwide studies (Barrett, 2009; Dweik & Al-Barghouthi, 2014; Pilus, 2013; Walkinshaw & Oanh, 2014; Matsuda, 2003; Timmis, 2002; Kuo, 2006; Ranta, 2010). Even though they are aware that most of the people they will communicate with in the future will not be *native* English speakers, students do not want to abandon their *native* English alignment in language training (Jenkins et al., 2011; Pilus, 2013).

As demonstrated by the above-described studies with varying study foci, further investigation is still necessary to fully understand how university-level English majors in particular perceive ELF. The learning process and the outcomes for students may be positively or negatively impacted by their perceptions of the language that they are learning (Ahmed, 2015; Soleimani & Hanafi, 2013). Furthermore, how students perceive the English language may influence how much effort they put out when studying it (Umo-Udofia & Andera, 2018). In this way, poor learning results will arise from unfavorable perceptions of the language they are learning (Almaqrn & Alshabeb, 2017). One component that is likely to favorably influence how students perceive the language they learn is its practical significance in everyday life (Crystal, 2008). Because of this, the results will almost likely be unsatisfactory if *native* English standards, which are no longer applicable or practical, are placed as the students' ultimate learning goal (Mat & Soon, 2010).

Overall, the research on the current state of English as an international lingua franca reveals that Turkish EFL students do not appear to choose to abandon their preference for *native* English norms. Furthermore, given the need for additional research in EFL contexts, the current study intends to evaluate tertiary level EFL students' perspectives of ELF and its instructional consequences in connection to their English proficiency. The study addresses the following questions with this goal in mind.

1. Do tertiary level Turkish EFL students' perceptions of ELF differ depending on their English proficiency in terms of: a) English varieties, b) ELF features, and c) English learning objectives?
2. Does English proficiency affect how tertiary level Turkish EFL students perceive the educational implications of ELF?
3. Do tertiary level Turkish EFL students' perceptions of educational implications of ELF differ depending on their level of English proficiency in terms of: a) English teachers, b) English exams, c) target language culture, and b) global cultures?

METHOD

Design

This study delves into the perceptions of tertiary-level EFL students regarding English as a lingua franca (ELF) and explores its pedagogical implications relative to their English proficiency. To achieve this objective, a descriptive survey model was employed to gauge the sentiments of EFL students towards ELF and its educational ramifications. Notably, the chosen methodology, as outlined by Karasar (2012), scrutinizes the current state of affairs, specifically in an ELF-oriented context vis-à-vis an EFL-oriented education. In essence, descriptive research aims to impartially portray phenomena as they presently exist, refraining from altering any variables. In this context, the researcher adopted a descriptive survey approach to comprehend the pedagogical implications stemming from EFL students' perspectives on English as a lingua franca. Moreover, the researchers' commitment to elucidating current circumstances without altering participants' experiences is evident in their methodological choice. This approach aligns with a descriptive epistemology, emphasizing an understanding of things in their natural state rather than imposing or rationalizing causal relationships.

Setting and Participants

Regarding the context, the rationale behind choosing a foundation university in İstanbul as the context of this study was the fact that it drew students and scholars from around the world, given that English was the medium of teaching in a significant number of its departments. The English preparatory school where the research was conducted uses the Common European Framework of Reference for Languages (CEFR). The CEFR typically consists of three groups and six levels, which may be categorized as basic user (A1, A2), independent user (B1, B2), and master user (C1, C2) (CEFR Guide, 2013). However, English preparatory school terminates at the B2 level; as a result, the curriculum does not cover the C1 and C2 levels. Additionally, students are required to take a placement exam to determine their starting level featured by the CEFR before beginning the preparatory school program. Weekly classes are 26 hours and include 18 main courses, 4 reading and writing, and 4 listening and speaking. Notably, when a student completes a level of study with a grade average of 70 or more, they are deemed successful at that level and move on to the next. Finally, students complete the B2 level in the same manner, and then they are finished with the English preparation program. As research subjects, the study included a total of 570 EFL students. Each participant was a student who spoke Turkish as their *native* tongue. There were 255 male students and 315 female students among the 570 EFL students. Their ages ranged from 18 to 21, and they were selected through convenience sampling. International students were removed from this study in order to allow for a more focused examination of the Turkish background. The students who took part in the study were those who were continuing their education in accordance with the CEFR levels that were in effect at the time the study was performed. Thus, the number of EFL students who participated in the study and their respective CEFR modules were as follows: 126 were in A1, 222 were in A2, 112 were in B1, and 110 were in B2. During the investigation, there were no students at the C1 and C2 levels since they were not part of the English preparation program. As a result, these levels were not included in this study.

Instrument

For the current investigation, a questionnaire was created that included key topics gathered from relevant literature (Biricik Deniz et al., 2016; Cogo & Dewey, 2012; Coşkun, 2011; Jenkins, 2015; Seidlhofer, 2011; Sönmez & Akyel, 2014; Soruç, 2015; Ton & Pham, 2010). This instrument underwent expert consultation for feedback on items and instructions, followed by necessary adjustments. Subsequently, it was tested on English preparatory school students to identify and address any potential confusion. The Kolmogorov–Smirnov test indicated non-normal distribution (p = 0.000), while Cronbach's α demonstrated a reliable score of 0.71, considered satisfactory in social sciences (Dörnyei, 2007). Notably, no item significantly impacted α when removed, underscoring the questionnaire's consistency. Upon conducting a factor analysis utilizing principal component analysis, along with equimax rotation and Kaiser normalization, it was observed that all items cohesively formed a distinct group. After the pilot study and factor analysis, a total of twenty-six questions were collected, with 13 focused on ELF and the remaining 13 addressing the pedagogical implications of ELF. Importantly, there were no significant differences between the first and second revisions of the questionnaire except for the use of synonyms or antonyms in a few items.

Table 1. Subcategories of the Questionnaire about EFL Students' Perceptions towards ELF and its Pedagogical Implicantions related to their English Proficiency

Questionnaire	Subcategories
EFL Students' Perceptions Towards ELF	1. English Varieties
	2. ELF Features
	3. English Learning Goals
EFL Students' Perceptions towards the Pedagogical Implications of ELF	4. English Teachers
	5. Target Language Culture
	6. Global Cultures
	7. English Exams

Table 1 displays the subcategories derived from the factor analysis, organizing the survey items into coherent themes: English varieties, ELF features, English learning objectives, English teachers, target language culture, global cultures, and English exams. The first section of the survey probed participants' perceptions of ELF, while the second section explored their views on the pedagogical implications of ELF. Notably, items marked with an asterisk (*) in the questionnaire indicate reverse items (see Appendixes 1 and 2).

Data Collection and Analysis

The data collection process involved the use of a 5-point Likert-type questionnaire. At the outset of the study, permits were requested, including those from the ethics committee and participant consent forms. Students were also made aware that participation was voluntary. Additionally, participants were informed about the purpose of the investigation. Then, according to the number of students, printed versions of the questionnaire were produced. After completing these preliminary phases, the study was conducted in collaboration with classroom teachers. It took them about a half hour to respond to all of the questions and return the papers. A total of 570 students completed the questionnaire according to the guidelines. The researcher used SPSS 25 to analyze the data obtained in this research. A mix of descriptive and inferential statistics were used. Using the students' English competence as a predictor, a One-way ANOVA was done to see if the replies of the students varied in any manner. Certain items on the questionnaire were written in opposition to ELF in order to verify students' perspectives. To obtain aggregate results for overall study, the questionnaire items opposing the definition of ELF and its pedagogical effects were reverse coded in favor of the ELF viewpoint which were marked * in the questionnaires (Appendixes 1 and 2). Thus, it became possible to compare modules identified by the Common European Framework of Reference (CEFR), indicating the students' English proficiency levels.

FINDINGS

The initial research question aimed to explore the potential impact of English as a Foreign Language (EFL) students' proficiency on their overall perception of English as a Lingua Franca (ELF). To delve into this inquiry, quantitative data was systematically collected and subsequently subjected to analysis through both descriptive and inferential statistical methods. The ensuing presentation of results is encapsulated in the following tables, where Table 2 specifically delineates the descriptive statistics pertaining to EFL students' perceptions of ELF. This categorization is based on their varying levels of English proficiency, providing a nuanced understanding of the relationship between proficiency and perception.

Table 2. Descriptive Statistics on EFL Students' Perceptions of ELF Based on their English Proficiency Levels

	Modules	N	M	SD
EFL Students' Perceptions towards ELF	A1	126	3.25	.43
	A2	222	3.21	.45
	B1	112	3.31	.46
	B2	110	3.20	.48

Table 2 provides a comprehensive overview of the student population across modules A1, A2, B1, and B2. In addition to presenting the total number of students, the table includes mean values and standard deviations, offering insights into their perceptions of the ELF concept. Notably, regardless of their proficiency levels in English, all students exhibited a neutral stance towards the ELF construct. This neutrality manifested as a reluctance to acknowledge variations in English, a tendency to prioritize intelligibility over the correct usage of English, and a preference for focusing on international communication rather than adhering to either the American

or British models of English. Building on these observations, Table 3 delves into the results of a One-way ANOVA analysis, specifically exploring EFL students' perceptions of ELF based on their varying levels of English proficiency.

Table 3. Results of One-way ANOVA on EFL Students' Perceptions of ELF Based on their English Proficiency Levels

		Sum of Squares	df	Mean Square	F	Sig.
EFL Students' Perceptions	Between Groups	.830	3	.277	1.297	.275
towards ELF	Within Groups	120.770	566	.213		

*p<0.05

In Table 3, the absence of statistically significant variations in students' judgments regarding English as a Lingua Franca (ELF) becomes evident, both within and among groups ($F = 1.297$, $p = .275$), particularly in relation to their English language proficiencies. This suggests that the level of students' English competence does not exert a significant influence on their interpretations of the ELF concept. With a *p*-value exceeding .05, the lack of statistical significance further emphasizes the uniformity in perceptions. Consequently, discernible differences in opinions about the ELF concept among modules A1, A2, B1, and B2 are not observed. In summary, regardless of their English proficiency, students consistently maintain similar opinions about this phrase.

The initial research question further aimed to explore EFL students' perceptions of English as a Lingua Franca (ELF) in relation to their English competency, involving the evaluation of specific variables such as English varieties, English learning goals, and ELF features. The subsequent analysis delved into the examination of relevant sub-dimensions, with Table 4 presenting descriptive statistics detailing EFL students' perceptions of ELF-related variables across different levels of English proficiency.

Table 4. Descriptive Statistics on EFL Students' Perceptions of ELF Related Variables Based on their English Proficiency Levels

Modules	N	M	SD
English Varieties			
A1	126	2.91	0.70
A2	222	2.85	0.67
B1	112	3.06	0.71
B2	110	3.01	0.62
ELF Features			
A1	126	3.99	0.73
A2	222	3.88	0.69
B1	112	3.97	0.67
B2	110	3.76	0.75
Learning Objectives			
A1	126	2.68	0.73
A2	222	2.75	0.75
B1	112	2.73	0.76
B2	110	2.69	0.71

Table 4 presents the enrollment numbers for modules A1, A2, B1, and B2, while also providing mean values for key factors from the ELF questionnaire in each module—such as English varieties, ELF features, and English learning objectives. Notably, when comparing students' perspectives on ELF between modules focusing on ELF features and English learning objectives, no significant differences emerge. However, a noteworthy distinction surfaces in the context of English varieties, revealing a substantial variance in students' views on the meaning of ELF between modules A2 (*M* = 2.85) and B1 (*M* = 3.06). This disparity implies that students in the B1 module, characterized by greater experience and agreement, differ significantly from those in the A2 module regarding English varieties. Furthermore, a comprehensive examination of these variables within and across groups is elucidated. The subsequent analysis, detailed in Table 5, outlines the outcomes of a One-way ANOVA investigating how EFL students perceive ELF-related variables based on their English proficiency levels.

Table 5. Results of One-way ANOVA on EFL Students' Perceptions of ELF Related Variables Based on their English Proficiency Levels

	Sum of Squares	df	Mean Square	F	Sig.
English Varieties					
Between Groups	4.24	3	1.41	3.03	0.029*
Within Groups	264.15	566	0.46		
ELF Features					
Between Groups	3.56	3	1.18	2.35	0.72
Within Groups	286.37	566	0.50		
English Learning Objectives					
Between Groups	0.54	3	0.18	0.32	0.808
Within Groups	315.58	566	0.55		

*p<0.05

Table 5 illustrates the absence of a significant variation in ELF features and English learning objectives. However, a noteworthy discovery emerges as a statistically significant difference is detected in relation to English varieties ($F = 3.03$, $p = .029$). Specifically, students enrolled in module B1 exhibit a more favorable perception towards deviations from native-English varieties compared to their counterparts in module A2. To delve deeper into these group distinctions, a post-hoc Tukey test was conducted, revealing a significant disparity between modules A2 and B1 concerning this specific factor. The comprehensive results of this post-hoc analysis are presented in Table 6, shedding light on how EFL students perceive ELF-related variables based on their respective English proficiency levels.

Table 6. Results of Post-hoc Tukey Test on EFL Students' Perceptions of ELF Related Variables Based on their English Proficiency Levels

Modules (I-J)	SD	Sig.
English Varieties		
A1 - A2	0.07	0.872
A1 - B1	0.08	0.292
A1 - B2	0.08	0.638
A2 - B1*	0.07	0.035*
A2 - B2	0.07	0.170
B1 - B2	0.09	0.945
ELF Features		
A1 - A2	0.07	0.513
A1 - B1	0.09	0.997
A1 - B2	0.09	0.081
A2 - B1	0.08	0.692
A2 - B2	0.08	0.531
B1 - B2	0.09	0.148
English Learning Objectives		
A1 - A2	0.08	0.809
A1 - B1	0.09	0.951
A1 - B2	0.09	0.999
A2 - B1	0.08	0.994
A2 - B2	0.08	0.905
B1 - B2	0.10	0.983

*p<0.05

Table 6 presents the results, revealing that the factors influencing ELF features and English learning objectives do not show statistical significance. Put differently, when the *p*-value exceeds 0.05, the variations concerning these variables are deemed unimportant. Nevertheless, a notable contrast emerges in the realm of English varieties between modules A2 and B1 ($p = 0.035$). This discrepancy underscores a significant finding: as

students' progress from A2 to B1 proficiency levels, there is a concurrent enhancement in their understanding and acceptance of linguistic variations. This observation suggests a positive correlation between English proficiency and the capacity to comprehend and embrace diverse linguistic elements.

The third research question delved into the perceptions of English as a Foreign Language (EFL) students regarding the pedagogical impact of English as a Lingua Franca (ELF), considering their proficiency in English. To elucidate this inquiry, the subsequent data elucidates the ensuing implications. Specifically, Table 7 offers descriptive statistics that outline EFL students' viewpoints on the pedagogical ramifications of ELF, categorized according to their respective levels of English proficiency.

Table 7. Descriptive Statistics on EFL Students' Perceptions of Pedagogical Implications of ELF Based on their English Proficiency Levels

	Modules	N	M	SD
Students' Perceptions towards the Pedagogical Implications of ELF	A1	126	3.01	.49
	A2	222	2.98	.49
	B1	112	2.96	.52
	B2	110	2.84	.47

Table 7 illustrates the overall student enrollment in modules A1, A2, B1, and B2, offering mean values and standard deviations of their opinions regarding ELF's educational implications. Notably, the data reveals a consistent neutral perception among students, irrespective of their English proficiency, towards the pedagogical consequences of English as a Lingua Franca (ELF). This neutral stance is evident in their acceptance of English's role as a link language for international communication. Building upon this observation, further analyses are presented in subsequent tables. Table 8, for instance, showcases the results of a One-way ANOVA conducted to explore EFL students' perceptions of the pedagogical implications of ELF, categorized based on their levels of English proficiency.

Table 8. Results of One-way ANOVA on EFL Students' Perceptions of Pedagogical Implications of ELF Based on their English Proficiency Levels

		Sum of Squares	df	Mean Square	F	Sig.
Students' Perceptions towards the Pedagogical Implications of ELF	Between Groups	1.911	3	.637	2.592	0.52
	Within Groups	139.144	566	.246		

*p<0.05

The analysis of variance (ANOVA) results, presented in Table 8, revealed no significant differences in students' opinions on the instructional implications of English as a Lingua Franca (ELF), irrespective of their English proficiency level ($F = 2.592$, $p = .052$). As the omnibus test did not reach statistical significance, post-hoc tests were not conducted. A closer examination showed no significant variations in the judgments of ELF's instructional implications among specific proficiency groups (A1, A2, B1, and B2). Similarly, there were no noteworthy differences in students' perceptions of ELF's instructional consequences across different modules. In essence, these findings collectively indicate that English competence level does not exert a significant influence on students' perspectives regarding the educational outcomes associated with ELF.

The fourth research inquiry aimed to expand upon the scope of its predecessor by incorporating various dimensions, such as English instructors, English tests, target language culture, and global cultures. In Table 9, we present descriptive statistics elucidating EFL students' perceptions of the pedagogical implications arising from variables related to English as a Lingua Franca (ELF), stratified by their levels of English proficiency. This approach not only allows for a comprehensive exploration of the multifaceted aspects of ELF but also enables a nuanced analysis of how these factors may influence the pedagogical landscape for students at different proficiency levels.

Table 9. Descriptive Statistics on EFL Students' Perceptions of Pedagogical Implications of ELF Related Variables Based on their English Proficiency Levels

Modules	N	M	SD
English Teachers			
A1	126	2.88	0.85
A2	222	2.77	0.82
B1	112	2.62	0.81
B2	110	2.56	0.69
English Exams			
A1	126	2.91	0.75
A2	222	2.94	0.78
B1	112	2.95	0.80
B2	110	2.81	0.84
Target Language Culture			
A1	126	3.36	0.97
A2	222	3.43	1.05
B1	112	3.53	0.96
B2	110	3.21	0.92
Global Cultures			
A1	126	3.16	1.09
A2	222	3.16	1.07
B1	112	3.25	0.97
B2	110	3.25	1.00

Table 9 provides a comprehensive overview of student enrollment in modules A1, A2, B1, and B2. It also presents mean values for key factors influencing the pedagogical consequences of English as a Lingua Franca (ELF) within each module. These factors encompass English teachers, English exams, target language culture, and global cultures. The analysis reveals no significant disparities across modules concerning EFL students' perspectives on the pedagogical consequences of ELF in relation to variables such as exams in English, British culture, and global cultures. Nevertheless, a noteworthy distinction emerges when examining the influence of English teachers on students' perceptions. Specifically, a substantial gap is identified, with module B2 students displaying a greater inclination towards having *native* English teachers in their classes compared to their counterparts in module A1. To further delve into these variations, Table 10 outlines the results of a One-way ANOVA, specifically focusing on EFL students' perceptions of the pedagogical implications of ELF-related variables categorized by their English proficiency levels.

Table 10. Results of One-way ANOVA on EFL Students' Perceptions of Pedagogical Implications of ELF Related Variables Based on their English Proficiency Levels

	Sum of Squares	df	Mean Square	F	Sig.
English Teachers					
Between Groups	7.87	3	2.62	4.02	0.007*
Within Groups	368.85	566	0.65		
English Exams					
Between Groups	1.42	3	0.47	0.75	0.523
Within Groups	358.51	566	0.63		
Target Language Culture					
Between Groups	6.19	3	2.06	2.07	0.102
Within Groups	562.99	566	0.99		
Global Culture					
Between Groups	1.04	3	0.35	0.32	0.811
Within Groups	618.20	566	1.09		

*$p < 0.05$

In the analysis presented in Table 10, a One-way ANOVA was utilized to explore potential variations in the three pedagogical implications associated with English as a Lingua Franca (ELF) factors—namely, English exams, target language culture, and global cultures—both within and between groups. The obtained results indicated an absence of statistically significant differences across these factors ($F = 4.02$, $p = .007$). Notwithstanding, a notable distinction surfaced, particularly with respect to English teachers. Subsequent post-hoc Tukey testing brought to light a significant difference ($p = .01$) between modules A1 and B2 regarding the inclination toward *native* English teachers. Consequently, students enrolled in module B2 exhibited a stronger preference for *native* English teachers in English Language Teaching (ELT) classrooms compared to their counterparts in module A1. For a more in-depth exploration of EFL students' perceptions regarding the pedagogical implications of ELF-related variables, the detailed results of the Post-hoc Tukey Test, categorized by their English proficiency levels, can be found in Table 11.

Table 11. Results of Post-hoc Tukey Test on EFL Students' Perceptions of Pedagogical Implications of ELF Related Variables Based on their English Proficiency Levels

Modules (I-J)	SD	Sig.
English Teachers		
A1-A2	0.09	0.603
A1-B1	0.10	0.064
A1-B2*	0.10	0.011*
A2-B1	0.09	0.384
A2-B2	0.09	0.106
B1-B2	0.10	0.932
English Exams		
A1-A2	0.08	0.991
A1-B1	0.10	0.975
A1-B2	0.10	0.779
A2-B1	0.08	0.998
A2-B2	0.09	0.538
B1-B2	0.10	0.547
Target Language Culture		
A1-A2	0.11	0.912
A1-B1	0.12	0.555
A1-B2	0.13	0.669
A2-B1	0.11	0.838
A2-B2	0.11	0.229
B1-B2	0.13	0.084
Global Cultures		
A1-A2	0.11	1.000
A1-B1	0.13	0.906
A1-B2	0.13	0.907
A2-B1	0.11	0.895
A2-B2	0.12	0.896
B1-B2	0.13	1.000

*$p<0.05$

The investigation into students' perceptions of the pedagogical implications of ELF factors for modules A1, A2, B1, and B2 is extended by examining the findings presented in Table 11. The table illustrates that, for the three identified factors—English exams, target language culture, and global culture—no statistically significant differences exist. Put simply, when $p > .05$, there is no meaningful distinction between these variables. However, a noteworthy contrast emerges in relation to the factor of English teachers, with a significant difference observed between modules A1 ($M = 2.88$) and B2 ($M = 2.56$). These results imply that as students progress from level A1 to B2, there is a discernible shift in preference, indicating a greater inclination to prioritize *native* English teachers over their non-*native* counterparts in classroom settings.

DISCUSSION & CONCLUSION

This study initially delved into the perceptions of EFL students regarding ELF across varying English proficiency levels (A1, A2, B1, and B2), focusing on English varieties, ELF features, and English learning objectives. The findings indicated no statistically significant differences in how EFL students, irrespective of their proficiency levels, perceived ELF in general. A neutral stance prevailed across all groups concerning English's status as a lingua franca and how it related to their perceptions of *native* English varieties. However, past research highlighted student preferences for *native* English due to factors such as pronunciation, learning objectives, and social prestige, though no explicit preference for *native* English variations emerged within this study.

A more in-depth exploration of ELF sub-dimensions, specifically English varieties, unveiled a noteworthy discrepancy. Statistical analyses revealed that students in the A2 module displayed less awareness of global diversifications in English compared to their counterparts in the B1 module. The results indicated that as English proficiency levels increased, so did students' awareness and acceptance of the heterogeneity within the English language. Lower-level students tended to perceive English as more monolithic and standardized, governed by consistent rules. This aligns with previous research by Galloway (2013) and Subtirelu (2013), who found that students' expectations of ELF were influenced by their views on *native* English, language learning pedagogy, and anticipated achievements.

Furthermore, aligning with CEFR level descriptions, students in A1 and A2 modules were categorized as basic users capable of communication in familiar contexts. In contrast, B1 and B2 level students were characterized as autonomous users capable of navigating unforeseen linguistic challenges. The CEFR positions B1 as a transitional level where students no longer rely solely on familiar linguistic properties. At this stage, students begin to recognize differences in English, prompting a reconsideration of their earlier perceptions of the language's "monolithic conceptualization" (Hall, 2017, p. 137). However, an increased awareness of English variations at higher levels, specifically B1 and B2, did not imply a complete abandonment of *native* English models, especially considering that C1 and C2 levels were not part of the English preparatory school curriculum.

Overall, the first section of this study revealed a nuanced understanding of how EFL students perceive ELF at different proficiency levels, shedding light on the influences of English varieties, ELF features, and learning objectives. While a neutral stance prevailed regarding ELF in general, disparities emerged when examining English varieties in more detail. These findings contribute to our understanding of how students' perceptions evolve as they progress through various English proficiency levels, offering valuable insights for language educators and curriculum developers.

The second section of this study delved into the perceptions of EFL students regarding the pedagogical implications of English as a Lingua Franca (ELF). The investigation considered English teachers, target language culture, global cultures, and English examinations, categorizing responses based on English proficiency levels (A1, A2, B1, and B2). Despite these distinctions, the overall statistical analysis revealed a consistent trend across all proficiency levels: EFL students exhibited a collective hesitation to recognize ELF classroom practices, attributing this reluctance to the prevailing influence of *native* English dominant pedagogy. This finding aligns with existing research that highlights the resistance of both teachers and students to embracing ELF's implications, particularly due to concerns related to assessments (Bayyurt et al., 2019; Griffiths & Soruç, 2019; Jenkins et al., 2011; Kanık, 2013; Sönmez & Akyel, 2014).

Further exploration of the sub-dimensions of ELF's pedagogical implications uncovered a notable distinction between modules A1 and B2, particularly concerning English teachers (*native* and non-*native*). Specifically, students in the B2 module expressed a preference for teachers whose first language is English, echoing earlier studies (Sönmez & Atay, 2009; Ürkmez, 2015). As English proficiency advanced, students increasingly viewed *native* English speakers as role models for English language education. Conversely, students in the A1 module exhibited a preference for non-*native* teachers, particularly Turkish English teachers, over their *native* counterparts. This preference was rooted in the need for grammar explanations in their *native* language during the early stages of language learning (Arıkan et al., 2008).

Corroborating these findings, research by Ürkmez (2015) and Sönmez and Atay (2009) highlighted that, in higher-level classes, students favored *native* English-speaking teachers for speaking practice and exposure to target language culture. In contrast, they leaned towards non-*native* English teachers in lower-level classes, valuing their assistance in learning grammar and writing. Lower-level students perceived Turkish English teachers as more effective in providing guidance on English grammar. However, as students progressed through their modules, there was a discernible shift in their preferences. The desire to attain a native-like competence, influenced by the

prevailing ideology of *native* English in English Language Teaching (ELT), led students to expect non-*native* English teachers to focus on receptive skills at lower levels and *native* English teachers to emphasize productive skills at higher levels.

In conclusion, this study aimed to explore EFL students' perceptions of English as a Lingua Franca (ELF) and its instructional implications, specifically examining these perceptions in relation to their English proficiency levels as determined by the Common European Framework of Reference for Languages (CEFR). The study's findings suggest that, overall, there were no significant differences in EFL students' views on the concept of ELF when considering their English proficiency levels. Regardless of their proficiency, all students tended to adopt a neutral stance toward the phenomenon of ELF when evaluating various aspects of an ELF questionnaire. However, upon closer examination of the questionnaire components, a noteworthy disparity emerged in students' perspectives on different types of English in modules A2 and B1. This divergence could be attributed to an increase in their English proficiency levels. As students' proficiency improved, so did their comprehension and discernment of the various types of English. Similarly, statistical analysis revealed no substantial variations in EFL students' assessments of the instructional consequences of ELF concerning their English skills. In this regard, all students, irrespective of their proficiency, displayed an ambivalent perception towards the implementation of ELF in the classroom. Yet, a more detailed exploration of the pedagogical implications of ELF questionnaire components identified a significant difference in the perceptions of students in modules A1 and B2, particularly concerning the role of English teachers. As EFL students' English proficiency increased, there was a preference for *native* English speaker teachers in their classrooms. Consequently, the study concludes that EFL students tend to adopt a neutral standpoint rather than outright denial of ELF, a trend consistent with findings from various studies (Cogo, 2010; Kalocsai, 2009; Peckham et al., 2012), which suggest a growing receptivity in perceptions toward ELF.

The implications derived from this study bear significance for the methodology employed in English as a Foreign Language (EFL) teaching. As the definition of EFL has undergone a noteworthy evolution, transitioning from a politically correct stance to one that is functionally purposeful, specifically as English transforms into a lingua franca, it becomes imperative for students in our globalized society to grasp the contemporary linguistic realities of the English language. In this context, adopting an EFL teaching style that critically evaluates *native* English ideology and pedagogy can foster a more tolerant perception of unorthodox Englishes, their speakers, and associated cultures. It is crucial for students to be exposed to the linguistic diversity and non-*native* variations stemming from evolving sociolinguistic dynamics in the modern world, moving beyond an exclusive focus on *native* English variants (Galloway & Rose, 2013; Kemaloğlu Er & Bayyurt, 2019; Kemaloğlu Er & Biricik Deniz, 2020). Consequently, EFL teaching methods should strive to enhance students' awareness of various models of English, both spoken and written, thereby augmenting their ability to interact and communicate effectively with those using English as a second language. Furthermore, the findings of this study hold implications for tertiary-level English preparatory school programs. Consequently, program planners should reassess the components of English teacher selection, target language culture incorporation, global cultural integration, and English proficiency assessments, all within the framework of English as a Lingua Franca (ELF). Acknowledging the contemporary reality that English has evolved into a multi-centric language, the English preparatory school curriculum must reflect this characteristic. However, this crucial aspect is frequently overlooked, and English preparatory programs often adhere to standardized English models that fail to meet the needs of present-day learners. Thus, when crafting curricula for these programs, organizers must reevaluate their perspectives based on ELF research and implement necessary updates to align with the changing landscape of English language usage.

This research, despite its contributions, is not without limitations. Firstly, the study was confined to a single institution, diminishing the generalizability of its findings. The exclusivity of the context raises concerns about the relevance and applicability of the results to other settings or populations. To enhance the study's external validity, future research should aim for a more diverse range of contexts. Secondly, while this study exclusively utilized a quantitative methodology, employing a mixed-methods approach could offer a more comprehensive analysis. Relying solely on quantitative techniques may result in a one-dimensional analysis that overlooks nuanced aspects of the research topic. Thirdly, expanding the participant count is crucial to bolster the study's statistical power, generalizability, and the credibility of the conclusions drawn from the collected data. A larger participant pool would provide a more robust foundation for meaningful insights. Furthermore, the restriction to Turkish students in this study narrows its scope and limits the generalizability of the results. A comparative analysis involving both Turkish and international higher education students would offer a broader perspective, allowing for a more comprehensive understanding of potential distinctions or similarities between these groups.

Looking ahead, future research should explore evolving trends in English Language Teaching (ELT) in light of the prospects for English as a Foreign Language (EFL) students. Such research would contribute to the field by operationalizing the changing realities of English in higher education and beyond, addressing the dynamic landscape of language education.

Statements of Publication Ethics

The author affirms that there are no unethical problems with this study. The approval was received from Istanbul Sabahattin Zaim University (approval date:28.01.2021 and number:2021/01).

Conflict of Interest

The author states this study has no conflict of interest.

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Determination of Preservice Science Teachers' Levels of Competence in 21st-Century Skills

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Abstract

The purpose of this research was to identify the 21st-century skills of preservice science teachers (PSTs) and compare their skills in terms of gender, year of study, and university. For this purpose, a cross-sectional survey was used to collect data from eight state universities in the Aegean region. The sample consisted of 799 first-, second-, third-, and fourth-year PSTs studying in the 2019-2020 academic year. For data collection, a 21st-century skills scale was developed based on the sub-sets of 21st-century skills existing in the scale development and adaptation studies. According to the research results, female PSTs had statistically significantly higher scores than male PSTs in the communication sub-scale of the 21st-century skills scale. Additionally, PSTs' communication and creativity scores differed significantly according to their year of study. Third-year and second-year PSTs had higher creativity scores than first-year and fourth-year PSTs. Third-year PSTs also had higher communication scores than first-year and fourth-year PSTs. PSTs' communication and cooperation scores also differed significantly according to their university. PSTs studying at universities that accept students scoring lower on the university entrance exam had higher communication and cooperation scores. In line with these results, future work might help PSTs acquire and develop 21st-century skills.

Keywords: 21st century skills, gender, year of study, pre-service science teachers.

Fen Bilgisi Öğretmen Adaylarının 21. Yüzyıl Becerilerine Yönelik Yeterlik Düzeylerinin Belirlenmesi

Öz

Bu araştırmanın amacı, fen bilgisi öğretmen adaylarının 21. yy becerilerini belirlemek ve cinsiyetlerine, sınıf düzeylerine ve üniversitelerine göre 21. yy becerilerini karşılaştırmaktır. Bu amaçla Ege bölgesindeki sekiz devlet üniversitesinden veri toplamak için kesitsel tarama kullanılmıştır. Araştırmanın örneklemini 2019-2020 eğitim öğretim yılında 1., 2., 3. ve 4. sınıfta öğrenim gören toplam 799 fen bilimleri öğretmen adayı oluşturmaktadır. Veri toplamak amacıyla literatürde yer alan ölçek geliştirme ve uyarlama çalışmalarından 21. yüzyıl becerilerinin alt boyutları toplanarak 21. yüzyıl becerileri ölçeği geliştirilmiştir. Araştırma sonucunda, kadın fen bilgisi öğretmen adayları, 21. yy becerileri iletişim alt boyutunda erkek katılımcılara göre istatistiksel olarak anlamlı düzeyde daha yüksek puan almıştır. Ayrıca katılımcıların iletişim ve yaratıcılık becerileri puan ortalamaları sınıf düzeyine göre anlamlı farklılık göstermiştir. Üçüncü ve ikinci sınıftaki öğretmen adayları birinci ve dördüncü sınıftaki öğretmen adaylarından daha yüksek yaratıcılık puanına sahiptir. Üçüncü sınıftaki öğretmen adayları birinci ve dördüncü sınıftaki öğretmen adaylarından daha yüksek iletişim puanına sahiptir. Katılımcıların iletişim ve işbirliği becerileri puan ortalamaları üniversitelerine göre anlamlı farklılık göstermiştir. ÖSYM puan sıralaması daha düşük olan üniversitelerdeki öğretmen adaylarının iletişim ve işbirliği puanları daha yüksektir. Bu bulgular ışığında 21. yy becerilerinin katılımcılara kazandırılması ve geliştirilmesine yönelik çalışmalar yapılabilir.

Anahtar kelimeler: 21. yüzyıl becerileri, cinsiyet, sınıf düzeyi, fen bilgisi öğretmen adayları.

INTRODUCTION

In recent years, rapid technological, scientific, and economic changes have led governments and societies to search for a new approach to education in terms of skills to raise people who can meet the needs and expectations of the 21st century (Stewart, 2010; Wilmarth, 2010). People need 21st-century skills in their daily life including education and work settings within the requirements of the current century. In other words, 21st-century skills are the most needed skills for 21st-century people (Griffin et al., 2012). People need these skills for their jobs and careers. In addition, the skills for self-actualization are different in the 21st century compared to the 20th century. The most important reason for this difference is the development of new information and communication technologies. National and international research institutes work hard to determine skills and competences that are valued in the 21st century and have evolved in tandem with the fast expansion of communication and information as well as the rapid growth of global economy (Karakaş, 2015; Reimers & Chung, 2016). A broad set of cognitive and affective skills that promote achievement are now referred to as 21st-century skills and are divided into several categories (Greenhill & Petroff, 2010). The major three categories are as follows: Information, Media and Technology Skills, Learning and Innovation Skills, and Life and Career Skills. They have been given a fresh viewpoint in light of current historical events, globalization, and the digital era. Higher education institutions and private organizations have proposed extensive definitions. Partnership for 21st Century Skills (2009) divided these skills into three main themes and seventeen subthemes:

• Information, media, and technology skills: Media literacy, technology literacy, information literacy

• Learning and innovation skills: Innovation, creativity, problem solving, critical thinking, collaboration, and communication

• Life and career skills: Adaptability, flexibility, self-direction, initiative, leadership, social and cross-cultural skills, responsibility, productivity (Partnership for 21st Century Skills, 2009).

Teachers have a key role in helping students acquire these skills because teachers are the key actors of today's education system in terms of upskilling. Designing, implementing and evaluating creative ideas, having learning experiences to engage students and enhance learning, enriching professional practice, and presenting positive models are the main characteristics of 21st-century teachers. The International Society for Technology in Education (ISTE) emphasized that teachers should have five standards to ensure efficient and effective education and training in the digital world (Crompton, 2017). These standards are listed as follows:

• Developing and designing digital-age assessment tools and learning experiences

• Facilitating and encouraging student's creativity and learning

• Learning about modeling and digital age

• Modeling and supporting digital responsibility and citizenship

• Participating in leadership and professional development

In today's rapidly developing technology-driven society, students need to specialize in new areas of knowledge and skills, have analysis and decision-making skills, and learn to navigate in large masses of information (Tufan, 2003). In this process, educators have a critical role in stimulating their students gain new skills and competences for the 21st century (Karataş, 2015). Individuals need to criticize and question their knowledge to produce creative solutions to problems that they encounter, to communicate effectively, and to design and produce new results (Trilling & Fadel, 2009). Identifying the skills that individuals should today have is as important as learning the extent to which individuals are familiar with 21st-century skills. Additionally, measurement tools have been developed to research individuals' 21st-century skills. The literature includes scale adaption and development studies to evaluate 21st-century skills of students, teachers, and administrators. The scale adaptation and development studies have investigated 21st-century skills in different sample groups including administrators (Çoban et al., 2019; Karaca-Atik et al., 2023), teachers (Deborah, 2012; Keskin & Yazar, 2015; Storksdieck, 2016), pre-service teachers (Anagün et al., 2016; Gür et al., 2023; Orhan-Göksun, 2016; Özyurt, 2020), university students (Berg et al., 2021; Koyunlu Ünlü & Dökme, 2022; Yılmaz & Alkış, 2019), high school and university students (Çevik & Şentürk, 2019), secondary and high school students (Kang et al., 2010), secondary school students (Ball et al., 2016; Karakaş, 2015; Ongardwanich et al.,2015), primary school students (Belet-Boyacı & Atalay, 2016), and preschool students (Yalçın et al., 2020).

The existing body of research on scale development has sought to measure the skills of students, pre-service teachers, and in-service teachers. However, a review of the literature yielded no result for a detailed and comprehensive measurement tool developed in Turkey or adapted to Turkish to investigate the competence of

teachers in teaching of 21st-century skills. Therefore, it emerges as a necessity to develop a detailed and comprehensive scale to explore pre-service teachers' competence in all 21st-century skills. More specifically, there is a need for an up-to-date measurement tool to explore PSTs' 21st-century skills who soon to teach students expected to acquire and develop those skills. Existing scales are not specific to the field and are not sufficient to explore this issue for PSTs. Therefore, it is hoped that the scale developed in this study will be valid, reliable and more comprehensive for use in future studies.

Defining the characteristics of the target audience, i.e., students, is a critical issue to consider in planning and designing an educational process (Callison & Lamb, 2004). Thus, teachers should first know the target audience well and plan the teaching environment in line with their characteristics (Melvin, 2011). From this point of view, teachers are expected to have and developed competence to communicate effectively with students and guide them (Orhan-Göksün & Aşkım Kurt, 2017). Teachers should have pedagogical, cultural and professional knowledge and be well-informed of contemporary approaches to teaching so that they can organize the teaching environment according to students' needs. Thus, teachers are the key stakeholders with the main responsibility for preparing and implementing teaching programs to keep up with the 21st-century skills and bring them into their teaching environments (Gürültü et al., 2020). As much as students are expected to have these skills, teachers are expected to have the competence to help students acquire these skills. Organizing activities about 21st-century skills is one of the most important competences expected of teachers in the 21st century. These activities increase students' academic achievement in a planned and programmed manner (Gürültü et al., 2018). Teachers' and students' having 21st-century skills undoubtedly affect each other (Bernhardt, 2015; Garba et al., 2015). Therefore, it is of critical importance to determine PSTs' level of 21st-century skills of PSTs who soon carry out the task of teaching 21st-century students. Earlier studies that have assessed the learning or teaching of 21st-century skills have often focused on examining a subset of these skills. However, they have not made a systematic assessment of the entire set of 21st-century skills (Jia et al., 2016). Thus, this study aimed to analyze PSTs' perceptions of their competence in the 21st-century skills. It is believed that this study help identify areas in pre-service teacher education, which need to be improved to better address the issue of teaching 21st-century skills. In other words, this study can be useful in determining the strengths and weaknesses of the science curriculum in the acquisition of 21st-century skills. Such studies can also be used as a self-reflection or assessment tool for in-service and pre-service teachers to learn about 21st-century skills and pinpoint areas that need revision and improvement. In addition, this study can help teacher educators develop a better understating of how to train and prepare pre-service teachers to teach 21st-century skills.

It is important to investigate PSTs' 21st-century skills according to different variables because teachers need to have these skills (Kan & Murat, 2018). Various variables such as gender, year of study, university, and specific teaching disciplines are most likely to cause differences in preservice teachers' 21st century skills. Atlı (2019) also states that the year of study is an important factor that affects students' perceptions. Thus, the fact that PSTs in the fourth year of study have higher levels of skills than those in the earlier years of study is an expected result due to their longer educational background and experience (Berkant & Varki, 2022). Additionally, the fact that pre-service teachers studying Turkish education and classroom teaching have higher levels of multidimensional 21st-century skills compared to pre-service science teachers can be explained by the fact that the social studies-based education in Turkish education and classroom teaching provides an advantage in terms of developing these skills (Aydın, 2019; Bal, 2018). Likewise, the difference in the cognitive levels of students studying at universities that accept students scoring highly on the university entrance exam also causes a variation in their perceptions. Today, everything from technology to from culture and from social life to business world is changing and developing rapidly. Therefore, students need teachers equipped with 21st-century skills to be successful in this age (Çepni, 2016). Knowing whether PSTs have these skills will help teachers understand how to teach these skills to students (Gülen, 2013). It is important to know that different variables affect PSTs' skills because determining whether they have 21st-century skills makes it possible to identify different strategies for their teaching education (Atalay et al., 2016). PSTs' having knowledge of 21st-century skills is critical because it allows them to have an idea about how to teach these skills to their students (Yalçın, 2018). Teaching students these skills can affect their future success. New strategies, course materials, and instructional technologies to teach these skills can be developed (Darling-Hammond, 2006).

In the restructuring of higher education, multidimensional 21st-century skills should be more prominent in curricula in order to create a generation that is knowledgeable about critical thinking, creativity, and cultural values and can compete in a global context (Aydın, 2019). Similarly, education programs need to be created to complement multidimensional 21st-century skills in every possible way (Bal, 2018). There is a need for studies investigating the success of the training in 21st century skills (Gürültü et al., 2018). Similarly, the success of the

programs applied to individuals should be monitored by continuous measurement in order to develop 21st- century skills (Kandemir, 2006). It is important to develop more individualized education programs for 21st- century skills (Zeybek, 2015). The study is valuable in terms of the design of individualized teaching programs and the multidimensional evaluation of competences of pre-service teachers who still continue their education in teaching 21st-century skills. This study is also significant because it allows educators, program developers and researchers to determine the extent to which current practices and teacher training programs in Türkiye are sufficient in developing pre-service teachers' competence in 21st- century skills teaching. Thus, it can provide fresh insights into the usefulness of teacher training programs and practices. This study aimed to compare PSTs' 21st-century skills according to gender, year of study, and university. Accordingly, the research problem was formulated as "What are the 21st-century skills levels of PSTs?". In line with this problem, the following sub-problems were addressed:

1. Is there a statistically significant difference in PSTs' 21st century skills mean scores according to their gender?
2. Is there a statistically significant difference in PSTs' 21st century skills mean scores according to their year of study?
3. Is there a statistically significant difference in PSTs' 21st century skills mean scores according to their universities?

METHOD

This study used a cross-sectional survey design, which is a quantitative research design. Accordingly, the characteristics to be examined by the researcher were measured at once over the sample, and then statistical analyses of the data were made (Fraenkel & Wallen, 2006). The survey model in educational research is the model in which researchers summarize the characteristics (skills, preferences, attitudes, etc.) of individuals, groups, or the physical environment (such as schools) (Fraenkel et al., 2012).

Participants

The sample consisted of 799 PSTs who were studying in the first-, second-, third-, and fourth years of study at the education faculties of the universities in the Aegean region in the 2019-2020 academic year. Tables 1, 2, and 3 below presents the demographics of the sample group.

Table 1. Distribution of PSTs by Gender

Gender	f	%
Female	647	81.0
Male	152	19.0
Total	799	100

Table 2. Distribution of PSTs by Year of Study

Year of Study	f	%
First-year	173	21.7
Second-year	111	13.9
Third-year	260	32.5
Fourth-year	255	31.9

Table 3. Distribution of PSTs by University

Year of Study	f	%
Aydın Adnan Menderes University (A)	123	15.6
Afyon Kocatepe University (B)	112	14
Manisa Celal Bayar University (C)	81	10.1
Dokuz Eylül University (D)	141	17.6
Dumlupınar University (E)	127	15.9
Muğla Sıtkı Koçman University (F)	80	10
Pamukkale University (G)	90	11.3
Uşak University (H)	45	5.6
Total	799	100.0

Data Collection

The following 5-point Likert type scales were used to explore PSTs' 21st-century skills. The scale items are rated as "Strongly Agree", "Agree", "Neither agree or disagree", "Disagree", "Strongly disagree". All of these scales were considered as a sub-scale to determine 21st-century skills. The data were analyzed using confirmatory factor analysis (CFA). The remaining items for the 21st-century skills scale as a result of CFA are presented in the confirmatory factor analysis section below. The scale was administered to PSTs within a two course-hour time in the middle of the academic year.

The Process of Developing the 21st-Century Skills Scale

The 44-item Teacher Communication Skills Scale was developed by Çetinkanat (1997) to evaluate teachers' perceptions of communication skill, and the Cronbach's alpha coefficient was calculated as .81 for the total scale. The Individual Innovativeness Scale was originally developed by Hurt and others (1977) and adapted to Turkish by Kılıçer and Odabaşı (2014). The scale includes 20 items to measure individuals' level of innovativeness, and the Cronbach's alpha was calculated as .82 for the total scale. The Critical Thinking Scale was developed as a result of the Delphi project organized by the American Philosophical Society in 1990 by Facione and others (1998) to determine critical thinking dispositions. The scale translated and adapted into Turkish by Kökdemir (2003) consists of 51 items, and the Cronbach's alpha was calculated as .88 for the total scale. The 40-item Entrepreneurship Skills Scale was developed by Bilge and Bal (2012) to evaluate perceptions and attitudes about entrepreneurship, and the Cronbach's alpha was calculated as .83. The Kaufman Domains of Creativity Scale developed by Kaufman (2012) with the perspective of domain-specific creativity was adapted into Turkish by Şahin (2016). As a result of the exploratory and confirmatory factor analysis, the scale consists of 42 items, and the Cronbach's alpha was calculated as .90 for the total scale. The Cooperative Skills Scale was developed by Güngör and Özkan (2011) as a 5-point Likert scale type consisting of a 20-items with 10 negative and 10 positive items. The maximum score that can be obtained is 100, and the minimum score is 20. The Cronbach's alpha was calculated as .80 for the total scale. The Technology Literacy Scale was developed by Keleş (2014) to measure knowledge deepening, knowledge creation, and technology literacy. This graded-performance scale consists of 27 items, and the Cronbach's alpha was calculated as .92 for the total scale. The Media Literacy Scale was developed by Karaman and Karataş (2009) and consists of 17 items to explore the relationship of pre-service teachers with mass media and to determine their levels of media literacy. The Cronbach's alpha was calculated as .84 for the total scale. All items in these measurement tools were determined and selected by seeking the opinions of two science education experts working on this subject.

The construct validity of the 21st-Century Skills Scale was analyzed using exploratory factor analysis (EFA). The Kaiser-Meyer-Olkin test run to measure the sampling adequacy for the scale was .920, and the Barlett's test of sphericity was found to be statistically significant at $\chi2(9180) = 30474.887$, $p < .000$. The 21st-Century Skills Scale was suitable for EFA. For the 136 items, the data analysis revealed an eight-factor structure, and it accounted for 50.03% of the sample variance. The Cronbach's alpha values for communication, innovativeness, critical thinking, entrepreneurship, creativity, cooperative, technology and media were .95, .86, .82, .94, .91, .71, .95 and .93, respectively. The EFA for all items was performed with the data collected from 298 pre-service science teachers in a pilot study. According to the results of the EFA, statistical analyses were carried out with 136 items. As a result of EFA, seven items were deleted, and 129 items remained. Considering the EFA results, items that go to more than one factor and need to be removed are the 4th, 5th, 7th items in the innovativeness factor, the 7th, 8th, 12th items in critical thinking factor, and the 5th item in the creativity factor (Table 4). If an item has a high or acceptable factor loading for more than one factor, the difference between the two load values is expected to be greater than 0.10 (Tabachnick & Fidell, 2001) to decide under which factor the item will be included. If there is a difference of 0.10 or more between the factor loadings of an item, the item is attributed to the factor with a high factor loading. For this reason, the 12th item in critical thinking and the 5th item in creativity were removed due to multiple factor loadings.

Table 4. 21st Century Skills Scale Items with Loadings from EFA

Items	1	2	3	4	5	6	7	8
C1	.69							
C2	.71							
C3	.70							
C4	.56							
C5	.68							
C6	.74							
C7	.75							
C8	.67							
C9	.64							
C10	.37							
C11	.62							
C12	.74							
C13	.65							
C14	.70							
C15	.54							
C16	.59							
C17	.52							
C18	.47	.32						
C19	.59							
C20	.52	.32						
C21	.55							
C22	.54							
C23	.63							
C24	.49							
C25	.57	.31						
C26	.65							
C27	.49							
C28	.64							
I1						.50		.32
I2						.52		
I3	.32					.56		
I4							.59	
I5							.70	
I6						.46		
I7							.63	
I8						.51		
I9						.57		.34
CT1							.50	
CT 2							.49	
CT3							.37	
CT4							.47	
CT5							.46	
CT6							.55	
CT7					.53			
CT8					.53			
CT9							.34	
CT10							.37	
CT11							.51	

Items	1	2	3	4	5	6	7	8
Cr1					.35			
Cr2					.41			
Cr3					.31			
Cr4					.41			
Cr5			.32		.31			
Cr6					.39			
Cr7					.42			
Cr8					.54			
Cr9					.40			
Cr10					.73			
Cr11					.74			
Cr12					.73			
Cr13					.77			
Cr14					.72			
Cr15					.67			
Cr16					.36			
Cr17	.31				.49			
Cr18					.65			
Cr19					.43			
Cr20					.64			
Cr21					.67			
Cr22	.32				.53			
Cr23	.33				.56			
Cr24					.56			
Cr25					.58			
Cr26					.63			
Co1							.36	.64
Co2							.37	.58
Co3							.34	.64
Co4								.47
Co5								.44
Co6								.50
Te1			.45					
Te2			.55					
Te3			.59					
Te4			.61					
Te5			.54	.34				
Te6			.61					
Te7			.60					
Te8	.34		.63					
Te9			.61					
Te10			.61					
Te11			.65					
Te12	.32		.61					
Te13			.63					
Te14		.34	.61					
Te15			.64					
Te16			.61					

Item						Item		
CT12	.34			.39		Te17		.66
Ent1	.57					Te18	.33	.57
Ent2	.63					Te19	.36	.57
Ent3	.58					Me1		.58
Ent4	.49					Me2		.59
Ent5	.53					Me3	.30	.60
Ent6	.60					Me4		.62
Ent7	.59					Me5		.61
Ent8	.66					Me6		.62
Ent9	.57			.31		Me7		.62
Ent10	.59	.30				Me8		.54
Ent11	.49			.34		Me9		.57
Ent12	.61					Me10		.66
Ent13	.58					Me11		.67
Ent14	.48	.32				Me12		.60
Ent15	.47		.34			Me13		.63
Ent16	.41					Me14		.62
Ent17	.50							
Ent18	.56							
Ent19	.55			.31				
Ent20	.39							
Ent21	.54			.31				
Ent22	.52	.33						

Note: *Communication=C, Innovativeness=In, Critical Thinking=CT, Entrepreneurship=Ent, Creativity=Cr, Cooperative=Co, Technology=Te and Media=Me*

Within the scope of congruent validity, the correlations between the scores on the sub-scales of the 21st-Century Skills Scale for PSTs were examined. The correlation coefficients were showed in Table 5.

Table 5. Correlation Coefficient Values

Sub-scales	Innovativeness	Critical Thinking	Entrepreneurship	Creativity	Cooperative	Technology	Media	Total
Communication	.56**	.60**	.61**	.49**	.49**	.56**	.50**	.73**
Innovativeness		.66**	.68**	.48**	.21**	.55**	.51**	.78**
Critical Thinking			.75**	.60**	.24**	.63**	.57**	.84**
Entrepreneurship				.63**	.23**	.70**	.60**	.87**
Creativity					.20**	.62**	.50**	.77**
Cooperative						.25**	.22**	.32**
Technology							.62**	.83**
Media								.76**

As shown in Table 6, the correlation coefficients ranged from .20 to .75 and at .01 significance level. The sub-scales of the entire scale had a statistically significant correlation with each other. The Cronbach's alpha coefficients was calculated for Communication Skills (.94), Innovativeness (.86), Critical Thinking (.80), Entrepreneurship Skills (.93), Creativity (.90), Cooperative Skills (.70), Technology Literacy (.94), and Media Literacy (.93).

CFA was performed to decide the construct validity of the scale. The goodness of fit values were found to be acceptable (X^2 = 30787.92, SD = 8119, p<.001, X^2/SD = 3.79, NFI = .96, CF7 = .96, RMSEA = .05). The standardized path coefficients were found to be between .30 and .82 and statistically significant at p < .001 level.

The path coefficients of the model related to the structure of scale is presented in Table 6. The sub-scales of Communication Skills, Innovativeness, Critical Thinking, Entrepreneurship Skills, Creativity, Cooperative Skills, Technology Literacy and Media Literacy consist of 28, 6, 9, 22, 25, 6, 19 and 14 items, respectively.

Table 6. 21st Century Skills Scale Items with Loadings from CFA

Item	Path coefficient	Item	Path coefficient	Item	Path coefficient
Communication1	.61	Entrepreneurship1	.66	Creativity23	.67
Communication2	.63	Entrepreneurship2	.59	Creativity24	.47
Communication3	.64	Entrepreneurship3	.68	Creativity25	.46
Communication4	.54	Entrepreneurship4	.52	Creativity26	.35
Communication5	.64	Entrepreneurship5	.54	Cooperative1	.39
Communication6	.67	Entrepreneurship6	.72	Cooperative2	.41
Communication7	.64	Entrepreneurship7	.64	Cooperative3	.45
Communication8	.66	Entrepreneurship8	.72	Cooperative4	.63
Communication9	.66	Entrepreneurship9	.69	Cooperative5	.82
Communication10	.33	Entrepreneurship10	.72	Cooperative6	.82
Communication11	.67	Entrepreneurship11	.70	Technology1	.58
Communication12	.73	Entrepreneurship12	.72	Technology2	.63
Communication13	.65	Entrepreneurship13	.71	Technology3	.67
Communication14	.69	Entrepreneurship14	.59	Technology4	.76
Communication15	.57	Entrepreneurship15	.54	Technology5	.55
Communication16	.57	Entrepreneurship16	.38	Technology6	.72
Communication17	.58	Entrepreneurship17	.58	Technology7	.75
Communication18	.50	Entrepreneurship18	.67	Technology8	.76
Communication19	.66	Entrepreneurship19	.66	Technology9	.71
Communication20	.60	Entrepreneurship20	.51	Technology10	.75
Communication21	.60	Entrepreneurship21	.65	Technology11	.75
Communication22	.60	Entrepreneurship22	.66	Technology12	.61
Communication23	.68	Creativity1	.61	Technology13	.73
Communication24	.51	Creativity2	.67	Technology14	.64
Communication25	.63	Creativity3	.64	Technology15	.71
Communication26	.65	Creativity4	.51	Technology16	.68
Communication27	.51	Creativity5	.51	Technology17	.74
Communication28	.60	Creativity6	.37	Technology18	.68
Innovativeness1	.70	Creativity7	.30	Technology19	.70
Innovativeness2	.75	Creativity9	.36	Media1	.63
Innovativeness3	.66	Creativity10	.44	Media2	.73
Innovativeness6	.65	Creativity11	.46	Media3	.77
Innovativeness8	.75	Creativity12	.38	Media4	.79
Innovativeness9	.78	Creativity13	.42	Media5	.73
CriticalThinking1	.56	Creativity14	.47	Media6	.74
CriticalThinking2	.60	Creativity15	.45	Media7	.75
CriticalThinking3	.53	Creativity16	.49	Media8	.63
CriticalThinking4	.60	Creativity17	.66	Media9	.68
CriticalThinking5	.65	Creativity18	.70	Media10	.74
CriticalThinking6	.56	Creativity19	.64	Media11	.62
CriticalThinking9	.44	Creativity20	.71	Media12	.67
CriticalThinking10	.66	Creativity21	.67	Media13	.61
CriticalThinking11	.58	Creativity22	.70	Media14	.72

As a result of CFA, the path coefficients of the remaining 129 items were above .30 and the goodness-of-fit indices values are acceptable. These results showed that the 21st-century skills scale valid and reliable. The factor loadings were well above the cut-off point .30, as proposed by Roberts and Bacon (1997). The goodness-of-fit indices show acceptable values and good fit values, as shown in Table 7 (Hu & Bentler, 1995; Tabachnick & Fidell, 2007).

Table 7. Goodness-of-Fit Indices of 21st Century Skills Scale for CFA Model

Fit indices	Value	Criterion
NFI	.96	Excellent
NNFI	.97	Excellent
IFI	.97	Excellent
RFI	.96	Excellent
CFI	.97	Excellent
GFI	.83	Good
AGFI	.81	Good
RMR	.052	Excellent
RMSEA	.058	Excellent
χ^2/df	3.79	Good

Data Analysis

Because all the data were normally distributed, MANOVA were used in the data analysis. In addition, other descriptive statistics are presented. In the comparison of descriptive statistics, the evaluation was made based on mean scores that can be obtained from the scale and its sub-scales. The Pearson correlation coefficient was calculated in relational analyses. The level of significance was set at .05.

After the data collection period of nearly two months, the data were screened and cleaned from errors. Based on the obtained data, validity and reliability analyses were made. Skewness and kurtosis values were used to check the normality of data. The skewness index was between -1.17 and .30, while the kurtosis index was between -.31 and 1.96 (Table 8). Considering the skewness and kurtosis values for all the sub-scales, all values were within a good interval (between -2 and +2) (Tabachnick & Fidell, 2001).

Table 8. Means, Standard Deviations, Skewness and Kurtosis Values for Sub-Scales

Sub-scales	$\bar{X}$	SD	Skewness	Kurtosis
Communication	4.37	.44	-1.17	1.96
Innovativeness	4.23	.59	-.75	1.04
Critical Thinking	4.08	.52	-.44	1.11
Entrepreneurship	4.02	.54	-.35	.34
Creativity	3.76	.56	-.12	-.31
Cooperative	3.13	.51	.30	1.67
Technology	4.02	.57	-.25	.20
Media	4.03	.59	-.21	.11
Total	3.96	.40	-.39	1.09

Research Ethics

This research study was evaluated by Aydın Adnan Menderes University Educational Research Ethics Committee in 2019 and found ethically acceptable (ADU – no: 2019/02).

FINDINGS

Results for PSTs' Levels of 21st Century Skills

Table 9 presents the descriptive statics for the research problem "What are the 21st-century skills levels of PSTs?". The mean score of 799 students on the total scale is 3.96.

Table 9. Descriptive Statistics on 21st Century Skills

Sub-scales	N	X̄	SD
Communication	799	4.37	.44
Innovativeness	799	4.23	.59
Critical Thinking	799	4.08	.52
Entrepreneurship	799	4.02	.54
Creativity	799	3.76	.56
Cooperative	799	3.13	.51
Technology	799	4.02	.57
Media	799	4.03	.59
Total	799	3.96	.40

As seen in Table 9, the arithmetic mean of the total score obtained by PSTs on the 21st-Century Skills Scale was calculated as $\bar{X} = 3.96$. This shows that in terms of the total scale, PSTs got a value above the average score ($\bar{X} = 2.50$). The arithmetic means of the scores obtained on the sub-scales varied between $\bar{X} = 3.13$ and $\bar{X} = 4.37$. According to these findings, PSTs' scores in the communication, innovativeness, critical thinking, entrepreneurship, technology and media sub-scales were above the average in terms of 21st-century skills. On the other hand, the scores in the creativity and cooperative sub-scales were below the average. Looking at the scores on the subscales, PSTs got the lowest mean score on the cooperative skills sub-scale.

Results for PSTs' Levels of 21st Century Skills According to Gender

MANOVA was used to answer the sub-problem "Is there a statistically significant difference in PSTs' 21st century skills mean scores according to their gender?" Table 10 presents the descriptive statistics for the gender variable.

Table 10. Descriptive Statistics for 21st Century Skills and Sub-scales by Gender

Sub-scales	Gender	N	X̄	SD
Communication	Male	152	4.18	.50
	Female	647	4.42	.42
Innovativeness	Male	152	4.16	.59
	Female	647	4.25	.59
Critical Thinking	Male	152	4.03	.55
	Female	647	4.09	.51
Entrepreneurship	Male	152	3.96	.62
	Female	647	4.03	.52
Creativity	Male	152	3.69	.60
	Female	647	3.78	.55
Cooperative	Male	152	3.23	.63
	Female	647	3.11	.47
Technology	Male	152	3.96	.62
	Female	647	4.03	.56
Media	Male	152	4.05	.60
	Female	647	4.02	.59

For the first MANOVA, Levene's Test (p > .05) provided the assumption of equality of variance for all eight sub-scales, and Box's M Test (Box's M=22.134; F=1.945; p > .05) provided the assumption of equality of variance-covariance matrices. According to the multivariate F-test results, there was a statistically significant difference between the groups according to gender on a linear combination of the sub-scales of 21st century skills [Wilks' Lambda = .927, F(8, 790)= 7.788, p<.05, $\eta2$= .073]. When the partial eta-squared value was examined, it explained 7.3% of the variance, indicating a medium effect size. Univariate F-test results were presented in Table 11.

Table 11. Univariate Test Results for 21st Century Skills

Sub-scales	F	sd	Error sd	p	η2
Communication	35.756	1	797	.000	.043
Innovativeness	3.204	1	797	.074	.004
Critical Thinking	2.095	1	797	.148	.003
Entrepreneurship	2.177	1	797	.141	.003
Creativity	3.492	1	797	.062	.004
Cooperative	6.722	1	797	.010	.008
Technology	1.731	1	797	.189	.002
Media	.267	1	797	.605	.000

As can be seen in Table 11 above, there is a significant difference between the groups only for the communication sub-scale (α = .05/8 = .006 after Bonferroni correction). According to the descriptive statistics in Table 10, female had significantly higher 21st century skills than male in the communication sub-scale. The partial eta-squared value showed that this effect was small.

Results for PSTs' Levels of 21st Century Skills According to Year of Study

MANOVA was used to answer the sub-problem "Is there a statistically significant difference in PSTs' 21st century skills mean scores according to the year of study?". Table 12 presents the descriptive statistics and Table 13 presents MANOVA results for the scores on the total scale and its sub-scales according to the year of study variable.

Table 12. Descriptive Statistics by Year of Study

Sub-scales	Year of Study	N	X̄	SD	Sub-scales	Year of Study	N	X̄	SD
Communication	First-year	173	4.31	.43	Creativity	First-year	173	3.67	.57
	Second-year	111	4.43	.44		Second-year	111	3.88	.55
	Third-year	260	4.44	.41		Third-year	260	3.84	.52
	Fourth-year	255	4.32	.47		Fourth-year	255	3.70	.57
Innovativeness	First-year	173	4.25	.60	Cooperative	First-year	173	3.16	.54
	Second-year	111	4.28	.61		Second-year	111	3.12	.49
	Third-year	260	4.27	.53		Third-year	260	3.07	.50
	Fourth-year	255	4.17	.62		Fourth-year	255	3.18	.50
Critical Thinking	First-year	173	4.05	.52	Technology	First-year	173	3.97	.60
	Second-year	111	4.10	.53		Second-year	111	4.10	.55
	Third-year	260	4.14	.47		Third-year	260	4.07	.56
	Fourth-year	255	4.04	.55		Fourth-year	255	3.97	.57
Entrepreneurship	First-year	173	3.98	.49	Media	First-year	173	3.94	.58
	Second-year	111	4.07	.55		Second-year	111	4.11	.59
	Third-year	260	4.06	.53		Third-year	260	4.06	.60
	Fourth-year	255	3.96	.58		Fourth-year	255	4.02	.58

For the second MANOVA, Levene's Test (p > .05) provided the assumption of equality of variance for all eight sub-scales, and Box's M Test (Box's M=168.753; F=1.531; p > .05) provided the assumption of equality of variance-covariance matrices. According to the multivariate F-test results, there was a statistically significant difference between the groups according to the year of study variable on a linear combination of the sub-scales of 21st century skills [Wilks' Lambda = .941, $F_{(24, 788)}= 2.033$, p<.05, η2= .020]. When the partial eta-squared value was examined, it explained 2.0% of the variance, indicating a small effect size. Univariate F-test results were presented in Table 13.

Table 13. Univariate Test Results for 21st Century Skills

Sub-scales	F	sd	Error sd	p	η2
Communication	4.982	3	795	.002	.018
Innovativeness	1.773	3	795	.151	.007
Critical Thinking	2.029	3	795	.108	.008
Entrepreneurship	2.129	3	795	.095	.008
Creativity	6.150	3	795	.000	.023
Cooperative	2.429	3	795	.064	.009
Technology	2.449	3	795	.062	.009
Media	2.110	3	795	.098	.008

As can be seen in Table 13 above, there is a significant difference between the groups for the communication and creativity sub-scales (α = .05/8 = .006 after Bonferroni correction). According to the descriptive statistics in Table 12, third-year students had significantly higher 21st century skills than first-year and fourth-year students in the communication sub-scale. In addition, second-year and third-year students had significantly higher 21st century skills than first-year and fourth-year students in the creativity sub-scale. The partial eta-squared value showed that these effects were small.

Results for PSTs' Levels of 21st Century Skills According to Year of University

MANOVA was used to answer the third sub-problem "Is there a statistically significant difference in PSTs' 21st century skills mean scores according to their university?". Table 14 presents the descriptive statistics and Table 15 presents MANOVA results.

Table 14. Descriptive Statistics by University

Sub-scales	University	N	X̄	SD	Sub-scales	Year of Study	N	X̄	SD
Communication	A	123	4.43	.45	Creativity	A	123	3.02	.52
	B	112	4.35	.56		B	112	3.28	.69
	C	81	4.38	.35		C	81	3.14	.44
	D	141	4.42	.41		D	141	3.09	.42
	E	127	4.36	.35		E	127	3.17	.50
	F	80	4.24	.47		F	80	3.08	.46
	G	90	4.45	.41		G	90	3.16	.38
	H	45	4.23	.47		H	45	3.12	.56
Innovativeness	A	123	4.24	.59	Cooperative	A	123	3.02	.52
	B	112	4.23	.64		B	112	3.28	.69
	C	81	4.16	.53		C	81	3.14	.44
	D	141	4.31	.55		D	141	3.09	.42
	E	127	4.24	.58		E	127	3.17	.50
	F	80	4.19	.60		F	80	3.08	.46
	G	90	4.23	.65		G	90	3.16	.38
	H	45	4.18	.57		H	45	3.12	.56
Critical Thinking	A	123	4.10	.50	Technology	A	123	4.07	.55
	B	112	4.08	.57		B	112	4.02	.61
	C	81	4.08	.47		C	81	3.95	.52
	D	141	4.05	.56		D	141	4.07	.57
	E	127	4.08	.44		E	127	4.02	.56
	F	80	4.05	.54		F	80	3.88	.65
	G	90	4.12	.53		G	90	4.05	.55
	H	45	4.10	.50		H	45	4.04	.57

	A	123	4.05	.58		A	123	4.10	.61
	B	112	4.04	.60		B	112	4.08	.60
	C	81	3.95	.51		C	81	3.95	.56
	D	141	4.03	.56	Media	D	141	4.02	.61
Entrepreneurship	E	127	4.05	.47		E	127	4.04	.51
	F	80	3.92	.51		F	80	3.92	.51
	G	90	4.04	.58		G	90	4.08	.67
	H	45	3.94	.51		H	45	3.93	.64

Aydın Adnan Menderes University (A); Afyon Kocatepe University (B); Manisa Celal Bayar University (C); Dokuz Eylül University (D); Dumlupınar University (E); Muğla Sıtkı Koçman University (F); Pamukkale University (G); Uşak University (H)

For the third MANOVA, Levene's Test (p > .05) provided the assumption of equality of variance for all eight sub-scales, and Box's M Test (Box's M=467.587; F=1.429; p > .05) provided the assumption of equality of variance-covariance matrices. According to the multivariate F-test results, there was a statistically significant difference between the groups according to the year of study variable on a linear combination of the sub-scales of 21st century skills [Wilks' Lambda = .904, F(56, 4227)= , p<.05, η2= .014]. When the partial eta-squared .value was examined, it explained 1.4% of the variance, indicating a small effect size. Univariate F-test results were presented in Table 15.

Table 15. Univariate Test Results for 21st Century Skills

Sub-scales	F	sd	Error sd	p	η2
Communication	2.768	7	791	.004	.024
Innovativeness	.642	7	791	.721	.006
Critical Thinking	.221	7	791	.980	.002
Entrepreneurship	.849	7	791	.547	.007
Creativity	.413	7	791	.895	.004
Cooperative	2.700	7	791	.005	.023
Technology	1.101	7	791	.360	.010
Media	1.196	7	791	.302	.010

As can be seen in Table 15 above, there is a significant difference between the groups for the communication and creativity sub-scales (α = .05/8 = .006 after Bonferroni correction). According to the Bonferroni test results, the communication skills of PSTs significantly differed according to their university. Communication skills showed a significant difference between Muğla Sıtkı Koçman University (X̄ = 4.24) and Pamukkale University (X̄ = 4.45). Taken together, the Bonferroni test result showed that communication skills of PSTs studying at Pamukkale University students were higher than the communication skills of PSTs studying at Muğla Sıtkı Koçman University. The partial eta-squared value showed that this effect was low. In addition, the cooperative skills of PSTs also differed significantly according to their university. There was a significant difference between Aydın Adnan Menderes University (X̄ = 3.02) and Afyon Kocatepe University (X̄ = 3.28). Taken together, the Bonferroni test result showed that, the cooperative skills of PSTs studying at Afyon Kocatepe University were higher than the cooperative skills of PSTs studying at Aydın Adnan Menderes University. The partial eta-squared value showed that this effect was small.

DISCUSSION & CONCLUSION

This study set out to compare and analyze PSTs' 21st-century skills in terms of gender, year of study, and university. The analysis results showed that PSTs' 21st-century skills differed statistically according to gender in two sub-scales. In the communication skills sub-scale, the mean score of female PSTs was statistically significantly higher than that of male PSTs. There was no statistically significant difference in other sub-scales according to the gender variable. In line with results of this study, Özdemir Özden et al. (2018) found that female pre-service teachers have higher mean scores of 21st-century skills than male pre-service teachers. The level of PSTs' characteristics of "New Millennium Students" differs significantly according to gender, year of study (first year and fourth year of study), universities, and family income level (Şahin, 2010). Similarly, significant results were found in favor of female PSTs according to gender in career and life skills and knowledge and technology skills

within the scope of PSTs' 21st century skills perception scale (Kan & Murat, 2018). It can be said female PSTs had higher scores in the communication sub-scale due to their more extroverted character traits. This result of the study is consistent with earlier studies on the same subject (Gökbulut, 2020; Gülen, 2013; Karakaş, 2015). Female students' level of using activities for problem solving, active learning, communication skills was also found to be higher than male students (Gülen, 2013). Female students had higher score of 21st-century skills (Karakaş, 2015). Based on the current results, female PSTs significantly differed from male PSTs in terms of their 21st-century skills. However, some studies also reported inconsistent results. Despite pre-service teachers' high scores of 21st-century skills, there was no significant difference according to gender (Gökbulut, 2020). Similarly, in a study conducted with teachers from different branches, there was no statistically significant difference in 21st-century skills according to gender and working environment of teachers (Eğmir & Çengelli, 2020; Uyar & Çiçek, 2020). Çevik and Şentürk (2019) found that male PSTs had higher 21st century skills than females. Similarly, there was no significant difference between male and female PSTs in learning and renewal skills sub-scales of the 21st-century skills efficacy perception scale (Kan & Murat, 2018). Similar results were found in the study of Bozkurt and Çakır (2016) who determined that there were significant differences according to year of study and gender. In this study, the multidimensional 21st-century skills of female PSTs were higher than male PSTs. Similarly, Dilekli and Karagöz (2018) reported higher levels of these skills for females compared to males. It can be said based on these results that female PSTs have become advantageous in terms of 21st-century skills due to the formal and informal education they receive. Female students may generally have more communication practice and experience, which can help them improve their communication skills.

The study also examined whether PSTs' 21st-century skills differ statistically according to the year of study. Their mean scores of the communication and creativity skills sub-scales differed significantly according to according to the year of study. There was no statistically significant difference in the other sub-scales. The mean score of third-year PSTs was statistically significantly higher than that of first-year and fourth-year PSTs for the communication skills subscale. The mean score of second-year and third-year PSTs was also statistically significantly higher than that of first-year and fourth-year PSTs for the creativity skills sub-scale. In line with the present results, Özdemir Özden et al. (2018) found that third-year pre-service teachers had a higher mean score of 21st-century skills than second-year pre-service teachers. Kılıç (2011) found a significant difference in students' scientific creativity according to the type of school they attended and their year of study. The level of pre-service teachers' carrying the characteristics of "New Millennium Students" also differed according to the year of study (first year and fourth year) (Şahin, 2010). The present result that third-year PSTs had a higher mean score than others in terms of creativity and communication skills can be explained by the fact that they have already acquired sufficient knowledge, skills, and behaviors to be a teacher. The reason for the result that fourth-year PSTs had lower communication and creativity mean scores might be that they experience career concerns and test anxiety because they soon to take a public personnel selection examination to be become a teacher.

The study finally examined whether PSTs' 21st-century skills differ statistically according to their universities. The mean scores of communication and cooperation skills differed significantly according to university. The mean scores on other subscales did not differ statistically significantly according to university. For the communication skills sub-scale, the mean scores of PSTs studying at Pamukkale University were statistically significantly higher than those at Muğla Sıtkı Koçman University. For the cooperative skills sub-scale, the mean scores of PSTs studying at Afyon Kocatepe University were statistically significantly higher than those of PSTs studying at Aydın Adnan Menderes University. The present results are in parallel with some earlier studies. PSTs' 21st-century skills efficacy perception scores did not differ in terms of learning and renewal skills and life and career skills sub-scales according to their university. Additionally, PSTs studying at Erciyes University had statistically higher scores in terms of knowledge, media, and technology skills (Kan & Murat, 2018). Eğmir and Çengelli (2020) found that teachers' 21st-century skills differ according to the school type and seniority. The level of pre-service teachers' characteristics of "New Millennium Students" varied according to fields and universities (Şahin, 2010). PSTs' level of skills differed according to their achievement in terms of their scores on the university placement exam. It can be said this difference in the dependent variables was basically caused by this disintegration. In addition, the learning experiences of PSTs at their universities vary due to the different teaching staff, technological infrastructure, and the different content of the departments. These changing learning experiences may have affected PSTs' 21st century skills of. Students studying at universities without technological infrastructure may have also lower technology skills.

Pre-service teachers' 21st-century skill differed in terms of university and department (Orhan-Göksun & Kurt, 2017). In Turkey, high school students take a placement exam (called ÖSYS, Student Selection and

Placement Examination) to attend a university. They are placed in different universities and departments according to their scores on this exam (ÖSYM [Student Selection and Placement Center], 2011). For this reason, the placement of students in universities depends on their achievement. As a result, 21st-century skills of pre-service teachers can differ by universities where they study. In addition, learning experiences of students at different universities vary due to the different teaching staff and the different content of the departments.

In this study, PSTs' 21st-century skills differed in some sub-scales of the 21st century skills scale according to gender, year of study, and university. In this context, it is recommended to conduct research on the acquisition of 21st century skills at different levels of universities and educational institutions that train future science teachers considering other variables. The findings of this study will shed light on future studies to be carried out on pre-service teachers' acquisition of 21st century skills. A further study can be done with pre-service teachers in different disciplines and in-service teachers. Further research can also be carried out to measure 21st-century skills of in-service teachers.

The important limitation of this study is that it was based on the answers given by 799 PSTs studying at university in the Aegean region. It was recommended to conduct more generalizable research with more participants covering not only a region but also other regions. In addition, qualitative research would provide more in-depth data regarding PSTs' 21st-century skills.

Statements of Publication Ethics

Throughout this research study, research and publication ethics were observed. Ethical permission of the present research was approved by Aydın Adnan Menderes University Educational Research Ethics Committee.

Researchers' Contribution Rate

First author has made substantial contributions to conception and design, or acquisition of data, or analysis and interpretation of data. The second author has been involved in drafting the manuscript or revising it critically for important intellectual content. The third author has given final approval of the version to be published.

Conflict of Interest

The authors declare no conflict of interest. This research study complies with research publishing ethics. The scientific and legal responsibility for manuscripts published in BUEFAD belongs to the authors.

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Comparison of CAT Procedures at Low Ability Levels: A Simulation Study and Analysis in the Context of Students with Disabilities

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Abstract

The estimation of extreme abilities in computerized adaptive testing (CAT) is more biased and less accurate than that of intermediate abilities. This situation contradicts the structure of CAT, which targets all ability levels. This research aims to determine the procedures that perform better at lower skill levels, in accordance with other ability levels, by comparing the performances of various CAT procedures. In addition, a large-scale test examined whether the determined procedures would show similar performance in the ability levels of students with disabilities, as a group unfortunately more often of extreme abilities and that CAT will offer advantages in many respects. A pool of 1000 items and 1000 examinees with standard normal ability distribution were simulated with Monte Carlo. The CAT performances of 36 conditions consisting of different item selection methods, ability estimation methods and termination rules were compared. As a result of the research, the precision criterion termination rule used together with the maximum likelihood ability estimation method, Kullbak-Leibler information item selection rule, and precision criterion termination rule with test length limit (20 items) performed better and more consistently in terms of CAT performance across the ability levels. These procedures show high performance in the ability levels of students with disabilities, also in real data.

Keywords: Computerized adaptive testing, CAT procedures, extreme ability levels, students with disabilities, Monte Carlo simulation, item selection method, students with low ability.

BOBUT Prosedürlerinin Düşük Yetenek Düzeylerindeki Performanslarının Karşılaştırılması: Simülasyon Çalışması ve Özel Gereksinimli Öğrenciler Bağlamında İnceleme
Öz

Bilgisayar Ortamında Bireye Uyarlanmış Test (BOBUT) yönteminin temel iddialarından biri ölçülen özellik bakımından uçlarda yer alan yeterliklerde geleneksel testlere göre daha kesin ve güvenilir sonuçlar üretmesidir. Ancak, BOBUT'ta da uç yeteneklerin kestiriminin orta yetenektekilere göre daha düşük kesinlikte olduğu, yanlı sonuçlar elde edilebildiği bilinmektedir. Bu durum, BOBUT'un tüm yeterlik düzeylerini hedefleyen yapısına ters düşmektedir. Bu araştırmada, çeşitli BOBUT prosedürlerinin performanslarının karşılaştırarak, alt yetenek düzeylerinde, diğer yetenek düzeyleri ile uyuşan biçimde, daha iyi performans gösteren algoritmaları belirlemek amaçlanmıştır. Ek olarak geniş ölçekli test sonuçlarından yola çıkarak, belirlenen prosedürlerin özel gereksinimli öğrencilerin yeterliklerinde de benzer performans gösterip göstermeyeceği incelenmiştir. Araştırmada öncelikle Monte Carlo simülasyonu ile 1000 maddelik bir madde havuzu ve standart normal dağılım gösteren 1000 kişilik bir yetenek dağılımı oluşturulmuştur. Farklı madde seçme, yetenek kestirimi yöntemleri ve sonlandırma kurallarından oluşan 36 koşulun, uçlarda yer alan bireylerin kestirimindeki BOBUT performansları kıyaslanmıştır. Araştırma sonucunda, En çok olabilirlik yetenek kestirim yöntemi, Kullbak-Leibler bilgisi madde seçme kuralı, standart hata ve madde uzunluğu sınırı (20 madde) ile birlikte kullanılan standart hata test sonlandırma kurallarının; alt yeterlik düzeylerinde en iyi performans göstererek, yeterlik düzeyleri boyunca BOBUT performansı açısından tutarlılık gösteren bir algoritma oluşturduğu gözlenmiştir. Engeli olan öğrencilerin yeterlik düzeylerinde yüksek performans gösterdiği gözlenen ilgili prosedürler, gerçek veri ile onanmıştır.

Anahtar kelimeler: Bilgisayar ortamında bireye uyarlanmış testler, BOBUT prosedürleri, uç yetenek seviyeleri, özel gereksinimli öğrenciler, Monte Carlo simülasyonu, madde seçim yöntemi, düşük yetenekli öğrenciler.

INTRODUCTION

Today, one of the most important applications in the discipline of measurement and evaluation is computerized adaptive testing (CAT) (Linacre, 2000; Weiss, 2011). CAT is an application of item response theory (IRT), the fundamental up-to-date measurement theory. In simple terms, CAT is a method for estimating ability levels with high precision by directing the items closest to the ability level of the respondent. For example, suppose a respondent is extremely poor in terms of the feature that a test measures. When the examinee encounters moderate or hard items, they will not be able to answer any item correctly. In this case, we cannot obtain information about the examinee's abilities. However, if they encounter items that are close to their ability, in other words, easier items, they will probably be able to answer some of them correctly. In this case, we will obtain more information about the examinees' competencies and inadequacies. In addition, the duration of the completed test will be 50% to 80% shorter (Kezer & Koç, 2014; Şenel & Şenel, 2018; Wainer et al., 2000a) since the items that will not provide information about respondents will not be applied. CAT achieves these powerful features thanks to the CAT algorithm; a fundamental example is presented in Figure 1.
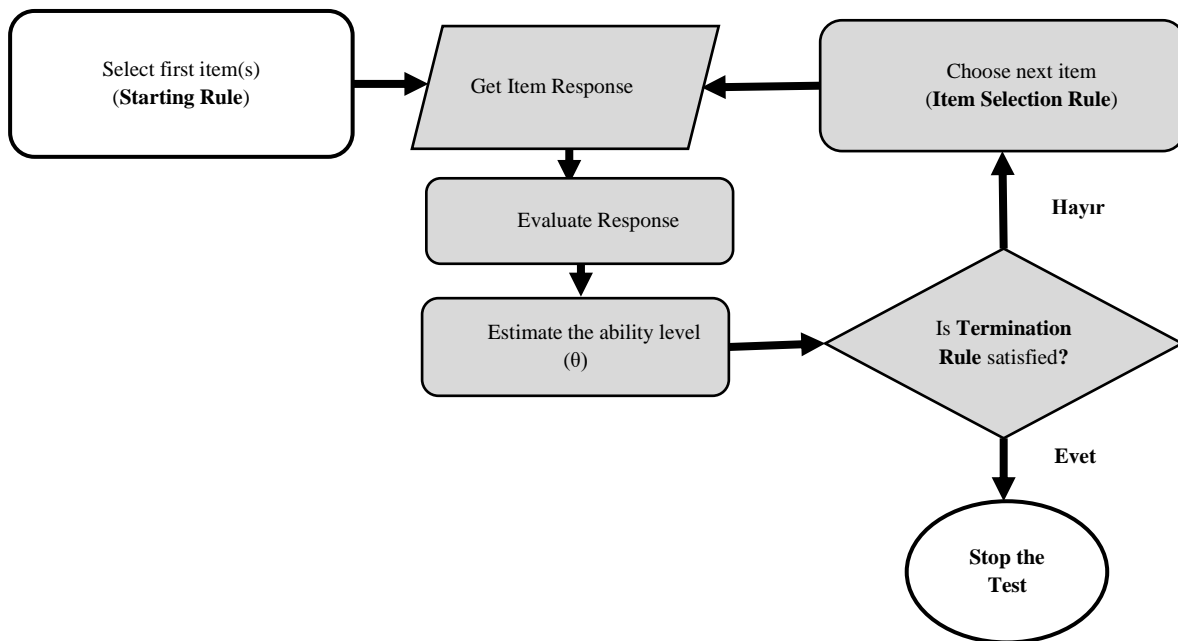
Figure 1. *A Fundamental CAT Algorithm (Şenel, 2021)*

As seen in the CAT algorithm in Figure 1, how the first and next items will be selected and how the test will be terminated are predetermined. The first item is selected from a large item pool consisting of qualified items with IRT-calibrated and predicted psychometric properties. For the first application, the selection method is often applied from items that are of moderate difficulty (Segall, 2004) or that address the medium ability level ($\theta=0$) (Magis et al., 2018). After applying the first item(s), an ability estimation will be predicted. Various methods are used in ability estimation, such as maximum likelihood (ML), maximum a posteriori (MAP), Bayesian expected a posteriori (EAP), weighted likelihood (WL) and robust estimator (RE) (Embretson & Reise, 2000; Magis et al., 2018; Mislevy & Bock, 1982; Segall, 2004; Warm, 1989). The ML (Lord, 1980) method is the most popular ability estimation method and the second most popular method is EAP (Bock & Mislevy, 1982).

After the examinee's first θ estimation, the items are mainly selected from among the ones that will provide high information and are closest to the estimated θ (Şahin & Ozbasi, 2017). Wainer et al. (2000) considered the *item selection rule* as one of the three basic dimensions that affect the validity of CAT. The process to "administer the appropriate item to the examinee" based on CAT takes place in this step. The maximum Fisher information (MFI) criterion, b optimal (*bOpt*), maximum likelihood weighted information (MLWI) criterion, maximum posterior weighted information (MPWI) criterion, Kullback-Leibler (KL) divergence criterion, and θ optimal (*thOpt*) are among the most frequently used item selection methods (Barrada et al., 2009; Magis et al., 2018; van der Linden et al., 2006). Using one of the preferred item selection methods, the most appropriate item for the

respondent at that stage of the test is applied. Re-estimation of θ is made after each item response. The "θ estimation-item selection-θ estimation" cycle continues until the termination rule is satisfied.

Various termination rules determine after the administration of which items test will be terminated. The most frequently used termination method is the *precision criterion (PC)* (van der Linden & Glas, 2010). In this method, the test ends when the standard error of ability estimation falls below a certain criterion (Embretson & Reise, 2000), frequently 0.32. The fact that the standard error has decreased to a certain level indicates that the reliability of the result has reached an acceptable level. In addition, a test length limit is an approach applied to terminate the test (Babcock & Weiss, 2009). Another approach is to terminate the test when no item in the item pool provides a predetermined level of information (Maurelli & Weiss, 1981). Using different termination rules together is also a recommended approach (Babcock & Weiss, 2009).

With these features, CAT provides test applications that are consonant with the ability level of the respondent and produces highly reliable test results with each respondent taking a different number of items. In this way, it produces more accurate and reliable test results than traditional tests for extremely low and high ability levels. This feature is one of the main strengths of CAT. With this strength, CAT is preferable for individuals with extreme ability levels. Considering that individuals with special needs such as students with disabilities remain at lower ability levels (Stone & Davey, 2011), CAT is an important option to increase test validity. In addition, CAT is becoming increasingly common in the field of health diagnosis (Gibbons et al., 2014, 2016), and disease is extreme values in health-related measurements. CAT has additional advantages for students with disabilities. Being convenient for computer-based test accommodations is one of them. Apart from this, there is no need for extended time-test accommodations with relatively short tests. Additionally, CAT is preferred because it provides more information and more reliable test scores for students with disabilities (Şenel & Kutlu, 2018a, 2018b; Stone & Davey, 2011).

The estimation precision of CAT is higher than that of conventional tests. However, CAT is less accurate in estimating extreme abilities than intermediate abilities, and biased results are obtained in extreme abilities (Babcock & Weiss, 2009; Riley et al., 2007). There may be positive bias in low ability levels and negative bias in high ability levels. CAT produces more precise estimates near θ=1 (Magis et al., 2018). This situation contradicts the structure of CAT, which targets all ability levels. That CAT produces more biased test results at lower ability levels compared to average ability levels is problematic.

The first reason that comes to mind for the differentiation of estimation precision at different ability levels may be insufficient qualified items in the item pool for extreme abilities (Belov & Armstrong, 2009). The main determinant of CAT performance is the quality of the item pool and its suitability for the target ability (van der Linden et al., 2006). High CAT performance requires an item pool of psychometrically strong items that address a broad θ level (Weiss, 1973). CAT item pools commonly include more items with moderate difficulty and provide more information for average θ level respondents. Figure 2 shows two indicator charts of a dichotomous two-parameter logistic model CAT item bank by Magis et al. (2018).
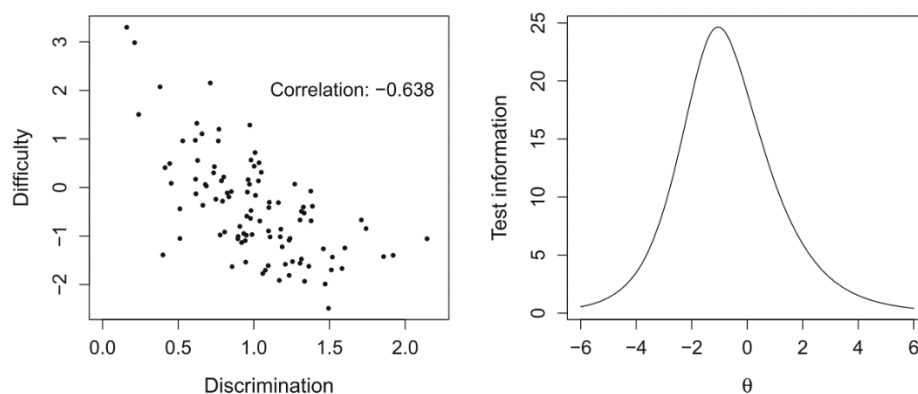
Figure 2. *Scatterplot of Discrimination and Difficulty Coefficients and Test Information Function of the 2PL Item Bank (Magis vd., 2018)*

As can be seen in the example in the figure, the difficulty and discrimination parameters of the items are stacked at moderate levels. Difficult or easy items are fewer in number than items with moderate difficulties.

Regarding this situation, the test mostly provides information at average levels, near θ=1. The information provided by the test decreases at extremely high and low θ levels.

There are studies on how to optimize the item pool and how to apply the most optimal CAT to the targeted population (Belov & Armstrong, 2009; Reckase, 2010). Apart from the design of the item pool, the methods preferred in the CAT algorithm may also affect the performance of CAT for individuals at extreme ability levels. Although the item pool is the main determinant, the methods applied can also affect the optimal CAT. A wide variety of CAT procedure combinations can be created by combining different test entry rules, item selection methods, ability estimation methods, and test termination rules. As a result of each combination, the individual may encounter item x versus item y. In different CAT procedures, approximate but different θ values are produced. As a result, the performance of different algorithms at extreme ability levels is also a critical issue. However, no research has been found in the literature examining which methods are more powerful according to the θ range. For a similar purpose, only concerning ability estimation methods, Chen, Hou, Fitzpatrick ve Dodd (1997) investigated the effect of population distribution and method of θ estimation on CAT using the rating scale model. Consequently, for either normal or negatively skewed population distributions, the three methods of ML estimation, EAP with a normal prior, and EAP with a uniform prior performed similarly. In addition, most studies compare the general performances of CAT. He, Diao ve Hauser (2013) compared the weighted deviation model, weighted penalty model, maximum priority index and shadow test approach item selection procedures in severely constrained CAT. The results indicate that, among all candidate methods, the shadow test approach works the best in terms of measurement accuracy and constraint management, except that it makes the poorest use of items. Some studies also examine CAT procedures that are effective in multidimensional computerized adaptive testing (MCAT) (Seo & Weiss, 2015; Yao, 2013). According to Yao (2013), the optimal five procedures are minimum angle, volume, minimizing the error variance of the linear combination, minimizing the error variance of the composite score with the optimized weight, and KL information. According to Seo and Weiss (2015), the MCAT model without a guessing parameter functioned better than the MCAT model with a guessing parameter. The MAP estimation method provided more accurate θ estimates than the EAP method under most conditions, and MAP showed lower observed standard errors than EAP under most conditions, except for a general factor condition using D_s-optimality item selection.

Common indicators of CAT performance are *test lengths, standard error values, bias,* and *root-mean-square-error(RMSE) values*. CAT with fewer items, low standard error values, low RMSE values, and close to zero bias performs well. Equations for bias and RMSE values are presented in Equation 1 and Equation 2, where j represents the number of respondents and N is the total number of respondents. According to Equations 1 and 2, the high difference between the estimated ability level and the actual ability level proves the low CAT performance.

$$Bias = \frac{\sum_{j=1}^{N}(\widehat{\theta}_{J_j} - \theta_j)}{N} \qquad \text{(Equation 1)}$$

$$RMSE\ (Root\ Mean\ Squared\ Error) = \sqrt{\frac{\sum_{j=1}^{N}(\widehat{\theta}_{J_j} - \theta_j)^2}{N}} \qquad \text{(Equation 2)}$$

The deduction is that methods that do not show significant changes in the precision of estimations according to the skill range should be selected in CAT applications, which are applied to individuals from a wide range of abilities. It is important to choose algorithms that provide sufficient information about lower ability levels, especially in large-scale tests involving many students with special needs. Based on this determination, this study aimed to compare the performances of various CAT algorithms at lower skill levels. In addition, it examined whether students with special needs who take a large-scale test are at lower proficiency levels than in the literature. The ability levels of students with special needs of the optimal CAT procedure, which emerged from the research, will be examined. In this context, we created the following research questions:

- Which combination of item selection method, ability estimation method, and termination rule has consistent and high CAT performance across different ability levels?

- Is the reading comprehension ability of students with disabilities who took a large-scale test significantly lower than that of students without disabilities?

- How does the optimal CAT algorithm perform at the ability levels of
  - a mixed group of students with and without disabilities who took a large-scale test?

      o   students with disabilities who took a large-scale test?

      o   students without disabilities who took a large-scale test?

Definitions

Central exam: The Turkey Central Secondary Education Exam (Ministry of National Education, 2018) for transition to secondary education applied in Turkey.

Reading comprehension ability: The test point obtained in the Turkish subtest of the central exam.

Limitations

In the study, the classification of disabled individuals was based on the disabled student classification based on the Central Exam application.

Post-hoc simulation in the study is limited to the 20-item Turkish subtest of the Central Exam.

METHOD

Study Group

This study has three main research questions. For the first research question, a Monte Carlo simulation was performed. Simulation data and related details are presented in the Data and Data Collection section.

For the second and third research questions, the Turkey Central Secondary Education Exam (hereinafter referred to as the *central exam*) data were analyzed as large-scale test data. Thus, the study group consists of 8th-grade students with disabilities (n=4410) who participated in the central exam in the 2017-2018 academic year and 5000 secondary school students without disabilities randomly selected from the students who participated in the central exam. The study group thus consists of 9410 students in total. The non-disabled group, who did not receive any test accommodation in the exam, constitutes 53.1% of the study group. The students with disabilities (n=4410), were classified into 11 groups. Group information and whether they received extended time accommodation are presented in Table 1. The disability classification is based on the classification used in the central exam.

Table 1. Disability and Extended Time Accommodation Distribution of Study Group.

Disability group		extended time accommodation			
		Yes	No	Total	
Physically impaired	n	253	162	415	9.4%
	%	61.0%	39.0%	100.0%	
Homeschooling and taking test at home	n	11	82	93	2.1%
	%	11.8%	88.2%	100.0%	
Visually impaired	n	355	0	355	8.0%
	%	100.0%	0.0%	100.0%	
Taking test at home	n	1	5	6	0.1%
	%	16.7%	83.3%	100.0%	
Attention deficit and hyperactivity	n	334	0	334	7.6%
	%	100.0%	0.0%	100.0%	
Hearing impaired	n	388	21	409	9.3%
	%	94.9%	5.1%	100.0%	
Mentally impaired	n	1164	85	1249	28.3%
	%	93.2%	6.8%	100.0%	
Pervasive developmental disorder	n	118	0	118	2.7%
	%	100.0%	0.0%	100.0%	
Specific learning difficulty	n	998	0	998	22.6%
	%	100.0%	0.0%	100.0%	
Chronic disease	n	0	59	59	1.3%
	%	0.0%	100.0%	100.0%	
Multiple disabilities	n	362	12	374	8.5%
	%	96.8%	3.2%	100.0%	
Total	n	3984	426	4410	100.0%
	%	90.3%	9.7%	100.0%	

Table 1 provides a summary of the students with disabilities as part of the study group. According to the table, 90.3% of the disabled part of the study group took the test with extended time accommodation. The highest rate among all disability groups is those with mental disabilities (28.3%) and those with specific learning difficulties (22.6%). The cross-table of the study group according to gender and educational institutions is presented in Table 2.

Table 2. Gender and school Type Distribution of Study Group

			School Type				Total	
			Public School	Private School	Religious School	Boarding School	n	%
Gender	Female	n	3496	289	460	45	4290	45.59%
		%	81.49%	6.74%	10.72%	1.05%	100.00%	
	Male	n	4247	369	452	52	5120	54.41%
		%	82.95%	7.21%	8.83%	1.02%	100.00%	
Total		n	7743	658	912	97	9410	
		%	82.28%	6.99%	9.69%	1.03%	100.00%	

According to Table 2, 45.59% of the group are female and 54.41% are male. Over four-fifths of the group (n=7743, 82.28%) are educated in public schools. This situation shows a distribution that reflects the school distribution in Turkey.

Data and Data Collection

Simulation study data

In the research, an item pool of 1000 items was created with ideal item parameter distributions (parameter a, uniformly distributed, in the range of 1-2; parameter b, uniformly distributed, in the range of -3-+3; parameter c, uniformly distributed, in the range of 0-0.20) (Wainer et al., 2000b), with Monte Carlo simulation. An ability distribution of 1000, with a mean of "0", and a standard deviation of "1" with a normal distribution was simulated. The CAT performances of different item selection methods, ability estimation methods and termination rules in estimating respondents at the extremes were compared.

The CAT procedures to be compared were chosen among the frequently preferred and recommended methods in the literature. EAP, ML estimation, and MAP were preferred as ability estimation methods. As item selection rules, MFI criterion, bOpt, KL divergence criterion, thOpt, proportional and progressive methods were used. The *PC* termination rule has been called the most powerful method for estimating low ability levels (Babcock & Weiss, 2009; Choi et al., 2011). The use of the test length limit as a termination rule is not recommended at lower ability levels. However, without item exposure control or content balancing, the ideal length can be specified as 15-20 in the test of a one-dimensional construct (Babcock & Weiss, 2009). In this study, the item length of "20" was added to the conditions as a second termination criterion (PC + 20). A total of 36 conditions were compared using combinations of these methods.

Large-scale test data

Large-scale test data were used to answer the second and third research questions of the study. The data of the students who participated in the 2018 Central Exam (Ministry of National Education, 2018) were obtained with the permission of the Ministry of National Education. Consisting of 90 multiple choice items, the central exam has verbal and numerical parts, which are administered in two separate sessions. The verbal part consists of Turkish, Religious Culture and Morals, History of the Republic of Turkey and Kemalism, and Foreign Language subtests. The numerical part consists of Mathematics and Science subtests. In the research, since the analyses were carried out according to the one-dimensional IRT, a single subtest was studied. Considering that reading comprehension is a basic skill, the Turkish subtest consisting of 20 items was chosen for analysis.

Turkish subtest

To use one-dimensional IRT models, assumptions are needed. The assumptions of unidimensionality, local independence, and model-data fit (Embretson & Reise, 2000; Hambleton & Swaminathan, 1985) were examined before data analysis. To examine the unidimensionality of the Turkish test, a modified parallel analysis was performed and the scree-plot graph in Figure 3 was created.
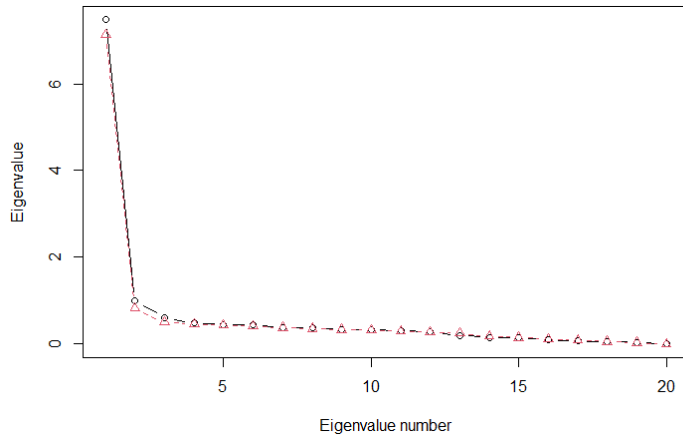
Figure 3. *Scree-plot for Turkish Subtest*

According to Figure 3, the test measures a dominant dimension. To determine which IRT model the test is compatible with, Akaike Information Criterion (ACI) Bayesian Information Criterion (BIC) and log likelihood values were examined according to a one-parameter logistic model, a two-parameter logistic model, and a three-parameter logistic model (3PL), and whether there was a significant difference between model fits was analyzed. The results are presented in Table 3.

Table 3. Model Selection Values

IRT Model	AIC	BIC	Log likelihood	P
1PL	216741.7	216891.9	-108349.9	<0.001
2PL	212752.5	213038.5	-106336.3	
3PL	210676.2	211105.1	-105278.1	

According to Table 3, the model with the highest model fit is the 3PL model. Item parameters were calculated according to the compatible 3PL model and θ values were estimated. In Figure 4, item characteristic curves and test information functions of 20 items in the subtest are presented.
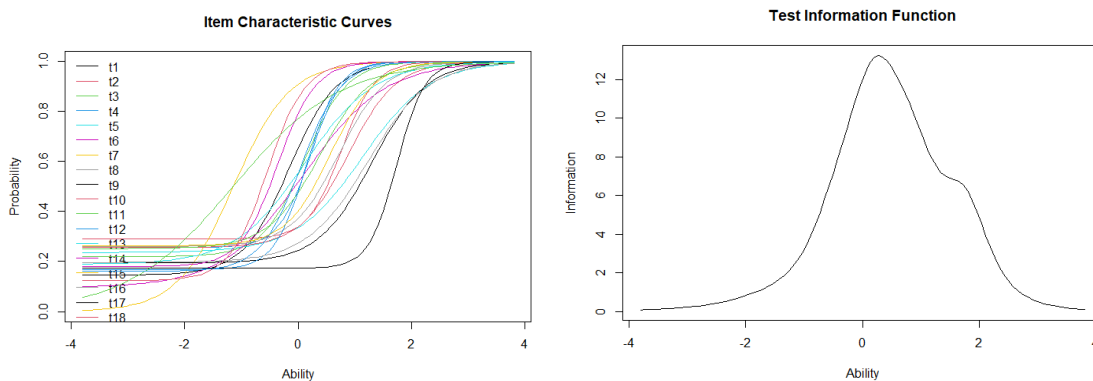
Figure 4. *Item Characteristic Curves and Test Information Functions of Turkish Subtest*

Data Analysis

According to the item characteristic curves in Figure 4, there are items with various difficulties (b parameter) and discriminations (a parameter) in the test. It is observed that the c parameters are around 0.20 as in most tests in multiple choice items. According to the test information function, the test gives the most information is around "0-0.5" θ levels.

θ levels representing students' reading comprehension ability levels were obtained from the Turkish subtest. These θ levels were used to answer the second and third research questions. An independent sample t-test was conducted to examine whether the reading comprehension proficiency of students with disabilities who took the test was significantly lower than that of students without disabilities. It was observed that the data provided the assumption of normality.

Since the real large-scale test data consisted of 20 items, a CAT simulation could not be carried out by considering the applied items as an item pool. A larger item pool, such as 200 or more items, is recommended for CAT (Şahin & Weiss, 2015). Therefore, a 1000-item item pool can be combined with Monte Carlo simulation, with item parameter distributions that can be considered ideal (parameter a is uniformly distributed, in the range of 1-2; parameter b is uniformly distributed, in the range of -3-+3; parameter c is uniformly distributed, in the range of 0-0.20) (Wainer et al., 2000b). The CAT simulation was continued with this simulated item pool. The item selection rule, ability estimation method and termination rule found in the answer to the first research question (item selection rule: KL, ML for ability estimation and PC [SE=0.32] as termination rule) were used in the CAT simulation in the third research question.

Based on the θ levels, CAT simulations were conducted for the third research question. For the ability distribution of the entire study group, CAT simulations were carried out separately based on the ability distributions of students with disabilities and without disabilities. Simulation analyses were carried out in the R *catR* package. Real-data θ estimations and IRT assumptions analysis were carried out in the R *ltm* package.

Research Ethics

The actual data used in the research were obtained from the Ministry of National Education of Turkey with permission. Since the data does not contain personal information, the research complies with ethical principles.

FINDINGS

Which combination of item selection method, ability estimation method, and termination rule has consistent and high CAT performance across different ability levels?

As a result of the research, 11 CAT procedure conditions were determined for optimal performance (r [correlation between actual θ and estimated θ] >= 0.95; bias <=0.01; RMSE< 0.33; number of items < 18) in terms of average CAT performance indicators. These optimal 11 conditions and CAT performance indicators are presented in Table 4.

Table 4. 11 Optimal Performing CAT Conditions

Condition No	Ability Estimation Method	Item Selection Rule	Termination Rule	Average Test Length	r	RMSEA	Bias
1	EAP	MFI	SH	12,9	0,96	0,3032	0,0074
2	EAP	progressive	SH	14,8	0,96	0,295	0,0014
3	EAP	proportional	SH	17,8	0,95	0,3229	0,0034
4	EAP	thOpt	SH	21,9	0,95	0,3287	-0,0063
5	EAP	bOpt	SH	22	0,95	0,3268	-0,0123
6	EAP	KL	SH	13,3	0,95	0,3161	-0,0053
12	ML	KL	SH	14,6	0,96	0,3172	0,0112
18	MAP	KL	SH	12,5	0,95	0,3242	0,0257
19	EAP	MFI	SH + 20	12,9	0,95	0,3101	-0,0053
20	EAP	progressive	SH + 20	15	0,95	0,3261	0,0047
21	EAP	proportional	SH + 20	17,6	0,95	0,3112	-0,0015
24	EAP	KL	SH + 20	13,3	0,95	0,318	-0,0064
30	ML	KL	SH + 20	14,6	0,96	0,3156	-0,0012

According to Table 4, the EAP ability estimation method and the KL divergence item selection criterion outperform other methods in terms of the overall average. To observe the strength of these 11 prominent conditions at different ability levels, the change graph of the RMSEA value according to the θ intervals is presented in Figure 5, and the variation graph of the bias value according to the θ intervals is presented in Figure 6. The numbers for the conditions were presented in Table 1.
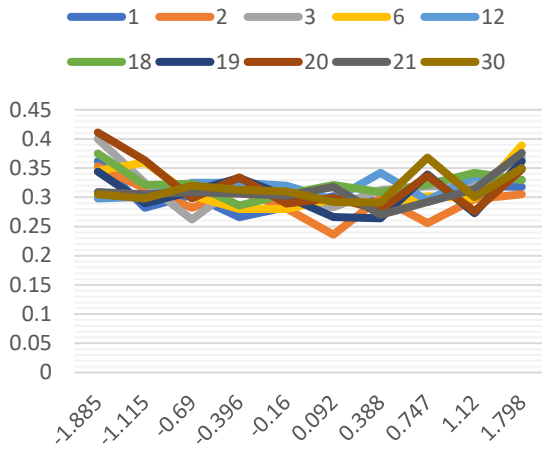
Figure 5. *RMSEA Change at θ intervals*   Figure 6. *Bias Change at θ Intervals*
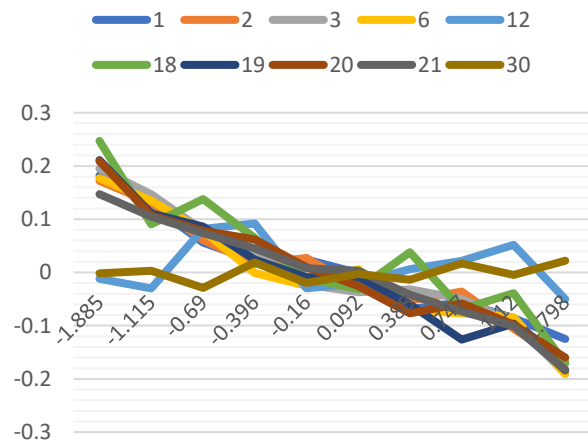
According to Figures 5 and 6, among the algorithms with low mean of RMSEA and bias, the algorithms that show consistency in terms of CAT performance across different proficiency levels are more straight-line, with the best performance at the lower proficiency levels. These can be specified as ML ability estimation method, KL item selection method, PC (condition 12) and PC +20 (condition number 30) test termination rules. It is observed in the chart that the lines of these conditions maintain their low levels.

Is the reading comprehension ability of students with disabilities who took a large-scale test significantly lower than students without disabilities?

This research question tested whether students with special needs stated in the literature mostly had low proficiency levels. First, Figure 7 presents histogram graphs of the estimated θ levels of students with and without disabilities.
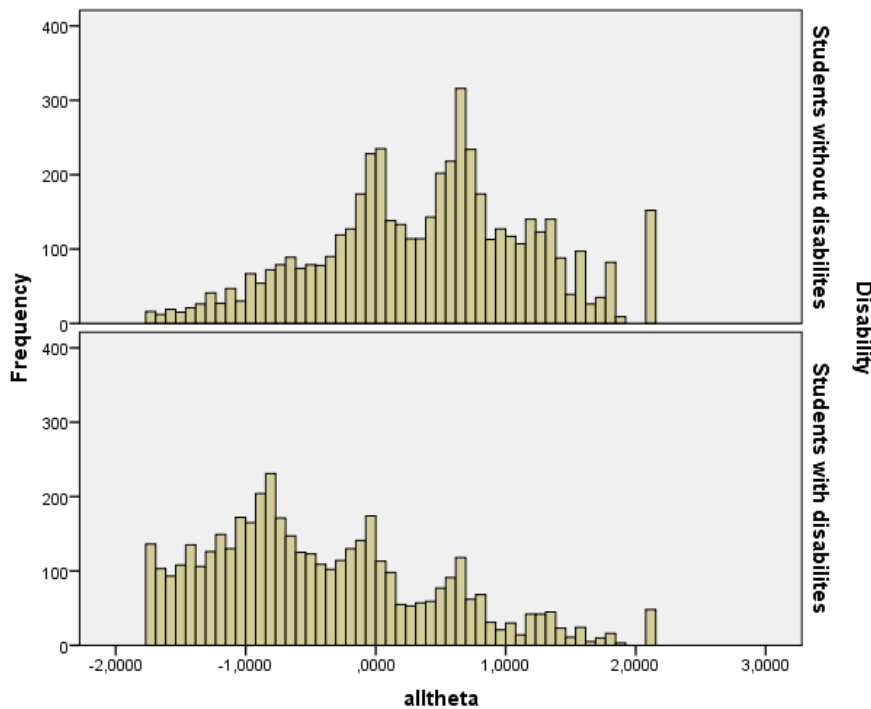
Figure 7. *Estimated θ Levels of Students with and without Disabilities*

Figure 7 shows that the distribution of scores of students with disabilities is skewed to the right, and the scores of those without disabilities have a skewed distribution to the left. This is a visual indication that the average of the achievements of those with disabilities is low and that of those without a disability is high. Table 5 summarizes the results of the independent samples t-test performed to examine whether there is a significant difference between the ability levels of those with and without disabilities.

Table 5. θ means t Test Results According to Disability Status

Group	n	$\bar{X}$	S	df	t	p
Students with disabilities	4410	-,428	,861	9408	-47,479	.000
Students without disabilities	5000	,395	,814			

The results of the independent samples t-test indicated that the θ levels of students with disabilities ($\bar{X}$=-0.428) are significantly lower than the θ levels of students without disabilities ($\bar{X}$ = 0.395). This supports the finding that students with disabilities have lower proficiency than their peers, which underlines the necessity of making arrangements in terms of CAT algorithm stages considering this situation in CAT applications attended by students with disabilities.

How does the optimal CAT algorithm perform at the ability levels of students with or without disabilities who took a large-scale test?

To answer this research question, the optimal CAT conditions found in the first research were studied. For each group, based on the real θ of the whole group (1), the disabled group (2) and the non-disabled group (3), the CAT performances applied under optimal conditions were examined. The results of the CAT simulations carried out with the KL item selection method, ML ability estimation method and *PC* termination rules from the item pool simulated according to the 1000-item 3PL model are presented in Table 6.

Table 6. Performances of the Optimal CAT Condition in Different Groups

Performance indicator	All group	Students without disabilities	Students with disabilities
Simulation time	9410	6.4473	5.581
Number of simulees	12.1018	5000	4410
Mean test length	14.80436	14.776	14.861
Correlation (true θs, estimated θs)	0.9446	0.929	0.936
RMSEA	0.3233	0.3237	0.3242
Bias	0.0038	0.0019	0.0054

As can be seen in Table 6, the averages of test lengths were almost the same in the two distinct groups ($\bar{X}_{sd}$ =14.861; $\bar{X}_{swd}$ =14.776), about 15. Similarly, the correlation between true θs and estimated θs is above 0.92 and is thus quite high. RMSEA values are also the same to the third digit after the decimal point. Although there is no significant difference between the bias values, it can be observed that more biased results are produced in students with disabilities.

DISCUSSION & CONCLUSION

For CAT to be more efficient, item pool designs are frequently discussed in the literature (Belov & Armstrong, 2009; Reckase, 2010; van der Linden et al., 2006). The compatibility of the item pool with the ability levels of the target group is also addressed in such studies. This study examines which CAT procedures are more effective when there is a wide range of ability distributions, by comparing the performances of various CAT procedures. In addition, Turkey Central Secondary Education Exam examined whether the determined procedures would show similar performance in the ability levels of students with disabilities, as a group unfortunately more often of extreme abilities and that CAT will offer advantages in many respects.

Based on the findings of the study, it was observed that the CAT performances of the ML ability estimation method and KL item selection methods were more consistent in different ability ranges in the tests intended to measure students at lower ability levels with precision. In addition, it has been observed that the performances of the PC termination rule and PC termination rule used with a 20-item length limit are similar. In CAT applications where these methods are applied, the average test length is 14.6; the RMSE values are respectively, 0.3172 and 0.3156, and the bias is 0.0112 and -0.0012, respectively. It has been observed that the ML ability estimation method

produces more consistent results in different ability ranges. This finding is inconsistent with the findings of Chen, Hou, Fitzpatrick ve Dodd (1997). Chen, et al. (1997) observed that the ML estimation, EAP with a normal prior, and EAP with a uniform prior comparable results methods produced comparable results for a group with normal distribution and a group with skewed distribution. However, it should be kept in mind that the rating scale model was used in this research and the analysis was made with prior distributions. In addition, there was no study examining the performance of CAT procedures in different ability ranges. However, there are studies examining the overall CAT performance of different procedures. Yao (2013) showed the KL item selection method and the PC termination rule among the five optimal procedures in his research examining CAT procedures that are effective in MCAT. This finding supports the research findings.

The methods that were found to perform optimally under the conditions discussed in the study were also tested on real data. First, whether students with disabilities had lower ability levels than those without disabilities, as stated in the literature, was examined (Stone & Davey, 2011). According to the results of the statistical test, the reading comprehension skill discussed in the research is lower in students with disabilities. In the large-scale test designed to answer the main question, it was observed that the performance of the optimal CAT algorithm, which was reached as a result of the research, was high and similar to the ability levels of the students with disabilities and without disabilities. These research findings can be evaluated in the selection of methods in studies that include students with disabilities or students with extreme ability levels. Advantageous aspects of CAT applications include test accommodations that have the potential to provide students with disabilities, no need for extended time accommodations, and more reliable ability estimation (Şenel & Kutlu, 2018a, 2018b); with the use of these methods, more unbiased and valid results can be produced.

In this research, investigations were carried out to show that students with disabilities have lower ability means in the central exam. However, it should not be forgotten that this finding does not mean that all individuals with special needs have lower abilities. It is important to carefully discuss the findings, keeping in mind that the study group is a special group. The results of the research should be interpreted in terms of pointing out that the design of CATs, where individuals with special needs are also tested, should be taken care of.

In this study, θ levels of students with disabilities were obtained from real large-scale test data. However, the CAT item pool was created with a Monte Carlo simulation. In further research, a real item pool and the performance of students with disabilities and other groups in optimal CAT can be compared as a post hoc simulation. There are studies based on such post hoc simulations for the applicability of some large-scale tests as CAT (Seo & Choi, 2018). Similarly, it can be suggested to researchers to compare the power of this optimal CAT application in different ability ranges in a completely real CAT application.

The research focused on measuring the abilities of students with disabilities. However, it is an important result for CAT applications in the field of health, considering that the research has revealed methods that show CAT performance at extreme ability levels similar to that at intermediate ability levels. These CAT procedures may also be preferred in CAT applications for the diagnosis of individuals who fall far below a criterion in terms of certain characteristics such as depression and mental health (Gibbons et al., 2014, 2016).

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The Effects of ARCS on the Acceptance of Online Learning Environments during the Novel Coronavirus Pandemic: A Structural Regression Analysis

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Abstract

Although the use of online learning environments has been increasingly integrated into teaching and learning of university students worldwide, the global pandemic COVID-19 has urged almost the exclusive use of these environments for at least temporary periods. Since there may be situations that disrupt the efficiency of education-teaching environments such as a pandemic, it is expected that university teaching will continue either in a mixed-mode combining face-to-face and online learning or in some cases by online learning only. Hence, it is essential to assess the acceptance of online environments by university students. This study assesses the effect of motivation on the acceptance of such environments. It concentrates on examining the effect of motivation regarding teaching materials on the acceptance of online learning environments. For this, while the motivation concept related to the teaching materials is based on the Attention, Relevance, Confidence, Satisfaction model developed by Keller (1987), the acceptance of online learning environments is based on the Technology Acceptance Model developed by Davis (1989). Discussions and suggestions regarding the results are presented by considering the relevant literature.

Keywords: distance education, online learning, media in education, teaching and learning strategies.

Yeni Tip Korona Virüsü Sürecinde Öğrenme Motivasyonunun Çevrimiçi Öğrenme Ortamlarının Kabulü Üzerindeki Etkisi: Bir Yapısal Regresyon Analizi
Öz

Çevrimiçi öğrenme ortamlarının kullanımı dünya çapında üniversite öğrencilerinin öğretim ve öğrenimine giderek daha fazla entegre edilmiş olsa da, küresel COVID-19 salgını en azından geçici sürelerle bu ortamların neredeyse özel olarak kullanılmasını zorunlu kılmıştır. Pandemi gibi eğitim-öğretim ortamlarının verimliliğini sekteye uğratan durumlar olabileceği için, üniversite öğretiminin ya yüz yüze ve çevrimiçi öğrenimi birleştiren karma öğrenme ya da bazı durumlarda yalnızca çevrimiçi öğrenimle devam etmesi beklenmektedir. Bu nedenle, üniversite öğrencileri tarafından çevrimiçi ortamların kabulünün değerlendirilmesi önemlidir. Bu çalışma, motivasyonun bu tür ortamların kabulü üzerindeki etkisini değerlendirmektedir. Öğretim materyallerine ilişkin motivasyonun çevrimiçi öğrenme ortamlarının kabulü üzerindeki etkisini incelemeye odaklanmaktadır. Bunun için öğretim materyallerine ilişkin motivasyon kavramı Keller (1987) tarafından geliştirilen Dikkat, İlgililik, Güven, Doyum modeline dayandırılırken, çevrimiçi öğrenme ortamlarının kabulü Davis (1989) tarafından geliştirilen Teknoloji Kabul Modeline dayanmaktadır. Sonuçlara ilişkin tartışma ve öneriler ilgili literatür dikkate alınarak sunulmuştur.

Anahtar kelimeler: uzaktan eğitim, çevrimiçi öğrenme, eğitimde medya, öğretme ve öğrenme stratejileri.

INTRODUCTION

Reflection of constructivist approaches to learning environments has led to reconsider the meaning of many concepts. This has led to new dynamics in teaching and learning; changing from teaching the students to student-centered learning. This approach brought new challenges for both the educators and the learners that need to be addressed. The global pandemic caused by the new type of Coronavirus has re-iterated the importance of online learning environments; almost all educational institutions felt obliged to review their educational processes to sustain learning in these environments effectively. Learning is a process (Tan, 2012) and whether this is performed face-to-face or online, it is essential to consider the characteristics of the learners and the ways they learn (Jonassen, 1986; Gulbahar, 2005). This highlights the importance of acceptance and motivation in learning. Acceptance is an important indicator of the attitude (ATTD) and behavioural intention (BI) towards adopting the use of technology in the learning environment concerned (Davis, 1989). Motivation is defined as "direction and magnitude of behaviour, an indicator of effort" (Keller, 1983). Ajzen and Fishbein (1980) explained behavioral intention as "a measure of the probability that a person will complete a given behavior", based on the fact that motivational factors influence behavioral intention.

The Motivation Model of Davis, Bagozzi and Warshaw (1992), states that the intrinsic and extrinsic motivations of individuals are important in technology acceptance. However, learner motivation regarding the teaching material used in the learning environment is not considered in their work. Moore (1993) on the other hand, emphasizes the content and interaction elements in the concepts of structure and dialogue that he discusses in the Transactional Distance theory. Teaching materials are important elements in helping learning in a learning environment. In an online learning environment, the interaction of a learner with the teaching materials is as important as the interaction with the instructor(s) and other learners. Also, the learning motivation of a learner based on his/her interaction with the teaching materials may play an important role in the acceptance of online learning environments.

As online learning environments become more essential than ever due to the ongoing COVID-19 pandemic process, it has become even more important to assess the effect of motivation on the acceptance of these environments. This study aims to examine the effect of motivation regarding teaching materials on the acceptance of online learning environments; a different presentation of distance education environments (Gülbahar, 2012). Within the scope of this study, the motivation concept related to the teaching materials is based on the Attention, Relevance, Confidence, Satisfaction (ARCS) model designed by Keller (1987), and the acceptance of online learning environments is based on the Technology Acceptance Model (TAM) developed by Davis (1989). Discussions and suggestions regarding the results are presented by considering the relevant literature.

Theoretical Framework

While the category of relevance, which can also be called interest, includes the education being aimed at achieving the goals of the learner, being compatible with learning styles, and being linked to previous knowledge; the confidence category states the positive effect of learners' positive expectations for success, experience geared towards success, and qualities of success. (Keller, 2016). Finally, under the category of satisfaction; the perception of satisfaction includes rewarding outcomes planned internally and externally to reveal desired learning behaviours (Keller, 2016). The feeling that they are learning new and useful things creates an inner sense of satisfaction for learners (Arora & Sharma, 2018).

Acceptance of Online Learning Environments and Motivation in Teaching Materials

Online learning environments can create flexible situations according to the learners' learning characteristics. According to transactional distance learning theory, learners interact with content (e.g. course materials), instructors, and other learners (Moore, 1989) and online technologies play a key role in this interaction. Learning activities and resources are prepared based on instructional design to enable learners to learn in a planned way on their own (Carman, 2002).

Motivation Theory (Keller, 1987), which is structured around the concepts of attention, relevance, confidence, and satisfaction, gives clues in the context of how teaching materials and online learning environments should be structured. In general, the majority of learning difficulties and unwanted behaviours in educational settings stem from a lack of motivation (Yıldız et al., 2019). This also applies to interactions in online environments. Considering the interaction of the learners with the teaching materials in the learning processes in online learning environments, the teaching materials in online learning environments should contribute to learning motivation in terms of design, content and access.

The main and sub-dimensions of the online learning environments in general and the teaching materials in particular based on the ARCS Motivation Model are presented in Table 1.

Table 1. Dimensions and sub-dimensions for materials to provide motivation based on the ARCS model

Attention	Relevance	Confidence	Satisfaction
To attract and sustain students' interest and attention.	To achieve what is expected.	To develop success expectation.	To provide the satisfaction of what is achieved.
To attract attention in terms of visuality, content and effectiveness.	The appropriate structuring of content to enable students' achievements.	Teaching materials should develop success expectation among learners.	Teaching materials should be satisfying in relation to access, design and content.

Attention

The category of attention includes sensory areas such as curiosity, excitement, interest, and boredom (Keller, 2016). Teaching materials prepared for online learning environments can be in the form of presentations, animations, text documents, video and audio files containing multimedia. Properly designed environments are effective in attracting the attention of learners (Mayer, 2003). Reeves (1998) states that multimedia is effective in attracting and sustaining attention because it can activate more than one senses at the same time.

Liu et al. (2009) discuss the concept of attention within the concept of concentration. In their work, an important relationship between concentration and perceived usefulness (PU) is stated. Hence, in this research, it is hypothesized that in an online learning environment;

H1. Attention has a positive effect on PU.

Relevance

This category, which can also be named as interest, includes the education being aimed at achieving the goals of the learner, being compatible with learning styles and being linked to previous knowledge (Keller, 2016). Variables such as subjective norms, image, professional suitability, and predictability of results have a significant effect on perceived ease of use (PEU) (Šumak et al., 2011). According to this, the following hypothesis is presented:

H2. Relevance has a positive effect on PU.

Confidence

This category states the positive effect of learners' positive expectations for success, experience geared towards success, and qualities of success. This effect is wholly based on a person's ability and effort and excludes variables such as luck, and the level of difficulty of the work to be completed (Keller, 2016). The learners' level of confidence is often dependent on motivation and effort needed to succeed (Orji et al., 2019). About this subject, the following hypothesis is proposed:

H3. Confidence has a positive effect on PEU.

Satisfaction

This category includes the perception of satisfaction includes rewarding outcomes planned internally and externally to reveal desired learning behaviours (Keller, 2016). The feeling that they are learning new and useful things creates an inner sense of satisfaction for learners (Arora & Sharma, 2018).

As with almost all information systems, the success of e-learning is thought to largely depend on user satisfaction and other factors that will subsequently increase their intention to continue using it (Roca et al., 2006). For example, it has been observed that satisfaction in the use of video for learning has a direct positive effect on PU (Nagy, 2018). Also, Lee et al. (2005), by integrating a motivational perspective into the TAM, reveal that both extrinsic (PU and PEU) and intrinsic (perceived pleasure) motivation tools are effective in explaining learners' intention to use the new learning environment.

Therefore, it can be proposed that:

H4. Satisfaction has a positive effect on PU.

It is believed that perception of satisfaction, one of the components of the ARCS motivation model, has a direct effect on the intention variable, which is one of the TAM components. However, there is very little work reported in the literature on direct impact. In a study conducted in the service industry, it was seen that after online shopping, customer satisfaction positively affected the intention to comment on the site (Finn et al., 2009).

H5. Satisfaction has a positive effect on BI.

Technology Acceptance

According to the TAM, the intention factor is very important for an individual to perform a behaviour; the higher the measure of an individual's intention to use a particular technology, the higher the behaviour of using that technology in the future. This explains the impact of the acceptance and use of technology and the realization of future behaviour. So that another variable that is effective in individual acceptance and use of technology is attitude (Davis, 1989). Ülgen (1995) emphasizes that attitude is a psychological variable that guides behaviour and is effective in decision-making.

Although our positive attitude towards technology will not bring along the behaviour of using that technology in the future, studies show that it has a very explanatory effect on intention, which affects behaviour (Ajzen, 1991; Davis, 1989, Venkatesh & Bala, 2008). On the other hand, while the PU is defined as the belief that using a certain system increases a person's job performance; PEU refers to the level of effort spent to use a particular system (Davis, 1989). In line with this definition, it can be stated that there is a relationship between PEU and PU. Joo et al. (2018) stated in their study that there is a strong relationship between PEU and PU. Attitude is expressed as the psychological disposition obtained as a result of the evaluation of a certain entity in terms of goodness or discontent (Eagly & Chaiken, 2007). It is believed that the perceived benefit of using new technology has a positive effect on attitude towards that technology in theory. In this context, Heijden (2003) stated in their research on web sites that there is a significant positive relationship between the PU of the site visitors towards the use of the site and the attitude towards the web site.

Similarly, it can be said that the PEU of technology has a positive effect on the attitude towards using that technology. This situation can be easily observed in the use of smartphones, search engines and social media platforms. For example, in the study of an online flight booking site, Guritno and Siringoringo (2013) stated that the PEU of the website has a positive effect on the attitude towards buying tickets from the website, but not as much as the PU and confidence variables have. In another study (Hu et al., 1999) stated that PU has an effect on the use of technology, but PEU has no effect. Finally, considering that technology is constantly evolving to facilitate human life and new products, new business models and approaches emerge, it is seen that some technologies are not adopted by the users at the expected level. This may mainly be due to the poor perception of the usefulness of that particular technology by the user. In a study conducted on an internet shopping site, it was established that the perception of the benefit of shopping from the website has a positive effect on the intention to use the website (Ramayah & Ignatius, 2005). In the studies carried out in the concept of e-learning, it has been observed that the PU has a positive effect on the intention regarding e-learning environments (Masrom, 2007; Liaw 2008). According to this, the following hypotheses are formed:

H6. PEU has a positive effect on PU.

H7. PU has a positive effect on ATTD.

H8. PEU has a positive effect on ATTD.

H9. ATTD has a positive effect on BI.

H10. PU has a positive effect on BI.

Based on the above-mentioned hypotheses, the suggested model is shown in Figure 1.
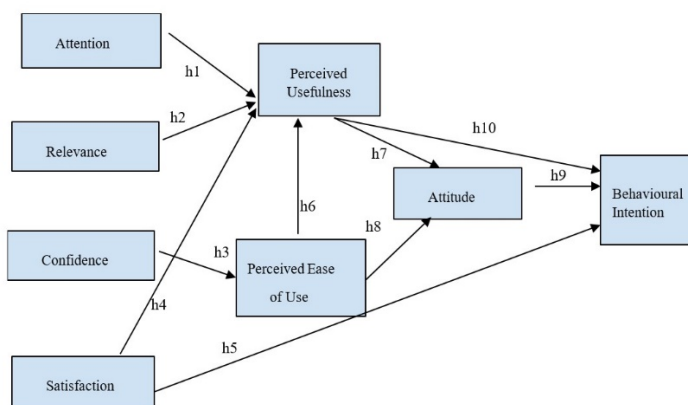
Figure 1. *The model tested by structural regression*

Importance of the Study

In his work on TAM, Davis (1989) stated that the acceptance of technology in technology-enriched learning environments is related to the internal factors of individuals, consists of variables such as BI, ATTD, PEU and PU. According to TAM, two concepts are known to explain the attitude: PEU and PU (Davis, 1989). According to the PEU and PU variables, which have an indirect impact on the BI of the use of current technologies in the learning environment supported by the technology, the learner must believe that the use of existing technology is easy and beneficial.

In this case, the effect of the motivation of learners regarding teaching materials on their acceptance of online learning environments emerges as an important research question. As a matter of fact, during the COVID-19 global pandemic process, we are in, as the educational institutions move their teaching and learning activities to online environments; it is essential to address the concept of the motivation of teaching materials in the acceptance of these environments. In the literature, there are studies on external factors that affect the acceptance of technology (Davis, 1989; Esteban-Millat et al., 2018; Joo, Kim, & Kim, 2016; Qin et al., 2011). A study of relevant work reveals that technology acceptance is mostly affected by external factors such as PEU and PU. However, learning is a process and hence the elements in the environment can affect technology acceptance too. Although this may not be a direct effect, it may be the case that the motivation learning materials give to a learner may help the acceptance of online learning environments. Therefore, in the acceptance of online learning environments, it is necessary to address the factors that serve learning rather than the PEU and the PU. In evaluating online learning environments, the teaching materials an individual interacts with must be considered in technology acceptance. To assess this, a focus on motivation in learning is essential. Since teaching materials are the fundamental elements of learning in online learning environments, these materials may help considerably in the acceptance of online learning environments. In this context, as the global pandemic enforces the use of online learning environments, the question to be answered can be formulated as; "What is the effect of university students' motivation in learning materials on their acceptance of online learning environments?

METHOD

The study aimed to examine the effect of university students' learning motivation (ARCS) on technology acceptance. This study, designed with a general survey model, aimed to take a snapshot of and describe a current situation (Büyüköztürk et al., 2017). In screening studies, it is important how the individuals participating in the research are distributed, rather than the reasons for the opinions and characteristics, without the effort to change and affect the situation in question (Fraenkel & Wallen, 2006). In the study conducted as an example of the relational screening model, the relationships between variables were tested with structural regression analysis. Bollen (1989) explains the evolution of the Structural Equation Model to its current form through three basic developments: path analysis, contextual synthesis of latent variable and measurement models, and general estimation procedures. Accordingly, the basic models of the Structural Equation Model were path analysis, confirmatory factor analysis models, structural regression models, and latent change models (Raykov & Marcoulides, 2006). Accordingly, structural regression models are built on the assumption that there are some specific explanatory relationships, such as latent regressions, on top of confirmatory factor analysis; and it is generally used to test the existence of explanatory relationships involving various latent variables.

Participants

The study group consisted of 999 students studying in different departments of the university within the scope of common compulsory courses that a total of 10,000 students are required to take at a state university in the spring semester of the 2019-2020 academic year. Students had online access to the teaching materials prepared for these courses. The teaching materials that were delivered synchronously and asynchronously through the university's learning management system where live lessons, an interactive interface (chat, blog, board, etc.), PowerPoint presentations and text-based documents were offered to learners through virtual classrooms with interaction for the study group.

Data Collection Tools

Motivation scale regarding instructional material

In this study, the motivational design for learning and performance was used: The ARCS Model approach scale related to the teaching material developed by Keller (2010) and adapted into Turkish by Dinçer and Doğanay (2016). The adapted scale consists of four subscales and explains 47.5% of the total variance. The Cronbach Alpha

Internal Consistency Coefficient for the whole scale is 0.93. The structure of the scale obtained by confirmatory factor analysis has fit indices χ^2/df = 2.32, SRMR = 0.04, RMSEA = 0.07, AGFI = 0.78, GFI = 0.81, NFI = 0.97, and CFI = 0.98. According to the fit indices it is possible to say that the tool has an excellent and acceptable values.

Technology Acceptance Scale

The technology acceptance scale developed by Ursavaş et al. (2014) consists of 37 items and 11 sub-factors. The factors in the scale are as follows: PU (4-items), PEU (3-items), perceived enjoyment (4-items), anxiety (3-items), BI (4-items), convenience (3-items), technological complexity (3-items), subjective norm (3-items), facilitating conditions (3-items), ATTD (4-items) and self-efficacy (3-items). Only 4 factors were used in this study, and these factors are PU, PEU, ATTD, and BI subscales

Data Analysis

Data analysis was performed with SPSS 23 and AMOS 23 programs and n, Min, Max, M, Sd, Skewness and Kurtosis values were obtained from the descriptive properties of the variables. The relationship between variables was tested with the Pearson Correlation coefficient. Also, variables related to students' learning motivations in the online learning environment were considered based on Keller's (2010) ARCS model and their effect on technology adoption was tested with structural regression analysis. Structural regression analysis is used because it is a technique more commonly used in exploratory research aimed at describing the relationship between structures (Hair et al., 2018). After presenting the descriptive statistics, findings related to the tested structural model are given.

Research Ethics

In this study, all the rules specified to be followed within the scope of "Higher Education Institutions Scientific Research and Publication Ethics Directive" were complied with. None of the actions specified under the heading "Actions Contrary to Scientific Research and Publication Ethics", which is the second part of the directive, have been taken.

FINDINGS

Findings of the Descriptive Statistics and Correlation Values

Descriptive statistics regarding the variables examined in the study are shown in Table 2.

Table 2. Descriptive Statistics

Variable	n	Min	Max	M	d	Skewness	Kurtosis	Attention(1)	Relevance(2)	Confidence(3)	Satisfaction(4)	PU(5)	PEU(6)	ATTD(7)	BI(8)
Attention(1)	999	10	50	30.26	9.93	-0.147	-0.32	1							
Relevance(2)	999	8	40	24.83	7.82	-0.2	-0.221	.959**	1						
Confidence(3)	999	9	45	27.85	8.71	-0.18	-0.196	.934**	.944**	1					
Satisfaction(4)	999	6	30	18.27	6.12	-0.16	-0.362	.961**	.950**	.934**	1				
PU(5)	999	4	20	14.14	4.13	-0.722	0.205	.653**	.670**	.689**	.648**	1			
PEU(6)	999	3	15	10.65	3.09	-0.724	0.253	.596**	.622**	.645**	.589**	.861**	1		
ATTD(7)	999	4	20	13.91	4.166	-0.657	0.087	.662**	.671**	.680**	.652**	.886**	.860**	1	
BI(8)	999	4	20	13.85	4.134	-0.656	0.118	.658**	.672**	.675**	.658**	.853**	.829**	.917**	1

PU: Perceived usefulness, PEU: Perceived ease of use, ATTD: Attitude, BI: Behavioural intention 0.05>p; 0.01>p***

According to Table 2, based on the mean score obtained from the instruments it was discovered that the students have a higher score than the average in ATTENTION (χ =30.26), RELEVANCE (χ =24.83), CONFIDENCE (χ =27.85), SATISFACTION (χ =18.27), PU (χ =14.14), PEU (χ =10.65), ATTD (χ =13.91), and

BI (χ =13.85) dimensions. In addition, when Table 2 is examined, there is a significant and positive relationship exists between the PU, CONFIDENCE, ATTD and BI dependent variables and the independent variables relevant to this study (p <0.01).

Findings of the Structural Regression Model

Structural regression models findings were found by the structural regression technique. These findings are shown in Table 3 below.

Table 3. Fit index values obtained in the first level CFA

Fit index values	Perfect fit	Acceptable fit	Fit Index Value Achieved in the Level-One CFA
χ2/sd	0 ≤ χ2/sd ≤ 2.	2 ≤ χ2/sd ≤5	3.49
GFI	0.95 ≤ GFI	0.85 ≤ GFI	0.99
AGFI	0.90 ≤ AGFI ≤ 1.00	0.85 ≤ AGFI	0.97
CFI	0.95 ≤ CFI ≤ 1.00	0.90 ≤ CFI ≤ 0.95	0.99
IFI	≥ 0.95	≥ 0.90	0.99
RMSEA	0.00 ≤ RMSEA ≤ 0.05	0.06 ≤ RMSEA ≤ 0.08	0.05
SRMR	0.00 ≤ SRMR ≤ 0.05	0.06 ≤ SRMR ≤ 0.10	0.01

Table 3 shows the fit indexes obtained from the structural regression model. The model has perfect fit indexes (χ2/sd =41.842/12) =3.49, p=0.000; GFI=0.99; AGFI=0.97; CFI=0.99; IFI=0.99; RMSEA=0.05; SRMR=0.01) (Bentler & Bonett, 1980; Browne & Cudeck, 1993; Byrne, 2006; Byrne & Campbell, 1999; Hu & Bentler, 1999; Joreskog & Sorbom, 1993; Kline, 2011; Tanaka & Huba, 1985; Schermelleh-Engel & Moosbrugger,2003). In the model, the testing of the data was performed with the structural regression technique and the effects of the variables are presented in Figure 2.
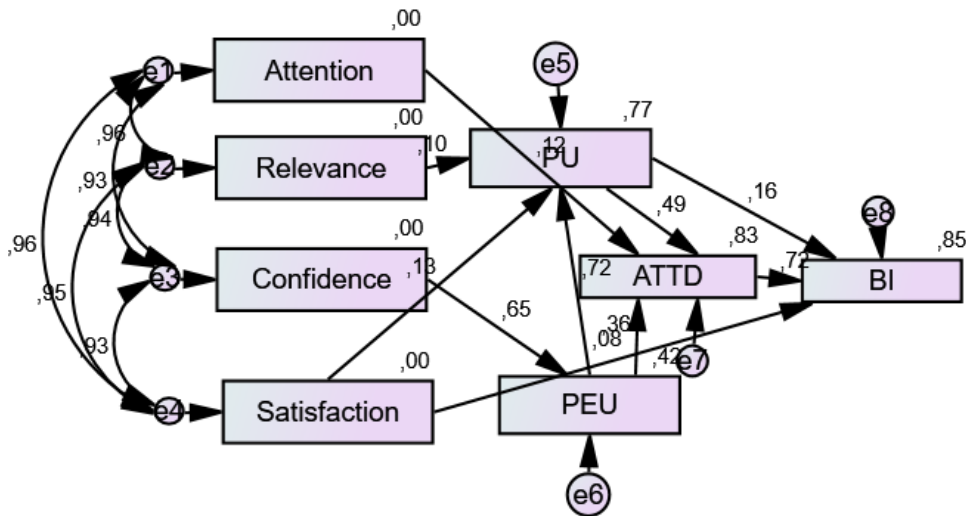
Figure 2. *Testing model with Structural Regression Technique*

Table 4. Results for hypothesis testing

Hypothesis	Relationship	β	t	p	r²	f²	Decision
h1	Attention→ATTD	0.124	7.153	***	0.124	0.14	Supported
h2	Relevance→PU	0.099	1.997	*	0.099	0.11	Supported
h3	Confidence→PEU	0.645	26.690	***	0.645	1.82	Supported
h4	Satisfaction→PU	0.126	2.621	**	0.126	0.14	Supported

h5	Satisfaction→BI	0.150	5.189	***	0.150†	0.18	Supported
h6	PEU→PU	0.724	37.515	***	0.724	2.62	Supported
h7	PU→ATTD	0.493	18.058	***	0.493	0.97	Supported
h8	PEU→ ATTD	0.719	14.091	***	0.719†	2.56	Supported
h9	ATTD→BI	0.717	26.709	***	0.717	2.53	Supported
h10	PU→BI	0.163	6.090	***	0.516†	1.07	Supported

†*the independent variable had a direct and indirect effect on the dependent variable. PU: Perceived usefulness, PEU: Perceived ease of use, ATTD: Attitude, BI: Behavioural intention*

When Figure 2 and Table 4 are evaluated together, it is seen that the ATTENTION independent variable has a direct effect ($\beta=0.124$, $p<0.001$) on the ATTD dependent variable, and an indirect effect ($\beta=0.089$) on the BI dependent variable. In addition, it is seen that the RELEVANCE independent variable has a direct effect on the PU dependent variable ($\beta=0.099$, $p<0.05$), and an indirect effect on the ATTD ($\beta=0.049$) and BI ($\beta=0.051$) dependent variables. While the CONFIDENCE independent variable has a direct effect ($\beta=0.645$, $p<0.001$) on the PEU dependent variable; It also has an indirect effect on the dependent variables of PU ($\beta=0.467$), ATTD ($\beta=0.464$) and BI ($\beta=0.409$). The SATISFACTION independent variable has a direct effect on the PU dependent variable (= 0.126, $p<0.01$), and an indirect effect on the ATTD dependent variable ($\beta=0.062$). It can also be seen that the SATISFACTION independent variable has both a direct ($\beta=0.085$, $p<0.001$) and an indirect effect ($\beta=0.065$, $p<0.001$) on the BI dependent variable. Furthermore, the PEU independent variable has a direct effect ($\beta=0.724$, $p<0.001$), on the PU, both a direct ($\beta=0.362$, $p<0.001$) and an indirect ($\beta=0.357$, $p<0.001$) effect on the ATTD, and an indirect effect ($\beta=0.6333$, $p<0.001$) on the BI dependent variables. While the PU independent variable has a direct effect on the ATTD dependent variable ($\beta=0.493$, $p<0.001$), it affects BI dependent variable both directly ($\beta=0.163$, $p<0.001$) and indirectly ($\beta=0.353$, $p<0.001$). Finally, it can be seen that the ATTD independent variable also has a direct ($\beta=0.717$, $p<0.001$) effect on the BI dependent variable.

Table 5. Effect size

Variables	r^2	f^2
PU	0.77	3.35
PEU	0.42	0.72
ATTD	0.83	4.88
BI	0.85	5.67

The proposed and tested model showed that the endogenous variables have adequate predictive relevance as given in Table 5. Accordingly, the PU variable is explained by the independent variables RELEVANCE, SATISFACTION and PEU at 77% ($r2=0.77$), the PEU variable is explained by the SATISFACTION independent variable at 42% ($r2=0.42$), the ATTD variable is explained by the ATTENTION, PU and PEU independent variables at 83% ($r2=0.83$) and finally, the BI variable is explained by the SATISFACTION, ATTD, and PU variables at 85% ($r2=0.85$).

Cohen's (1988) f value, which shows the effect size was determined on the dependent variables PU, PEU, ATTD, and BI. This method measures the effect size, if the significant results obtained in the model and its significance in practice, or not. To reach this, calculating the f2 value for regression analyses and linear models are being suggested as follows:

$$f^2 = R^2/(1 - R^2)$$

The results can be interpreted by the division of multiple correlation coefficient (R2) by its subtraction from 1(1-R2). An f value giving $0.02 \leq f2 < 0.15$ refers to small effect, $0.15 \leq f2 < 0.35$ means there is a medium effect and $0.35 \leq f2$ indicates a large effect (Cohen, 1988). Hence, in this study the effects of all endogenous variables are large.

DISCUSSION & CONCLUSION

In the current study that was carried out based on the dynamics of online learning environments, the motivation of the teaching materials' impacts on learner acceptance of online learning environments was investigated. The data was gathered with the participation of students following online courses during the COVID-19 lockdown. The results reveal that the model tested in the ARCS and TAM framework is reliable and valid. Also, all hypotheses tested were supported in the scope of study. The structural regression analysis used in testing the model indicates that the motivation linked to the learning materials significantly and strongly explains the acceptance related to online learning environments with a variance of 85%. The findings of the study show that the motivation given to the learners by the instructional materials has an important effect on the components that affect the acceptance of the online learning environments.

H1. Attention→ATTD

In this study, a significant predictor of attitude was found as a result of testing the attention variable. Keller (2008) stated in his study that the attention factor related to the teaching materials increases the learners' motivation. The "attention" dimension is an element that increases attention and the motivation of learners and hence it necessitates that, the teacher has to consider ways of attracting the attention of learners and avoiding any distraction while delivering a lecture (Ocak et al., 2011). In this case, concretization, agreement and conflict, laugh, diversity, participation and questioning are strategies that serve attention dimension and increases motivation (Keller, 2008). Hence, teaching materials can attract learners' attention and have an impact on their attitudes towards online learning environments. Attitude is an important determinant of latent variables (Byrne, 2010) and BI (Ajzen, 1991; Davis, 1989). Keller (2010) states three important strategies for attracting learners' attention: perceptual arousal, inquiry arousal, and changeability. According to Cobb (2013), perceptual arousal becomes active with a change of environment. In this case, the change of the teaching and learning environment for students during the current pandemic period and the accompanying online teaching materials constitute a perceptual stimulation. Thus, a positive effect on students approach to learning environments related to attention variable was found. However, inquiry arousal is also related to the satisfaction of learners' curiosity, and it encourages students to solve problems and ask questions (Cobb, 2013); the findings of this study indicate that online learning environments help students in their research and in finding answers to their questions. Online teaching materials satisfying students' curiosity has a positive effect on students' attitudes. Finally, since the changeability strategy is also about providing continuity for learners (Cobb, 2013); it forms a positive attitude through online teaching materials (enriched with graphics, pictures, sound, etc.).

H2. Relevance→PU

In this study, the appropriateness of the teaching materials is a significant predictor in terms of usefulness. According to Keller (2010), students' expectations and needs and informing them about the importance of learning outcomes is related to the appropriateness of the teaching materials. This perspective makes the findings of the study quite interesting. It implies that as the interaction of learners with the learning materials reveals the importance and functionality of the learning materials in real-life situations, their motivation affects their perception of benefit in the learning environment. Instead of presenting the subject directly to the learners, allowing the learners to assimilate the subject and helping them to visualize the subject serve the dimension of relevance in increasing motivation (Ocak et al., 2011). This dimension has the feature of increasing the motivation of the learners in terms of the learners' experiences on the subject, the importance of the subject, its future benefits and its relevance (Keller, 2008). Therefore, informing learners about the relevance of a resource in the learning environment is likely to affect the PU of the said resource positively.

H3. Confidence→PEU

Another external variable considered in this study is confidence. Keller (2010) stated that learners need to feel competent in performing the tasks assigned to them. The confidence dimension, which requires organizing activities to develop the sense of confidence in the learner during the learning process and to ensure active participation in the lesson (Ocak et al., 2011), besides requiring that the learning objectives and needs are clearly stated, the difficulty level is increased, the learner is given responsibility with realistic expectations, and has a motivation-enhancing feature that includes different teaching strategies in terms of providing opportunities for its independence (Keller, 2008). Hence, the teaching materials offered in online learning environments are important for learners to develop a positive attitude. Confidence in the learning materials presented to students positively affects the acceptance of learning environments. It also has a positive effect on the PEU of learners who feel competent in the online learning environment. Therefore, it is seen that the materials presented are meaningful for

learners and that they serve the learners to complete the task by feeling confident and that they serve positively to the PEU, which is a predictor of the PU and ATTD. Also, Keller (2010) states that expectation for success, challenge setting and attribution moulding that are associated with the trust dimension, serve to understand the dimension of trust regarding the teaching materials. Providing a learner in an online learning environment with the confidence that he/she can achieve success will meet the expectation of success. This is further clarified by (Keller, 2010) stating that the sense of achievement can be triggered by the design of the instructional material presented to the learner, the presentation of the content in a meaningful way, and the clear and understandable expression of the learning tasks.

The findings of the study show that the motivation towards the teaching material is related to the PEU. The confidence dimension serves the motivation element regarding the teaching materials. This leads to the PEU. So, the perception that the opportunities in the environment where the material is presented serve their learning and support their success, the learners will further strengthen the PEU of the learning environment. This dimension serves the confidence motivation element and hence it is possible to talk about its effect on the PEU. So that, with the help of the perception that the opportunities in the environment where the material is presented serve their learning and support their success, the learner will further strengthen the perception of convenience on the learning environment. Finally, the dimension of attribution moulding, which emphasizes the effort shown to contain the element of trust and includes providing feedback to support the learner, also supports the perception of the convenience of the materials.

Finally, the attribution moulding, which is contained within the confidence element, emphasizes the effort shown and includes the provision of feedback to support the learner, also supports the perception of the convenience of the presented material.

H4-H5. Satisfaction→PU and BI

According to Keller (2008), seeing his/her expectations in the outcomes of the tasks given increases a learner's motivation. Hence, the outcomes of the study are important. When the teaching materials presented to a learner in online learning environments meet the learner's expectations, it can be concluded that the teaching materials are beneficial for the learner. The satisfaction dimension which requires structuring the course/teaching materials so that the learners are satisfied with the learning outcomes (Ocak et al., 2011), helps to increase motivation in terms of real-world connection, using positive reinforcement and equality (Keller, 2008). The PU is defined as "the degree to which a person believes that using a particular system would enhance his or her job performance" (Davis, 1989:320). Similarly, considering the strong correlation between benefit and behavioural intention (Davis, 1989; Khalifa & Shen, 2008), it is meaningful to determine a learner's perceived satisfaction as an important predictor for BI. Bağcı and Çelik (2018) reveal in their studies that satisfaction is effective in the intention to continue to use a resource.

H6-H7-H8-H9-H10

According to Venkatesh and Bala (2008), attitude is one of the strong determinants of BI. The current study' findings are parallel with various studies reported, showing that students' attitudes towards mobile learning and acceptance model are positively correlated with behavioral intention factor (Chaka & Govender, 2017) and attitude in e-learning environments is an important determinant of BI (Moreno et al., 2017). The important predictors of BI are the PU and the PEU; the effect of attitude on behavioral intention is also known (Davis, 1989). The significant effect of the satisfaction factor on the BI shown in this study is also explained in the literature (Wang, 2017). Ajzen and Fishbein (1980) describe BI as the measure of the probability of a person completing a given behaviour, suggesting that motivational factors influence the BI.

On the other hand, the attitude factor is significantly predicted by the PU and the PEU factors and the attention factor of ARCS. The form, to change/have changed or to measure attitudes is an important factor in determining human behaviour (Kaçar, 2011). Cüceloğlu (1991) stated that temporary tendencies are not seen as attitudes emphasizing that attitudes include not only feelings but also behaviours and they are long-term. He also stated that the most important factor that transforms into behavior is the strength of an attitude. Considering that the strength of an attitude is affected by its cognitive, affective and motor dimensions and that these dimensions are in interaction with each other (Fishbein & Ajzen; 1975). Attitude is an implicit variable that cannot be directly observed and is resistant to changes (Hamutoğlu, 2018). The PEU is expressed as an indicator of the PU and the attitude towards use (Davis, 1989). In this study, both the PU and the PEU were found to be important predictors of the attitude variable confirming the studies reported (Davis, 1989; Esteban-Millat et al., 2018). Besides, in line with the study that found that the confidence motivation element is effective on attitude (Balantekin & Bilgin,

2017); in this study, it is seen that the attention motivation element also has a significant effect on attitude. Other studies state the relationship between attitude and motivation (Karahan & Taşdan, 2016; Erdem & Gözük Küçük, 2013).

In this study, the PU factor is significantly predicted in terms of PEU factor as well as the satisfaction and relevance factors of ARCS. The findings of this study are influenced by individuals' PEU. The PEU of an online learning environment helps improve PU. This result is similar to the findings in the literature. In their studies on the acceptance of social networks by Qin et al. (2011) and acceptance of mobile learning management system by Joo et al. (2016), it is stated that the perception of ease of use has a significant and positive effect on perceived benefit. This study also showed that satisfaction and suitability factors also predict perceived benefit significantly and positively. This is due to the satisfaction of learners with the teaching materials presented to them in an online learning environment. (Keller, 2010) stated that the instructional elements in a learning process should be from the students' immediate environment; saying that this will serve the convenience strategy by benefiting from the students' current interests and experiences. It can be considered among the reasons why the presentation of the concepts that the students are familiar with from their close environment with the convenience strategy affects the result.

Finally, the PEU factor is predicted by ARCS' confidence factor. The PEU is defined as "the degree to which a person believes that using a particular system would be free from effort" (Davis, 1989:320). Although in the field of study the PEU is described with features such as having a simple, usable and user-friendly user interface (Güldal, 2014); it can be seen in this study that motivation based on confidence has a significant effect on the PEU too. Although this finding contradicts Keller's statement of confidence previously quoted, it demonstrates similarities to the study conducted by Orji et al. (2019). The findings of the study show that the outcome is linked to giving the learners the perception that the materials presented on the online learning environment will meet their needs and they will complete the course. In giving this perception, the teaching and learning materials presented to learners should not have complexities and promote confidence, and hence have a significant effect on the PEU.

Implications for Theory and Practice

The main contribution of this study to the literature is the attempt to examine the motivational factor on students' online acceptance behaviour during the COVID-19 pandemic. However, this study is different than the studies assessing the direct impact of external variables on the design of teaching, and the impact of external and internal variables on technology integration and acceptance (Hamutoğlu & Başarmak, 2020; Ertmer, 1999, Sánchez-Prietoa et al., 2019; Wachira, & Keengwe, 2011). The use of the ARCS model in this study is not for increasing the acceptance of online learning environments by designing education, but for increasing the acceptance indirectly by increasing motivation. The acceptance of online learning environments was tested through the online materials offered to learners. For this reason, the results of the study offer some important implications for both theoretical and practical aspects of online learning during the crisis period. Theoretically, the study explains the adoption of online learning environments holistically through the TAM and the ARCS. The findings of this study, which is an example of exploratory work, have been supported by the studies in the literature. When the implications of using these results in practical applications are considered, it can be noted that the teaching materials presented to students in online learning environments have important consequences on the behaviour of using these environments by increasing students' motivation. Besides, different motivational factors linked to the teaching materials offered to learners also have different effects on different predictors of behavioural intention. For example, one of the practical implications of the study is that the perception of benefit is related to the learners' satisfaction with the material presented to them and the suitability of the material. Similarly, if you want to indirectly increase the learner's intention to use a particular technology in the future by increasing the PEU, you need to work on teaching strategies related to the element of confidence. Similarly, you can focus on the attitude factor to ensure the acceptance of a particular technology, and indirectly increase the acceptance of that technology through the attitude factor with the attention motivation element. Finally, the satisfaction motivation element, which has a direct effect on acceptance, can be used in line with the practical implications of the results. Learners can develop a positive attitude towards online learning environments and develop an attitude of using these environments in the future based on the PU and the PEU of the teaching materials offered, through their motivation.

Conclusion

In this study, the unavoidable transition of educational institutions to online learning environments due to the global pandemic process and the evaluation of the effect of the motivation of university students regarding teaching materials on their acceptance behaviours of online learning environments were examined. In this study, the concept of motivation was discussed in the framework of the ARCS model and acceptance of online learning environments in the TAM framework. The findings of the study show that the intention factor in the acceptance of online learning environments is significantly predicted by attitude and PU factors and the satisfaction factor of ARCS. On the other hand, the attitude factor is significantly predicted by the PU and PEU factors and the attention factor of ARCS. Finally, while the satisfaction and relevance dimensions of motivation and the PEU factor were significant predictors of the PU factor; the PEU factor is also significantly predicted in terms of the confidence factor of the motivation dimension.

Limitations and Future Directions

It is thought that this study, which has some limitations, should focus on the limitations of the research in order to guide future research opportunities. The first of these limitations is that the participants were studying in a public university in Turkey, and they were obliged to take common courses that are determined by the Higher Education Council. The model tested in the study should also be carried out with different groups of learners. So that more comprehensive results can be obtained in testing the validity of the model and in the discussion of the findings. Another limitation is the generalizability of the study.

Although evidence is provided by G*power analysis (Faul et al., 2007) that the sample of the study is sufficient, similar studies can also be conducted with data collected from different university students and students studying at different countries. Finally, the results obtained in the study can be supported by the controlled experimental setups and qualitative studies to be carried out. For example, the motivational elements of the teaching materials offered to the learners may allow a comparative analysis of the effect of the experimental setups on the acceptance of the technology. With qualitative interviews with students, the effect of motivational factors on variables that affect acceptance behaviour can be supported by providing data diversity.

Statements of Publication Ethics

In this study, all the rules specified to be followed within the scope of "Higher Education Institutions Scientific Research and Publication Ethics Directive" were complied with. None of the actions specified under the heading "Actions Contrary to Scientific Research and Publication Ethics", which is the second part of the directive, have been taken.

Researchers' Contribution Rate

Author 1: %25

Author 2: %25

Author 3: %25

Author 4: %25

All authors took an equal part in all processes of the article. All authors have read and approved the final version of the study.

Conflict of Interest

The authors declare that there is no conflict of interest with any institution or person within the scope of the study.

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Cross Boundary Virtual Museum Experiences of Pre-service Social Studies Teachers during the Pandemic

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Abstract

The present study aimed to examine the experiences of the 18 senior class pre-service social studies teachers based on virtual tours of the Hermitage, Louvre, and British museums in the scope of the online "Museum Education and Historical Places" course during the COVID-19 Pandemic. The study investigated their views on the benefits of their experience with the aforementioned museums for the purposes of social studies courses. The study design was based on a holistic single case method. Accordingly, the study data was collected by means of the reports of the pre-service teachers, online forum comments, and focus group interviews. Content and descriptive analysis techniques were used to assess the study data. The findings show that pre-service teachers see the virtual collections of the specified museums as an alternative source for social studies lessons, and that if these collections are integrated with the lessons, they will support the learning outcomes and provide students with many skills. On the other hand, it is possible to say that virtual museum experiences contribute to teacher candidates from an individual point of view beyond their professional contributions and change their perspectives. Therefore, the research suggested that an awareness about virtual museum activities should be raised in the undergraduate level to foster a wider and productive use of virtual museums in the educational environment.

Keywords: Covid-19 Pandemic, museum education, social studies education, teacher education, virtual museum.

Sosyal Bilgiler Öğretmen Adaylarının Covid-19 Pandemisi Döneminde Sınır Ötesi Sanal Müze Deneyimleri

Öz

Bu araştırmada COVID 19 virüsü kaynaklı küresel salgın döneminde "Müze Eğitimi ve Tarihi Mekânlar" dersini çevrimiçi alan 18 son sınıf sosyal bilgiler öğretmen adayının ders içinde Ermitaj, Louvre ve British müzelerine ilişkin sanal müze deneyimleri ve bu müzelerden sosyal bilgiler derslerinde yararlanma potansiyeli ile ilgili görüşlerinin incelenmesi amaçlanmıştır. Bütüncül tek durum desenine uygun olarak kurgulanmış olan bu nitel araştırmanın verileri öğretmen adaylarının raporları, çevrimiçi forum yorumları ve odak grup görüşmelerinden elde edilmiştir. Veriler betimsel analiz ve içerik analizi teknikleri kullanılarak değerlendirilmiştir. Bulgular, öğretmen adaylarının belirtilen müzelerin sanal koleksiyonlarını sosyal bilgiler dersleri için alternatif bir kaynak olarak gördüklerini, bu koleksiyonların derslerle bütünleştirilmesi durumunda kazanımları destekleyeceği ve öğrencilere pek çok beceri kazandırabileceği görüşünde olduklarını göstermektedir. Diğer yandan sanal müze deneyimlerinin öğretmen adaylarına mesleki katkıların ötesinde bireysel açıdan da katkılar sağladığını ve bakış açılarını değiştirdiğini söylemek mümkündür. Bu nedenle sanal müzelerin eğitim ortamında daha yaygın ve verimli kullanımı için lisans düzeyinde öğretmen adaylarının sanal müze etkinliklerine ilişkin farkındalıklarının ve becerilerinin artırılması gerektiği önerilmektedir.

Anahtar kelimeler: COVID 19 Pandemisi, müze eğitimi, sosyal bilgiler eğitimi, öğretmen eğitimi, sanal müze.

INTRODUCTION

Museums are the places that serve as a reconstruction of the image of the former times in authentic and true terms, providing the visitors with the opportunity to have an emotional experience about an event that happened in the history and to attribute a personal meaning (Clutterbuck, 2008). Therefore, museums are among the most convenient spaces that keep a record of and teach the world through the real artefacts in their collections (Buyurgan, 2006). Museum collections are a rich source of diverse experiences with the narratives and information that embody in the pieces. The visitors' experience is further enhanced by the thoughts they create in individuals, which promotes creativity by stimulating their imagination (Gartenhaus, 2000). Museums serve a cultural and social function, including inspiring individuals, improving their quality of life, developing a sense of identity and community solidarity (Karadeniz & Çıldır, 2012), and facilitating lifelong learning (Hawkey, 2004). Therefore, due to these qualities of museums, discussions focusing on the educational function of the museum have mostly been on the agenda of museum experts and ecucators.

In the meantime, educational units were established in museums in developed countries, including the USA, Germany, France, and the UK. Specialists were trained to work in those units, and programs were created for schools and educators. In addition, museums in the aforementioned countries assumed certain duties such as providing services to schools inside museums or introducing itinerant museums (Buyurgan, 2017). Despite the practical interruptions today, it is possible to say that the education and training contents of a larger part of the courses at different education levels in many states are associated with museums. However, it is not possible to mention that there is a widespread museum-school cooperation in Turkey. Schools and teachers are responsible for organization of museum tours in the academic year. Therefore, the decisive factor for actual museum tours is the willingness of the teachers. Relevant researches indicated that museums could not be utilized sufficiently in education due bureaucratic obstacles in the process of obtaining permission, concerns about not being able to complete the curriculum, cost, and physical distance (Çengelci, 2013; Demir, 2015; Egüz & Kesten, 2012; Ekmekçi, 2015; Karataş et. Al., 2016; Kırksekiz et al., 2020; Kısa, 2012; Şentürk, 2019). It was suggested that above concerns of the school administrators and teachers would be eliminated should the ministry of National Education and its local directorates assumed a responsibility with regard thereto (Avcı-Akçalı, 2015; Güler &Alkış, 2003). On the other hand, virtual museums are considered an alternative solution to the difficulties associated with physical museum tours (Ata, 2010).

A virtual museum is an organized collection and presentation of artifacts and information resources by means of electronic media (McKenzie, 1995). In other words, virtual museums feature multimedia exhibits on the Web that simulate a spectrum of experiences an individual can have during a physical museum visit (Christal, 2003). Although the virtual museum as a concept and term dates back to a period prior to the introduction of worldwide web, or Internet, the same recently became popular with the proliferation, acceptance, and enhanced access to virtual reality technologies (Schweibenz, 2019). In a 2010 report by the Council of Europe Directorate of Culture and Cultural and Natural Heritage, it was suggested that the roles of museums changed due to certain difficulties that arose in the last 20 years. Technological developments are at the forefront of the factors that urged museums to move towards a rapid process of change. Thanks to the possibilities of novel technologies, it is no longer necessary to be confined to the walls of building or the fence of a site, and further, images are accessible to visitors across the world (Torch, 2010). With the digital opportunities, museum collections are now on display via the web and 360˚ panoramic virtual tour are available (Mamur et al., 2020). Virtual museums provide convenience at times the visitors are not able to physically visit the museums due to cost, distance, and physical disability. Virtual museums also help with overcoming two problems; i.e., safety of the artifact and physical limitations that hinder larger artifacts put on show inside the exhibition halls. Furthermore, while it is limited to interact with original artifacts in a physical museum setting, visitors can see the artifacts from all sides and interact with them virtually (Tsichritzis & Gibbs, 1991). In other respects the opportunity to see important objects, buildings and environment that have lost their orginality or no longer exist, by receeonstruction technology that virtual museums provide is quite valuable (Skamantzari & Georgopoulos, 2016). In summary, as McKenzie (1997) puts it, "The beauty of virtual museum is the capacity to connect the visitor with valuable information across the entire globe."

In an environment of rapid and comprehensive technological developments, it is important to use digital means in educational activities to keep up with the times. As regards the teaching process, there has been an increase in museum visits using 360-degree imaging technology, augmented reality, second life museums, and designing activities using Web 2 tools in virtual environments. Certain studies indicated that if augmented reality included in traditional methods in learning environments, the gains were higher (Garzón & Acevado, 2019) and

that had a positive impact on academic success (Koca & Daşdemir, 2018). In addition, second live museum environments and museum education activities are very effective for accommodating various teaching methods (Baker et. al., 2009). Studies with different courses and grade levels suggested that the inclusion of various virtual museum applications in the teaching process created a positive environment, made learning fun, and increased students' interest in the lesson (Çalışkan & Çerkez, 2012; Çınar et.al., 2021; Yıldırım & Tahiroğlu, 2012). Results of various studies demonstrated that virtual museum applications contributed to the success of the course, supported the targeted cognitive and affective achievements (Demirboğa, 2010; Kampouropoulou et.al., 2013; Ulusoy, 2010; Ustaoğlu, 2012; Turgut, 2015), helped with concretization of the conceptions, fostered permanent learning, and created an active teaching environment (Işlek & Danju, 2019; Işlek 2021). Along with the digitalization as a result of rapid technological developments in the 21st century, the COVID -19 pandemic, which affected the world since its very beginning in the late 2019, made it almost a necessity to take advantage of digital opportunities in the field of education and culture.

Pandemic has caused the use of virtual museums to become widespread across the world and thus in Turkey. According to a report by ICOM, almost all the museums were closed in April 2020 and in the meantime, the museums focused their activities on virtual tours, virtual exhibitions, social media shares, remote interactions with public, and migrating their collections to virtual environment. The use of digital means during the first stage of pandemic increased by at least 15% (ICOM, 2020). Despite the fact that the museums strived to adapt further to the requirement of the digital world of the 21st in the process of the COVID-19 pandemic, educational institutions and teachers need to improve themselves in that respect. Daniella (2020) argued that the use of virtual solutions in the exhibition of museum collections was no longer a novelty and underlined that the use of museum collections for distance learning was not yet popularized in educational environments. In addition, upon a review of a number of virtual museums as educational tools, she concluded that virtual museums were not adequate to assume the educational function alone and believed that the teachers should step in as guide in educational process.

Kırca (2008) suggested that the rate of conscious museum visits was low in Turkey and the largest segment among the visitors were students. Accordingly, schools have an important function to serve in the learning of museum culture. However, relevant studies reported that there were also teachers, who did not have a museum culture. A study by Görmez (2020) indicated that 86 out of 209 social studies teacher candidates had never been to a museum before, and 34 visited a museum only once or twice in their lifetime. The research of Öztürk - Kömleksiz and Gökmenoğlu (2020) reported that some of the students of two schools located near the Natural History and Archeology Museum in the Turkish Republic of Northern Cyprus never visited the museum, while seven out of 16 teachers did not have the habit of visiting a museum. The results of virtual museum visits are also similar. Ilhan et al. (2021) reported that 23 out of 37 participant social studies teacher candidates had no previous virtual museum experience. The results of respective studies by Kaya and Okumuş (2018), by Karakaya (2015) and by Canlı (2016) with students from various age groups indicated that 85%, 80%, and 94% of the participants had no previous experience of virtual museum tours. Çınar et. al. (2021) reported that secondary school students who had low habits of visiting a museum with their families also had a low awareness of virtual museums, and they didn't take virtual museum tours even during the Pandemic style.

Virtual Museum as an Alternative Source for Teaching Social Studies

Social studies have been taught as a course in the primary and secondary schools of certain countries since the beginning of the 20th century. Based on the perspectives offered by various social sciences, understanding the world, the past and present societies, recognizing, protecting, and transferring cultural heritage are some of the themes included in social studies education. In this context, there is a strong correlation between teaching social studies and the mission of museums. As Kahn (2020) suggested, many people are in an effort to make sense of the world. Because of their role in compiling and sharing knowledge and cultural heritage, museums are in an excellent position to support those efforts.

Studies reported that the use of museums in social studies courses made significant contributions. In the USA, a special and free virtual history museum featuring contents from American and world history was developed to improve students' understanding of social studies. It was aimed with the virtual history museum to contribute to students' ability to use evidence, analyze and interpret artefacts, explore multiple perspectives, and develop their own interpretations, so that all students would understand the content of the course, and increase the participation and success of disadvantaged students in the course (Bouck et. al., 2009). Above all, interacting with the objects in the museum creates a source of curiosity, interest, and motivation in students, improves their interest in the lesson, and supports effective and meaningful learning by fun. It increases social interaction by encouraging active participation and collaboration among peers (Çalışkan & Çerkez, 2012; Filiz, 2010). Furthermore relevant

studies in the literature reported that the same was associated with increased success in teaching social studies (Stinson, 2001); historical thinking, critical thinking (Nunez, 2021), questioning, using evidence, developing empathy, perceiving change and continuity (Filiz, 2010); raising awareness of historical artifacts and cultural heritage, recognizing sub-disciplines of social sciences, and contributing to raise the general culture of the students (Kısa, 2012; Şentürk, 2019; Uztemur, et al., 2019; Yılmaz & Şeker, 2011). Core competencies, special objectives, field- specific skills and values, many achievements that can be associated with almost all the fields of learning, and especially culture and heritage in the social studies teaching program in Turkey are suitable for accommodating almost all the virtual museum activities. In addition, the program also prescribed that virtual museum activities should be used in lessons. Furthermore, the National Council for Social Studies (NCSS, 2016) promoted the effective use of technology for effective social studies teaching and learning.

In the light of the studies briefly mentioned above, the social studies lesson that students take at an early grade is important in raising awareness about physical or virtual museums, and it is important that especially social studies teachers should be adequately equipped as regards thereto. However, certain studies reported that social studies teachers' or teacher candidates' awareness of virtual museum activities was low (Aktaş, 2017; Kırksekiz at al., 2020; Peker, 2014), that virtual museum practices were not adequately included in social studies courses (Aladağ, et. al., 2014; Egüz, & Kesten, 2012; Karakaya, 2015; Memişoğlu & Kamçı, 2013), and that, teachers and prospective teachers should receive training on the said subject or improve their practice skills (Çalışkan et. al., 2016; Görmez, 2020; Islek & Danju, 2019; Yeşilbursa & Uslu, 2014; Yıldırım & Tahiroğlu, 2012). As explained above, in the field of social studies, which is open to cooperation with museums by its nature, it is a major shortcoming that teachers do not benefit from virtual museums, which eliminates the legal procedure, time, distance, and cost limitations of organizing a physical visit to a museum.

The low awareness of social studies teachers about virtual museums, the suggestions that their awareness should be raised during undergraduate education, the need to increase the number of studies on virtual museums in teacher training, and especially the conditions mandated by the COVID-19 pandemic require more practice and research in this field. The subject of this study is the practices of Museum Education and Historical Places, which is an optional course for senior students of the faculty of education, social studies teaching program during the spring term. However, the practical part of the course (Mach to June 2020) could not be conducted due to the closures associated with COVID-19 pandemic and therefore, the course had to be carried out asynchronously for a period of time upon sudden transition to online teaching. Thus, students were encouraged to explore virtual museums and associate them with social studies curriculum by making use of the museums' opening to the public for the purposes of the practical part of the course. Accordingly, the virtual museums offered by the reputable British Museum, the State Hermitage Museum, and Louvre Museum, were chosen for their rich collections in the field of social sciences.

The importance of this research is to question the potential of benefiting from the Hermitage, Louvre and British museums virtual collections in social studies lessons from the perspective of pre-service teachers and to reveal how this experience will affect them. In addition, the study has the potential to provide new insights for educators and researchers.

The question "What are the opinions of the pre-service social studies teachers on experiencing the Hermitage, the British and Louvre museums virtual tours and the potential of benefiting from these museums in the social studies lessons?" was the starting point of the study. The aim of research was to investigate the experiences of pre-service social studies teachers with the British Museum, the State Hermitage Museum, and Louvre Museum, who took the online "Museum Education and Historical Places" course during the COVID-19 pandemic and review their views on how to benefit from those museums in social studies courses. Accordingly, answers to the following questions were sought:

1. What are the views of the pre-service social studies teachers regarding the potential of benefiting from virtual tours to the State Hermitage Museum, the British Museum, and Louvre Museum?

2. What are the views and thoughts of the pre-service social studies teachers about the effect of virtual museum tour experiences on themselves?

METHOD

Research Design

The present study, which aimed to investigate for a given period of time and in the real-life setting the experiences of pre-service social studies teachers with virtual museum tours and their views on the potential of

benefiting from those museums for the purposes of social studies courses, was designed as a qualitative case study. According to Merriam and Tisdell (2016), in-depth investigation of a particular phenomenon in a limited system (in terms of number of participants, process, etc.) is convenient with the case study research design. The research is suitable for the holistic single-state pattern, one of the patterns that Yin (2013) grouped according to the number of situations and analysis units. Pre-service teachers, who took the Museum Education and Historical Places course via distant and asynchronous education during the COVID-19 pandemic were considered a case in this research. The virtual museum experiences, associated assessments, and views of the pre-service teachers constituted the analysis unit of the research.

Study Group

Considering that it will provide various advantages to the researcher in pandemic conditions, convenience sampling technique was preferred in the determination of the participants. The participant group of the study consisted of the senior class pre-service teachers, who took the Museum Education and Historical Places elective course during the spring term of the 2019-2020 academic year in the Social Studies Teaching program of the Faculty of Education. Participants were composed of 18 teacher candidates, twelve female and six males. Figure 1 shows the information about whether the participants had any previous virtual museum tour experience or not and figure 2 shows previous virtual museum experience, and their prior knowledge of the museums they studied within the scope of the course. The pre-service teachers, who did not take a course of museum education before, were informed about the concept and applications of virtual tour in the Special Teaching Methods course they took in the previous class.
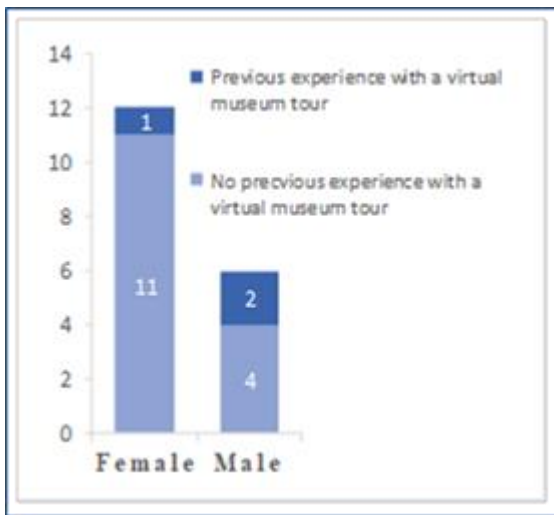
Figure 1. *Experiencing Virtual Museum Tour According to the Gender of the Participants*

As seen in Figure 1, only three of the participants have experienced a virtual museum tour before the course. One of them is female and two are male.
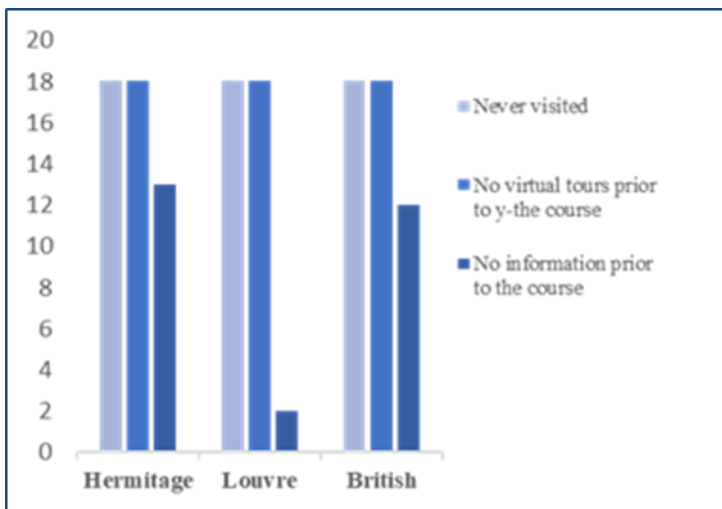
Figure 2. *Participants' Previous Virtual Museum Experience and Their Prior Knowledge of the Museums*

Figure 2 shows that none of the participants had visited these museums, real or virtually before. In addition, while most of the participants do not have prior knowledge about the State Hermitage and the British museums, most of them know Louvre Museum.

Data Collection

Research data was collected between April and June of 2020. The pre-service teachers were asked to individually investigate the three museums and prepare reports and share their virtual museum experiences in an online forum for about 15 days subsequent to the submission of the reports within the scope of the course. Furthermore, online focus group interviews were made with 16 volunteer teacher candidates. Focus group interviews were conducted by dividing the participants into two equal groups. After analyzing the research findings, individual phone interviews were made with 10 students to confirm the unclear data. Activity reports, forum comments, and semi-structured interview forms were used to collect data.

1. Activity reports*:* The pre-service teachers were asked to write their activity report subsequent to each virtual museum tour to include the following information.

    –   Thoughts and experiences about museums, collections on display, and virtual tours,

    –   At least two examples for each museum that associate museum collections or galleries with the learning domains and achievement of social studies course,

    –   Feeling and thoughts about the impact of virtual museum tours experiences.

2. Forum comments*:* Upon completion of the virtual tours and submission of the activity reports, the digital forum platform, provided by the university system was used for a period of 15 days for sharing experiences and creating group interaction. Three separate forums were created with the following headlines, and no restrictions or criteria were imposed on the content of the comments.

–   My experiences and opinions about the virtual tour of the State Hermitage Museum

–   My experiences and opinions about the virtual tour of Louvre Museum

–   My experiences and opinions about the virtual tour of the British Museum

The researcher did not post any comments on this platform. After 15 days a data set of 159 pages in total, including 127 comments about the State Hermitage Museum (H), 132 comments about the Louvre Museum (L), and 142 comments about the British Museum (B) were compiled.

3. *Semi-structured interview form:* As prepared by the researcher upon consulting with two field experts the form was used in the focus group interviews. Interviews questions were similar to those included in other data collection tools.

Data Analysis

Content analysis and descriptive analysis techniques were used in combination for the evaluation and interpretation of the study data. Descriptive analysis technique helps to summarize and interpret based on previously determined themes. Content analysis technique requires creating concepts and relationships with an aim to explain the new data to be investigated in the scope of the study (Yıldırım & Şimşek, 2018). Data collection tools were designed to explore new themes as well as predetermined themes. During the analysis process, first the written activity reports were reviewed, and the statements related to the study questions were hand coded. Thereafter, the output of the forum comments and the transcripts of the interview recordings were compared to the codes obtained above. Therefore, repetitive instances, consistent instances with existing codes and new code instances were determined. Finally, the statements of each participant in the data collection tools (report, forum comments, interviews) were compared again to the generated code list. The codes were grouped under certain themes and interpreted in tables. The number of repetitions (f) of the codes, the examples of expressions of the participants are given as they are in the tables. The names of the pre- service teachers were expressed in the study with abbreviations (AK, BS, YK…) consisting of the initials of their names and surnames.

Data triangulation and participant confirmation techniques were used to increase the validity of qualitative research. Data triangulation means that themes and descriptions are supported by findings obtained from different individuals or different data collection techniques. Participant confirmation is taking the opinions of the participants on whether the descriptions and themes in the research report are complete and accurate (Creswell, 2012). For the purposes of the study, it was sought to increase the validity of the findings by using different data collection techniques and sharing the research findings with some participants and taking their opinion.

Research Ethics

Ethical permission (29.07.2020-640) was obtained from Ege University Scientific Research and Publication Ethics Committee for this research. In addition, all the participants were informed about the study and their consent was obtained.

FINDINGS

All the pre-service social studies teachers expressed their opinions about museums both in the activity reports and in the forum platform. In particular, the forum environment gave the opportunity to experience further interaction with each museum. Accordingly, 13 pre-service teachers (AK, AS, BKU, EAK, EE, EGS, EM, ID, MOY, NA, SO, YD, and YK) revisited the museums, reviewed new artifacts, and shared their findings on museums and artifacts with their friends. Mutual comments were made on certain topics, including the phantom of Louvre Museum, the Russian Ark movie, the video clip of Aphesit by the Carters, the meaning of and associated stories from certain paintings exhibitions in the museums etc. The teacher candidates, who did not take a virtual tour of museums previously, had a prior knowledge mostly about the Louvre Museum compared to the other two. They knew the Louvre Museum mostly due to Mona Lisa portrait on display, the pyramid structure at the entrance of the museum, or the novels they have read. Some knew the State Hermitage Museum because of the Pazyryk rug they were familiar from the history courses.

The Potential Of Benefiting From Virtual Tours Of The Museums In Social Studies Lessons

In their reports, the pre-service teachers associated the collections in each museum with at least two learning domains and achievements of social studies lesson. Related data are available in Table 1. Some of the pre-service teachers associated museum's collections with more than two learning domains or achievements. Furthermore, there were also participants, who expressed their views about the effects of museums on the learning environment and the set of skills they can develop in students. Related data about the effect of museums on the course setting are given in Table 2.

Table 1. Learning domains and achievements of social studies lesson that the pre-service teachers associated with the museums

Learning domains and achievements (learning outcomes)	H *f*	L *f*	B *f*
1. Individual and society	**-**	**-**	**1**
6.1.2. Analyzes the place of social, cultural, historical connection to the formation of social coherence.	-	-	1
2. Culture and Heritage	**18**	**18**	**17**
5.2.1. Realizes the important contributions of Anatolian and Mesopotamian civilizations to the history of humanity based on their concrete ruins.	4	12	14
5.2.4. Analyzes the role of cultural elements in the coexistence of people.	-	1	-
5.2.5. Evaluates the historical development of cultural elements in daily life.	2	-	4
6.2.1. Makes an inference about the geographical, political, economic, and cultural characteristics of the first Turkish states established in Central Asia	11	-	-
6.2.2. Interprets the emergence of Islam and the changes it caused.	-	4	-
6.2.3. Realizes the political, social, and cultural changes after the Turks' conversion to Islam.	1	2	-
6.2.4. Analyzes the process of the Turks settlement in Anatolia between XI. - XIII. centuries.	-	-	1
6.2.5. Explains the role of historical trade routes in political, cultural, and economic relations between societies.	-	-	1
7.2.1. Explains the emergence process of the Ottoman Empire as a political power and the factors affecting this process.	1	-	-
7.2.2. Analyzes the conquest policy of the Ottoman empire through examples.	1	-	-
7.2.3. Comprehends the processes that forced the Ottoman Empire to change in line with the developments in Europe.	4	7	-
7.2.5. Gives examples of the Ottoman culture, art, and aesthetics.	11	2	3
3. People, places, and environments	**-**	**1**	**3**

6.3.4. Makes inferences about climate characteristics based on human experiences in different natural environments of the world.	-	1	3
4.Science, technology, and society	**1**	**5**	**6**
4.4.3. Researches the inventors of the technological products it uses and the development of these products over time.	-	-	2
6.4.1. Gives examples of the effect of social sciences on social life based on studies and findings in social sciences.	1	1	-
7.4.1. Examines change and continuity in the preservation, dissemination, and transfer of knowledge.	-	3	4
7.4.3. Analyzes the effects of the developments in Europe between the XV. and XX. centuries and the formation of today's scientific knowledge.	-	1	-
6. Active citizenship	**-**	**1**	**-**
6.6.1. Compares different forms of government in terms of the basic principles of democracy.	-	1	-
7. Global connections	**3**	**1**	**3**
4.7.3. Compares the cultural elements of different countries with the cultural elements of Turkey.	-	-	1
4.7.4. Respects different cultures.	-	-	1
5.7.3. Explains the importance of tourism in international relations.	1	-	1
5.7.4. Gives examples of substantial common heritage items in various countries.	3	1	1
7.7.3. Develops ideas for the solution of global problems with one's friends.	-	-	2

In Turkey, the social studies course starts at fourth grade of primary school and taught for four years. There are a total of seven learning domains and four to six achievements related to those learning domains at each grade level in the current social studies curriculum (MEB, 2018). Total number of achievements is 131. A review of Table 1 indicated that pre-service teachers associated museums with six learning domains and 24 achievements. Only the fifth learning domain, i.e., "production, distribution and consumption" was not associated with any museum. All three museums were mostly associated with the "culture and heritage" learning domain and a number of associated achievements. "Science, technology and society" and "global connections" were the associated learning domains for all the three museums, albeit less. The State Hermitage Museum was associated with a number of achievements within the "culture and heritage" learning domain. The Art of Islamic Middle East-The Ottoman Empire (15), Pazyryk finds (13), Ottoman arms and armor (9), Renaissance artifacts (5), the Urartu Room (4), Culture and Art of Central Asia -Antiquity and Early Middle Ages (2) galleries were the preferred resources of pre-service teachers in the museum. Whereas as regards the Louvre Museum, the Near Eastern Antiquities, Islamic arts, Renaissance works galleries, and paintings and sculptures from different periods were indicated as related to the "culture and heritage" learning domain. The most referred to collection pieces included the code of Hammurabi and "Liberty Leading the People" by Eugène Delacroix. A pre-service teacher designed an activity using this painting by the drama method and shared it on the forum platform with her friends. Teacher candidates exchanged views on this issue (Figure 3).

June 9th, 2020, Tuesday, 3:52 AM *".... you were impressed by the painting like me. Indeed, a period could be described so well with a single painting. It is directly related with the achievement. A great convenience for our lesson."* SO

June 9th, 2020, Tuesday, 4:00 AM *"Guys, I think I was born to play games with students. :) I started planning drama activities for each museum as if it were homework :)..."* SO

June 9th, 2020, Tuesday, 1:05 PM *"I also thought about how I could use the painting 'Liberty Leading to People' in the class. I think the example of creative drama you gave seems to be a very interesting method. It can be quite enjoyable to use the table while teaching the French Revolution."* EGS

Figure 3. *Part of the forum records containing comments of two participants*

In the British Museum, mostly the artifacts on display at the Ancient Turkey, Ancient Mesopotamia and Egyptian galleries were associated with the "culture and heritage" learning domain by the pre-service teachers. "Science, technology and society" learning domain was mostly associated with the collections of Louvre and British museums. The learning domain of "people, places and environment" was associated with the British and Louvre museums by a few participants, while clothing of different cultures from the British Museum were indicated by 2 pre-service teachers as a source. A teacher candidate referred to the statue "Raherka and Meresankh" from Louvre Museum as a source that could be used for that learning domain. The "individual and society" learning domain was associated with the Standard of Ur in the British Museum by the EAK. On the other hand, the learning domain of "active citizenship" was associated by YD with the painting of "Henry IV bringing food into Paris" from Louvre Museum. YD stated that concept of monarchy could be associated with that painting. As regards the learning domain of the "global connections", the British, Italian, Spain, Japanese, and Indian artifacts from the Sate Hermitage Museum, the Apollon gallery and Castiglione's Square Hall from the Louvre Museum, and Japanese artifacts from the British Museum were indicated as a source by a few pre-service teachers.

In Table 2, there are views of pre-service teachers on the benefits of virtual tours of the museums in question for the purpose of the social studies lessons. Most of the pre-service teachers suggested that all the three museums were important resources for the lesson and could make the lesson interesting and fun. Although the Louvre was accepted as a museum that supported the achievements of the course, there were also pre-service teachers who expressed their reservations that the very limited virtual access to galleries posed a disadvantage. Museums artifacts were associated with concretization the concepts, reinforcing knowledge, contributing to permanent learning, and developing certain skills. The highest number of comments by the pre-service teachers was made for the British Museum, which, was associated with a number of skills and values, especially perceiving change and continuity. The State Hermitage Museum was especially indicated for supporting course achievements, concretizing concepts, and recognizing cultural heritage, where the Louvre Museum was associated with skills and values in the context of art, aesthetics, and creativity.

Table 2. Views of participants on the benefits of the virtual museums for social studies courses

Views	H	L	B	Related expression examples
In the teaching process	*f*	*f*	*f*	
Making course entertaining	12	10	14	*"I think the museum [L] will be of great interest to the students and help us a lot in our lesson."* EE *"It is [H] source that can help us in many subjects in the social studies course and will make our course more fun and jazz up."* BKU
A good resource for social studies teachers/very suitable for the content and achievements of the course	14	11	11	*"There are [H] many collections to associate with social studies achievements"* GG *"I saw many of my friends comment that the museum [L] is suitable for our achievements. Actually, this museum is definitely for our achievements. But the fact that all galleries are not accessible limits us. For the reason, I think we may have difficulties in guiding or students."* AS
Concretizing the concepts	11	4	9	
Conducive to reinforcement/permanent learning	6	8	3	(H) *"We can evaluate the development of different cultures and different civilizations in the historical process though concrete examples."* HKY
Active teaching	3	1	7	(B) *"In this way, we can teach a lesson in which students are active and make the information permanent. "*EGS
In skill and value education				
Perceiving change and continuity	3	3	15	*"I think that the money [B] he mentioned can have a great impact on children's understanding of change and continuity as concrete evidence"* AS
Analytical and critical thinking	5	8	7	(L) *"A question asked about ... will make the students think, learn to criticize, reveal their historical background, and produce original ideas."* NA
Evidence- based learning	7	3	5	(B) *"Our homeland contains so much value and beauty. It is very important to add this value and awareness to our students."* BKU
Recognition and protection of cultural heritage	7	1	4	*"It [B] can be very helpful for our students to understand cultural differences and diversity…"* ID
Recognizing and respecting different cultures	2	-	9	[H] *"Respects and empathy for different cultures can be developed. Values and skills of social studies lesson can be gained."* BT
Developing sense of aesthetics, sensitivity to art, and creativity	3	5	3	*"For example, we can benefit a lot from engravings [B], especially since they are collections that daily life. This is most important purpose of evidence -based learning."* NA *"I think these collections [L] will be very useful to provide cultural, artistic, and aesthetic satisfaction to students."* EE
Developing historical empathy	5	3	2	*"... these items [B] can be used to immerse students in the atmosphere of the past ant to look at history from their own time."* SO
Establishing the relationship between culture and geography	-	-	3	
Total comment	78	57	92	

Effects Of Virtual Museum Tour Experiences on Pre-Service Social Studies Teachers

Table 3. The views and feelings of participants about the impact of the virtual tours to them

Views and feelings	*f*	Related expression examples
Enjoyable activity	16	"*It was one of the funniest activities I've done during my university education.*" SO
Recognizing different cultures	12	"*It was quite an enjoyable experience. While examining the collections in the museum, you have the opportunity to discover different cultures.*" FC
Gaining professional qualification	12	"*I will definitely use it in my lessons in the future, as I think it will immediately attract the attention of students in the 5th and 6th grades.*" GG
Encouragement to research	12	"*I even left the virtual tour and did some research on cylinders [Gudea] for a while.*" AK
Raising awareness about protecting cultural heritage	10	"*We can see the artifacts smuggled out of our country in museums of other countries. If we could preserve our artifacts at that time, we would now have the opportunity to visit them in our own museums.*" BT
An alternative for those who cannot go to museums	9	
Simplifying devotion, travel, and finance	8	"*The distance and time between where me and the Hermitage Museum have shortened. Financially economical.*" BKU
My knowledge has increased/ learned new things	8	"*This is the first time I have heard that Japan has developed in the field of producing porcelain, and they are trading it.*" BS
A useful activity during the pandemic period	7	"*This process has been difficult for all of us. I think it as both enjoyable and educational to given such an assignment for this course. I enjoyed… The virtual tour has been extremely useful, as museums visits will not to be possible during the pandemic period.*" ID
A genuine desire to visit	7	"*I added all there of these museums to my places to visit list. I want to go to these museums, see and feel the artifacts, even though I experienced virtual tour.*" BT
Understanding the importance of technology for life	6	"*Especially when we are going through such a different process around the world… Once again, I understood the importance of technological applications such as virtual tour, which replace the activities that are deprived of.*" EM
My general knowledge increased	4	"*In addition, the most challenging situation for me personally was inadequacy of my foreign language. When I went to visit all these collections in their places. I realized that I must have a certain competence in the foreign language.*" AS
Realizing the deficiencies	4	
Acquiring a different viewpoint	4	
Developing an interest in the arts	4	"*I became more interested in art, I started to study other museums and works of art, and to read about art history.*" EAK
Developing historical empathy	3	"*…while showing that I have deficiencies in history, it helped me to connection the works whose stories I learned with the period they belonged.*" AK

Table 3 suggested that most of the pre-service teachers enjoyed examining the world's important museums in a virtual way. The two pre-service teachers, who did not express their views on the current subject, were generally more disinterested and made less comments compared to the others. Probably due to the closures associated with the COVID-19 pandemic, the pre-service teachers were more interested in this assignment compared to any other assignments. Apart from being an enjoyable activity, the pre-service teachers stated that

they had the opportunity to get to know different cultures, their professional competences improved, their field knowledge and general culture increased, and they gained awareness about the importance of preserving cultural artifacts. Other issues that pre-service teachers emphasized included the fact that the virtual tour experiences gave the opportunity to visit museums that cannot be visited in real life, saved time, distance, and economy, and showed the importance of technology in life. Certain pre-service teachers stated that they really wanted to visit those museums. In addition, apart from the pre-service teachers, who expressed personal inadequacy in terms of foreign language and knowledge, there were also those, who stated that they developed historical empathy and different perspectives, and showed interest and orientation in art. The following statement of pre-service teacher, who was particularly impressed by Louvre Museum's virtual tour and said that she started painting again, was quite indicative:

I started to paint oil paintings in high school visual art lesson. In fact, the painting I made once was exhibited in a shopping mall. While I was examining the tables in Louvre that memory flood back. I don't know what the virtual visit to the Louvre added to my friends, and what inspired in them, but this experience has a great importance for me to realize myself (YD).

Figure 4. *Painting made by YD after virtual museum experiences*

DISCUSSION & CONCLUSION

The present study investigated the views of social studies pre-service teachers, who took online Museum Education course during the COVID-19 Pandemic period, about the virtual tour experiences with the State Hermitage, Louvre, and the British museums, the potential benefit of these museums in social studies courses, and the effects of this experience on the participants. The study data were collected from the pre-service teacher's reports, comments shared on the online forum, and focus group interviews.

As expected, the museums in question were not physically visited previously by the pre-service teachers due to the distance. However, the results of the study showed that none of the pre-service teachers took the virtual tours of those world-famous museums before, and most of them did not even know about the existence of those museums other than the Louvre Museum. In addition, the rate of social studies pre- service teachers, who did not take a previous virtual museum tour was 83%. This result regarding virtual museum awareness was consistent with the results of previous studies (Canlı, 2016; Çınar et al., 2021; Görmez, 2020; İlhan & Dolmaz, 2020; İlhan et al., 2021) conducted with student groups of different ages in Turkey.

The pre-service teachers first associated the collections/galleries in the museum with the learning domains and achievements of the course with an aim to investigate the potential benefit of the virtual tours of the State Hermitage, Louvre, and British museums in social studies lessons. The collections/galleries in the museum were associated with 6 of the learning domains and a number of achievements. All the three museums were associated with different achievements of the culture and heritage learning domain by almost all the teacher candidates. They identified various items such as paintings, sculptures, and coins as sources. In addition, they provided examples

of how they could benefit from those collections, including making example of the collection for concretization of concepts and using creative drama for interpretation, analysis, and evaluation. Most of the pre-service teachers, who had lower awareness of virtual museums at the beginning, found out that these museums were an alternative source for the social studies lesson. Furthermore, the same stated that the use of virtual museums would have a positive effect on making the lesson fun and interesting, concretizing concepts, supporting permanent learning, and developing critical thinking. Similarly, as reported by certain studies conducted with teachers and teacher candidates (Aladağ et al., 2014; Çalışkan et al., 2016; Islek, 2021; Islek & Danju, 2019; Kafadar, 2020; Kırksekiz et al., 2020; Sungur & Bülbül, 2019) the participants considered the virtual museums as a valuable resource for the course.

Utilizing technological solutions in the learning process helps students to analyze, assimilate, contextualize, and synthesize their knowledge by positively affecting their motivation. Although most virtual museums support students' conceptualization process, they are insufficient on promoting their knowledge and cognitive development. In this case, it is important for a teacher to participate in the process and provide effective guidance (Daniela, 2020). Naturally, the 3D museum images, and museum collections included in the learning process are not enough to achieve the expected efficiency in the social studies course. It is necessary to activate students, to increase classroom interaction, and to support skills and value development by using various web tools and teaching techniques together. Although an exemplary classroom practice was not presented to the social studies pre-service teachers in this study, they were encouraged to think and discuss how they could use virtual museums in lessons upon their undergraduate education knowledge. In the present study, social studies pre-service teachers presented examples of evidence based learning and critical thinking, similar to a study by Mamur et al. (2020), which was conducted with teachers, who designed drama activities. In addition, the results are supportive of a study by Turgut (2015) that the inclusion of virtual museum activities in social studies lessons was effective in achieving both cognitive and affective gains, developing different perspectives, increasing the power of interpretation, evaluation, and establishing a connection between artifacts and historical reality. As Yıldırım and Tahiroğlu (2012) stated that including virtual museum activities in social studies lessons can provide a learning environment, where students can develop many of the skills included in the curriculum. Smilarly in the present study, the pre-service teachers stated the use of virtual tours of those museums with international collections in the lessons, would help them develop awareness of cultural heritage, intercultural differences and similarities, and respect for different cultures. Most of the pre-service teachers agreed that the virtual design of the British Museum could serve as an important source for gaining the perception of change and continuity in social studies. There were pre- service teachers, who indicated that the Louvre Museum would contribute to the development of the sense of aesthetic and creativity in students.

The second part of the study investigated the views of pre-service teachers about how virtual museum experiences impressed them. Accordingly, 90% of the pre-service teachers performed well above what was expected from them, interacted with friends for about fifteen days, wrote on their experiences for several pages, and encouraged each other to re-examine the works. The foregoing were important indicators for the study, suggestive of the fact that the pre-service teachers did not take virtual museum tours as a compulsory homework, but with real pleasure. The results of the present study suggested that the awareness of pre-service teachers about associating museum collections with the social studies curriculum was raised and went beyond merely realizing that the virtual museum tours could be used as a resource in the lessons. In other words, although it was aimed to improve the professional competencies of the teacher candidates within the scope of museum education, museums had also an important role in supporting creative, cultural, and intellectual development of individuals and facilitating lifelong learning beyond any professional aspect as suggested by Hawkey (2004).

The present study found that the virtual museum experience contributed to the development of pre-service teachers in terms of general culture upon being knowledgeable about different cultures. They were encouraged to do more research. This experiment provided the participants with an improved awareness about the protection of cultural heritage and helped them to question their previous knowledge. Certain pre-service teachers were pleased to see the artifacts of their own culture and homeland in different museums, while the same led to a feeling of sadness in others and led to do discussion on necessity of preserving the cultural heritage. Those results are consistent with Kashack's (2014) suggestion that museums in social studies could serve as a medium, where students could increase their historical and civic understanding by being exposed to artifacts and narratives not found in classroom. Furthermore, previous studies also reported that museums increased interest in cultural issues (Uztemur, et al.,2019), fostered recognition and interpretation of intercultural interactions (Mamur et al, 2020), and provided opportunities to explore different cultures (Ismaeel & Al-Abdullatif, 2016). An individual familiar

with the cultures of different societies as well as one's own culture and comprehends the relationship between them can understand the value of other societies in addition to being able to understand their own culture (Mercin, 2006). Therefore, virtual museums, with their collections from different cultures, may prove to serve as an important tool in developing multicultural education and perspective based on the principle of cultural diversity (Ulvay & Ozkul, 2017).

As suggested by Hein, learning in the museums is a constructivist learning process. Individuals create their own personal meanings according to their own knowledge and experiences (Clutterbuck, 2008). Museums can enable people to acquire qualities associated with empathy, creativity, critical thinking, interest, and curiosity (Seidel & Hudson, 1999). The present study showed that the pre-service teachers, who opened up to different cultures and worlds with their virtual museum experiences, tended to question themselves from various perspectives. While it made some pre-service teachers realize their inadequacies in various aspects, it helped others to discover their own potential in terms of enjoying questioning, looking from a different perspective, critical thinking, and sensitivity to art. These results supported the conclusion by Dilmaç (2016) that museum visits encouraged students to broaden their horizons.

The COVID-19 pandemic urged the use of virtual means at a time when museum professionals were considering balancing physical and virtual museum activities. Thanks to the access opportunities provided by the museums, many visitors had the chance, at least in the virtual way, to see the collections that they had never seen before and perhaps would not be able to see in their lifetime (Kahn, 2020). The suggestion that museums went beyond their physical limits and facilitated the spread of culture thanks to technology (Corona, 2021) gained more meaning in this period. In the present study, the pre-services teachers were satisfied with virtual tour of the museums, which they thought they would not have the opportunity to pay a physical visit due to distance, budget, and lack of time. They appreciated the opportunities that technology provided them in extraordinary times when physical activities were limited. However, the pre-service teachers stated that virtual tours could never replace the physical ones and they wanted to make physical visits to the museums to closely see the collections they were curious about. This result was also reported in previous studies (Ata, 2010; Çalışkan et al, 2016; Kırksekiz et al., 2020; Turgut, 2015). In conclusion, it is possible to say that the desire of visitors to see museums up close would increase if digital connections provide awareness about the collections of real museums, as suggested by Clough (2013).

Recommendations

The important advantages of including virtual museums in the teaching process are obvious, given the difficulties of benefiting from physical tours to museums in the educational environment. In this case, it is important for teachers to have a certain competence in recognizing virtual museums, associating them with curriculum, and increasing student partition with various practices. Since the virtual environment is a different field and requires certain competencies, it is necessary to give a separate place to virtual museum practices in teacher training programs. Furthermore, further studies on examples of virtual museum practices in the classroom setting are required in order to provide the educators with relevant guidance. In addition, as Falk (2022) stated, museums need to find a way to reach more audiences, including socially and economically disadvantaged groups.

Statements Of Publication Ethics

Ethical permission (29.07.2020-640) was obtained from Ege University Scientific Research and Publication Ethics Committee for this research.

Conflict of Interest

There are no conflicts of interest in this study.

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Mentor-Mentee Relationship and Ethics

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Abstract

This study aimed to examine the attitudes and behaviors of mentors in the mentor-mentee relationship in terms of adherence to ethical standards, based on the views of mentees. The study group consisted of six doctoral students from the Graduate School of Educational Sciences and the Graduate School of Social Sciences. Participants were selected using a criterion sampling method, and interviews were conducted with those who met the criteria. A semi-structured interview form was used in the data collection process, and thematic analysis method was adopted for data analysis. The findings of the research indicate that the behavior of mentors towards their mentees was ethically significant. The participants' views showed that it was important for mentees to be autonomous in their relationship with their mentors, to receive guidance, for mentors to allocate time, to share in their work, and to act fairly. In addition, the confidentiality of the interviews played a critical role in the mentor-mentee relationship. The findings acknowledged that the mentor-mentee relationship was critically important for career development, and the mentor was considered a significant figure. It is mentioned that the mentor's failure to fulfill their responsibilities and adhere to ethical principles can be overlooked due to the mentee's preference to complete the process. The results suggest that considering ethical principles in the mentor-mentee relationship can contribute to solving current issues and preventing larger problems.

Keywords: Mentor and mentee relation, ethics, doctorate education.

Mentor-Menti İlişkisi ve Etik
Öz

Bu çalışma, mentor-menti ilişkisinde mentorun tutum ve davranışlarının etik standartlara uygunluğunu, mentilerin görüşlerine dayanarak incelemeyi amaçlamaktadır. Çalışma grubu, Eğitim Bilimleri Enstitüsü ve Sosyal Bilimler Enstitüsü'nde öğrenim gören altı doktora öğrencisinden oluşmaktadır. Katılımcılar, belirlenirken ölçüt örnekleme yöntemi kullanılmış ve ölçütleri sağlayan katılımcılarla görüşmeler gerçekleştirilmiştir. Veri toplama sürecinde yarı-yapılandırılmış görüşme formu kullanılmış, veri analizinde ise tematik analiz yöntemi benimsenmiştir. Araştırmanın bulguları, mentorlerin mentilere karşı sergilediği davranışların etik açıdan önemli olduğunu ortaya koymaktadır. Katılımcıların görüşlerinden elde edilen sonuçlara göre, mentilerin mentorleriyle ilişkilerinde özerk olmaları, rehberlik yardımı alabilmeleri, mentorların zaman ayırmaları, çalışmalarında paylaşımda bulunmaları ve adil davranmaları önemlidir. Ayrıca, görüşmelerin gizliliğinin de mentor-mente ilişkisinde kritik bir rol oynadığı vurgulanmıştır. Katılımcıların görüşlerinden çıkarılan sonuçlara göre, mentor-menti ilişkisinin kariyer gelişimi için kritik bir öneme sahip olduğu ve mentorun önemli bir figür olduğu kabul edilmiştir. Mentinin, süreci tamamlamayı tercih etmesi nedeniyle, mentorun sorumluluklarını yerine getirmemesinin ve etik ilkelere uymamasının görmezden gelinebileceği belirtilmektedir. Araştırma sonuçları, mentor-menti ilişkisinde etik ilkelerin göz önünde bulundurulmasının mevcut sorunların çözümüne ve daha büyük problemlerin önlenmesine katkı sağlayabileceğini göstermektedir.

Anahtar kelimeler: Mentor-menti ilişkisi, etik, doktora eğitimi.

INTRODUCTION

Mentoring, as an ancient practice from the early times of human history, has its origin in the Odysseus Epic in Greek mythology. King of Ithaca, Odysseus, entrusted his son Telemachus to Mentor when he was off to the Trojan war. Mentor was given a responsibility to educate his son and to raise him as the future King of Ithaca. Over the years, Mentor turned out to be a private teacher and a trusted counsellor of Telemachus (Anderson & Shannon, 2014; Klasen & Clutterbuck, 2002; Merriam, 1983). Also, in Homer's epic poem, the Mentor is often interpreted in terms of guidance and conceptualized as mentoring. Mentoring is defined as guiding and supporting a less experienced person through a more experienced person in order to develop his/her competencies. While the more experienced person is called mentor, the less experienced person is called "mentee" or "protégé" (Carruthers, 2004; Creamer et al., 2001; Gaskill, 1991; Haines, 2003; Kram, 1983; Taylor, 1992; Weil, 2001). In Türkiye, the word "mentee" is used as "mente" by Özdemir (2012) for the person who receive guidance and support (Bakioğlu, 2015). Although it was named differently by various scholars, it is essential to thoroughly understand the concept of mentorship due to the positive outcomes of mentorship practices.

A number of conclusions can be drawn for mentoring in The Odyssey. First, being a mentor is a voluntary action since Mentor willingly fulfilled his responsibilities to Telemachus. Second, through Mentor's effort, the hidden potential of Telemachus was revealed, which indicates that mentoring is a nurturing process facilitating the mentee's development. Third, the mentor's wisdom is acknowledged and embraced by the mentee, which reveals the insightful process of mentoring. Fourth, Telemachus took the Mentor's advice into consideration and Mentor kept all the interaction with Telemachus confidential, which reveals the supportiveness and protectiveness of mentoring (Anderson & Shannon, 2014).

In modern times, the terms mentor and mentoring was first used in the North American business and social movements in the 1960s (Ferreres, 2019). There were two articles focusing on mentoring in business published in the Harvard Business Review in the late 1970s. In the following decades, mentoring became known in the field of education. Specifically, it was initiated with millionaire Eugene Lang's speech to high school students, which was the foundation of the I Have a Dream event (IHAD). In this speech, he guaranteed college education to students if they graduated from high school. (IHAD included a mentoring component as well as college education) IHAD aimed to decrease high and junior high school students' dropout rates and encourage postsecondary school matriculation (Bashi, 1991).

Having a mentor has many benefits such as enhancing creativity, keeping up with career progression, increasing knowledge and skills, advancing known and unknown skills, developing a personal morality, building friendships (Moberg & Velasquez, 2004). In addition, mentors' places absolute faith in the mentees and encourage them to express feelings and thoughts freely, as well as supporting high expectations. These benefits increase self-esteem, self-concept, and self-confidence (Kalbfleisch, 1997; Kim & Zabelina, 2011). In this respect, the mentor-mentee relationship has the potential to improve the career and psychosocial aspects of mentees (Auster, 1984; Johnson & Nelson, 1999; Kram, 1983). More specifically, the development of a sense of competence, confidence and effectiveness in a young manager is also supported through role modeling, acceptance, reassurance, counseling and psychosocial functions based on friendship (Kram, 1983; Roberts, 2000).

Social support theory argues that mentors should provide emotional support such as listening, trust or concern, appraisal support such as affirmation and feedback, informative support such as advice, suggestions and information, and instrumental support such as labor or money. Mentor is also expected to prevent or decrease the stress of mentee through emotional support (Davis, 2010; Eby et al., 2013). Despite the fact that social support does not eliminate stressors in people's lives, it reduces anxiety levels and supports them to be more optimistic, to control themselves, and to try alternative ways to overcome problems (Çetin, 2018; Karakose et al., 2016; Yirci, 2017).

Rowley (1999) defines mentoring as a critical and effective adult learning strategy that requires a conscious effort. In another definition, mentoring is considered as a symbiotic relationship between a mentor and mentee helping each other to meet their mutual career goals (Haines, 2003). The relationship between mentor and mentee is unofficial. At the beginning, both of them are expected to be voluntary and after a while inequality arises between mentor and mentee because of experience, knowledge, and status differences (Kalbfleisch, 1997).

Some researchers consider mentors as friends (Ambrosetti, 2014; Kwan & Lopez-Real, 2005; Özkalp & Kırel, 2018). However, friendship generally refers to a symmetrical and mutual relationship. However, due to inequality, the relationship between a mentor and a mentee does not include the symmetry of relationships between friends (Schlosser & Foley, 2008; Weil, 2001). Therefore, at the beginning of the mentoring process, the mentor

and mentee need to discuss the outline of mentoring in order to share mutual understanding and vision (McKimm et al., 2003).

In general, the mentor and mentee relationship is characterized through extraordinary mutual commitment and personal interest (National Academies Press [NAP], 1992). Ideally, this relationship should be regarded as the kind of partnership where mentor and mentee work together. When working with young people, the mentor is aware of his/her responsibilities and interacts appropriately with the mentee in accordance with the highest ethical standards (Kitchener, 1986; Vujovich, 1999). Although this relationship generally benefits both sides and scientific profession, some ethical problems may occur (Resnik, 2005) since scientists often do not agree on behavioral standards governing science, how to interpret these standards, and how to employ them (Whitbeck, 1995).

The terms mentor and mentoring have become credible in recent years, when concerns about scientific misconduct arose (Weil, 2001). Mentoring also has potential risks (Auster, 1984). For example, a mentor may use the power of mentoring for his/her own egocentric purposes rather than meeting the needs of a mentee. In addition, mentoring relationships may limit the potential of both parties. Mentors may disrupt the development of the mentees by discouraging the autonomous work. Also, mentee may prefer to depend on the mentor's skills rather than developing his/her self-supervision skills (Haines, 2003). Despite the significance of ethical considerations in the mentoring process, only a few studies have concentrated on this issue (Schlosser & Foley, 2008).

Ethical codes may be used to identify ethical problems and solve them in an ethically sustainable way (Karaköse & Kocabaş, 2009; Löfström & Pyhältö, 2017; Vandekerckhove & Tsahuridu, 2010; Wiley, 2000). In general, ethical skills are connected to the principles that provide individuals with a distinct sense of significance and direction in their lives, as well as a commitment to honoring the rights of others to live and work with honesty (Pask & Joy, 2007). Ethical principles provide the ethical justification at the first stage. Within a professional organization, these principles are commonly transformed into a collection of ethical guidelines that professionals commit to adhering to while carrying out their work within the organization. Ethical codes are considered as a set of organizational laws since they are formal and obligatory and are enforced by a supervisory authority (Kitchener, 1985, Kitchener, 1986). Therefore, ethical principles and theories should be taken into account in order to make rational and ethically defensive decisions in mentor-mentee relationships (Kitchener, 1985).

Although the main concerns in mentoring ethics are similar, there is an interdisciplinary perspective on ethics (McDonald & Hite, 2005). For instance, while Auster (1984) sociologically discussed gender in mentor-mentee relationship, Spencer and colleagues discussed the mentoring relationship from a psychotherapy perspective (Rhodes et al., 2009; Spencer & Rhodes, 2005).

According to Allan (2010) various professional organizations around the world (American Psychological Association's Ethical Principles and Code of Conduct, 2002; Code of Conduct, Ethical Principles and Guidelines of the British Psychological Society, 1993; Canadian Code of Ethics for Psychologists, 2000; European Federation of Psychological Associations [EFPA] Meta - Code of Ethics, 2005; Code of Ethics: For Psychologists working in Aotearoa/New Zealand, 2002; Ethical Code of Professional Conduct of the South African Psychologist Board, 2002; Draft Universal Declaration of Ethical Principles for Psychologists (Ad Hoc Joint Committee), 2005) have a consensus about ethical principles:

• Respect for dignity and rights of people,

• Justice,

• Autonomy,

• Nonmaleficence,

• Beneficence,

• Veracity,

• Fidelity, and

• Responsibility.

Allan (2010) also identifies ethical codes as justice, autonomy, according dignity, nonmaleficence, pursuit of excellence, beneficence, care and compassion, veracity, fidelity and accepting accountability. Although professional ethical principles are categorized separately for different majors, there are common principles including honesty, reliability, professional commitment, and respect (Özbek, 2003). The ethical principles for educators were first identified by National Education Association [NEA] in the USA in 1929 (Özbek, 2003). Student commitment principles put forward by the NEA are listed below:

Commitment to Students: Educators know the importance of teaching profession. Therefore, they tend to facilitate the spirit of research, gaining and understanding knowledge, and revealing ideas about important goals. In order to fulfill their responsibilities, educators:

1. Do not restrict students' attempt to gain knowledge

2. Do not unnecessarily deny that students have different views

3. Do not suppress or distort subject matter related to students' enhancements

4. Do protect children from environments that prevent learning and that harm their health or safety

5. Do not put students in situations in which they get embarrassed or disparaged

6. Due to their race, color, religion, sex, nationality, marital status, political and religious beliefs, family, social and cultural background or sexual preferences

   a. Do not discourage students to participate in any program

   b. Do not deny benefits to any students

   c. Do not grant any advantage/help to any students

7. Do not benefit from the professional relationships with students to gain benefit for their own good

8. Do not disclose any information about their students unless there is a necessity (i.e., professional purpose or required by law) (NEA, 2018).

Mentors cannot rely only on good intentions to develop productive and safe relationships with their mentees. Indeed, failure to pay attention to ethical issues may result in undesirable or even harmful decisions. By being mindful of these issues from the outset of their relationship, mentors can create strategies and resources to effectively address ethical concerns (Kitchener, 1986). In this regard, mentors ought to be motivated to contemplate how their conduct in diverse scenarios and real-life situations can impact their association with their mentees, as well as the welfare of the individuals they are responsible for protecting. In order to achieve this, mentors should be willing to tolerate uncertainty as they decide the best action plans. Due to the complex nature of mentoring relationships and the effects of various socio-demographic variables on these relations, mentoring requires a rational, thoughtful, informed, and self-reflective approach (Rhodes et al., 2009).

In addition to an increase in awareness regarding ethical issues, mentees need thinking strategies to analyze and interpret a problem. A mentee should understand the association among ethical intuitions, ethical rules, and ethical principles and law. Mentees can act in line with disclosed ethical codes to understand the fundamental contradictions in ethical problems and to decide between conflicting ethical claims (Kitchener, 1986).

Researchers emphasize that a "one-size-fits-all" approach to mentoring is ineffective for individuals with diverse needs and backgrounds (Benishek et al., 2004; Lowman, 2013). Also, this unrealistic utopia only leads to an atmosphere of denial and oppression (Schlosser & Foley, 2008).

On the other hand, the mentoring relationship may not always be successful or function appropriately. There is hardly any literature assessing which problems are autonomous and idiosyncratic. However, traditional methods in education and mentoring are under stress. Some studies have raised concerns about how the increasing number of mentors and mentees in various contexts and studies can impact the quality of the relationship between a mentor and a mentee. As research labs expand and the number of mentors and mentees increases, the quality of the educational environment and the mentor-mentee relationship are at risk (NAP, 1992).

It should be recognized that the mentor-mentee relationship, similar to any personal relationship, is delicate. Challenges in the relationship can lead to issues for both parties and may result in an ineffective mentoring experience (Scandura, 1998). A mentee may overlook a mentor's negative behavior or ethical violations in order to protect his/her academic progress. If the relationship deteriorates further, the mentee may ultimately leave their academic pursuits behind.

Djerassi (1999) reported the case of Jason Altom, a student who suicided due to his mentor's abuse. In his suicide note, he wrote that

"I am a PhD student in the field of chemistry at Harvard University. The university only assigns one supervisor for academic major and career selection. A supervisor just like a judge. If there was a council of supervisors, we wouldn't be stuck like this. We can't be flexible."

This note and the other indicators showed that students had difficulty due to intensity of course schedules and were pushed to be alone, and were not able to find an authority for support (Sabah Newspaper, 1998).

There has been criticism that there are no established principles to govern research conducted by research institutions and their members, and that scientists and institutions lack a mechanism to guarantee the integrity of the research process (NAP, 1992). The benefits of effective mentoring are reported in the literature. With increased movement within an organization, mentors must step in to address gaps in continuity.

Mentoring is a process that leads to a positive learning experience and results in more socialized, more stable, and more productive employees. Nevertheless, on occasion, mentoring relationships may not proceed as intended. Many studies focused only on the positive assets of mentoring. On the other hand, the difficulties in interactions between mentor and mentee and the ethical issues should not be disregarded (Scandura, 1998). As it was in the past, mentoring remains a crucial component of graduate education today. For an effective mentoring, ethical principles should be integrated to the mentor-mentee relationship (Ellis, 1992).

There are a number of studies on the ethical issues in the mentor-mentee relationships. They focused on issues such as race and ethnic origins, socio-economic status, limits of relationship, ability levels, sexual preferences, religious beliefs (Benishek et al., 2004; Kalbfleisch, 1997; Ragins, 1997; Schlosser & Foley, 2008; Yirci et al., 2016), age, communication, anger, jealousy (Chong, 2009; Johnson & Nelson, 1999; Kalbfleisch, 1997), sexual intercourse (Chong, 2009), sexual harassment, competency, integrity in professional relationships, and denial of access to services (Johnson & Nelson, 1999).

The mentoring relationship depends on relations, and it has some potential risks. In the book series *The Dark Side of Close Relationships*, Cupach and Spitzberg (2011) categorized those risks into behavioral risks (e.g., violence, threats, and stalking) and emotional risks (e.g., anger, pain, and depression). These risks include violence (bullying), conflicts (disagreement), jealousy, anger (anger), threats, harming, rejection, stalking, cheating, fraud, depression, betrayal, teasing, loneliness, desolation, separation, termination, bullying, negative emotions, sexual harassment, inability, sexual aggression, argument, enemies, shyness, anger, and disturbing.

The aim of the study was to investigate ethical conflicts and violations within the mentor-mentee relationship, which holds a significant place in the literature but has not been fully explored in Türkiye. It is expected that this research will help formulate ethical codes that are uniquely tailored to the nature of the mentor-mentee relationship. To achieve this objective, the study sought answers to the following questions:

1. What are your opinions regarding your advisor's treatment of your individual rights?

2. How do you perceive the support that your advisor offers during the counseling process for your academic development?

3. How do you feel about the level of respect shown by your advisor towards your work?

METHOD

Research Model

This study employed the phenomenological design, one of the qualitative research designs. Phenomenology, which originates from the Greek word "phenomena" meaning appearances, is a method of exploring the way in which individuals experience, perceive, and interpret objects, events, and experiences (Holt & Sandberg, 2013). Phenomenological research attempts to investigate people's lived experiences in order to understand what they are going through (Christensen et al., 2015; Creswell, 2017; Ersoy, 2017). Phenomenological research typically relies on in-depth interviews that involve open-ended questions as the primary method of data collection. Additionally, participants are often asked to provide written accounts of their experiences (Christensen et al., 2015). Therefore, phenomenological design was preferred in order to examine doctorate students' relations with their supervisors during their doctoral education.

Participants

The participants of the study consisted of PhD students in Graduate School of Educational Sciences and Graduate School of Social Studies at a university. Participating students were selected using criterion sampling technique, a purposeful sampling selection method. This technique allows researchers to examine and to understand a particular phenomenon (Creswell, 2017). In the present study, three criteria were identified: (1) having a master's degree from either Graduate School of Educational Sciences or Graduate School of Social Studies; (2) conducting doctorate education, and (3) already completed first two semesters. The rationale behind these criteria was to identify doctorate students who already had a longer and dependent mentor-mentee relationship with their supervisor in terms of social and academic life. Taking these criteria into account, interviews with participants willing to join the study on a voluntary basis began, and the data collection process continued

until the data set reached saturation. The data collection was concluded when the analysis of participant opinions and the generated codes started to repeat, which is an indication of the fact that the data set had reached saturation. A total of 6 individuals were included in the study. Based on these criteria, six participants were selected. Table 1 provides demographic information about the participants. In order to protect their privacy, the participants were anonymized.

Table 1. Demographic information about the participants

Participants	Gender	The stage of Doctorate Education	Location for interview
Kenan	Male	Dissertation Writing	Office of a research assistant
Kürşat	Male	Dissertation Writing	Office of a research assistant
Derya	Female	Dissertation Writing	Office of a research assistant
Ercan	Male	Dissertation Writing	Office of a research assistant
Erkan	Male	Dissertation Writing	Office of a research assistant
Fatma	Female	Preparing for comprehensive examination	Teachers' room at a school

Data Collection Tools

In order to collect data, a semi-structured interview technique was used. The tool consisted of open-ended questions and was designed by the researchers. A semi-structured interview form includes flexible questions allowing researchers to collect specific data from each participant, and a significant portion of the interview process involves asking questions or discussing issues that need to be clarified (Merriam, 2015). During the phenomenological interview process, communication and interaction between the researcher and the participant is key, and both parties play an active role in the process (Ersoy, 2017). In phenomenological research, the views of participants are obtained through open-ended questions that are designed by the researcher, without being constrained by the researcher's own perspective or the findings of previous studies (Creswell, 2017). To ensure that participants' perspectives were not restricted, to uncover divergent viewpoints, and to allow for additional inquiries if needed, a semi-structured interview format was utilized in this study.

The researchers designed the interview questions based on the ethical principles introduced by the National Education Association [NEA] in 1929. The questions were reviewed by two experts in the field. Two PhD students were interviewed as part of a pilot study, but the data collected from these interviews were not included in the analysis process. The final version of interview form was designed based on the expert opinion and pilot study. Sample questions used in the study include "How do you feel about your supervisor's attitude and behavior toward your personal rights?", "What is your perception of the support your supervisor offers in terms of your academic development during the consultation process?", and "How do you feel about the recognition your supervisor gives to your efforts in your academic work?". In order to obtain more detailed data on the research topic, the researchers developed probe questions to follow up on participants' responses during the interviews (Creswell, 2017; Merriam, 2015). The followings are examples of probe questions: "How do you feel about the confidentiality of the information you share with your supervisor? What is your supervisor's perspective on communicating with other faculty members in the department and seeking assistance from them? How do you feel about the input that your supervisor provides regarding the subject you are working on? "What is your opinion on the feedback that your supervisor gives you about your work?", "How objective do you think your supervisor is when it comes to this issue?", and "Do you feel that your supervisor is taking advantage of your efforts?". Permission from the participants was obtained to record the interview process. The audio recordings of the interviews were transcribed into written format. Participants were then given the opportunity to review the written transcripts to confirm that they accurately reflected what they had meant to convey during the interviews.

Data Analysis

An inductive thematic analysis method was used in data analysis. An important feature of qualitative research is that it has an inductive process (Merriam, Qualitative research: A guide to design and ımplementation, 2015). Thematic analysis involves examining a series of steps focused on identifying recurring themes or ideas in a text data set. The process of organizing data into themes is a fundamental aspect of many qualitative research methods. For example, while content analysis allows researchers to calculate the frequency of the codes to conduct statistical analysis, thematic analysis does not include statistical analysis (Riger & Sigurvinsdottir, 2016). Thematic analysis is a qualitative research method that involves analyzing and organizing data into themes, with the goal of reducing and summarizing the data to capture important concepts within the dataset. This process typically involves dividing the data, classifying it, summarizing it, and restructuring it to identify key themes or patterns in the information (Ayres, 2008). Through thematic analysis, researchers determine the themes based on the narratives (Clark & Creswell, 2015; Creswell & Poth, 2018; Ersoy, 2017; Riger & Sigurvinsdottir, 2016). The

thematic analysis includes the following steps for researchers: (1) becoming familiar with the data (2) creating the first codes, (3) exploring themes, (4) reviewing the themes, (5) defining and naming the themes, and (6) writing the report (Braun & Clarke, 2006). In this study, these steps were followed. In the fifth stage, the themes were defined and named. In the study, two main themes were created, namely "Autonomy" and "Academic Activity".

Validity And Reliability

Validity and reliability are important considerations for researchers at every stage of the research process, from developing the initial framework to collecting, analyzing, and interpreting data, as well as presenting the final findings (Merriam, 2015). To ensure the validity, participant confirmation was obtained after transcription of the interviews. Participant confirmation is a research practice in which researchers present the identified themes or narratives to the participants and request confirmation of the accuracy of the themes or stories (Creswell, 2017; Merriam, 2015) One of the ways to obtain descriptive validity is to use more than one coder to collect and interpret data (Christensen et al., 2015).

FINDINGS

In this study, the interviews were conducted to examine the mentor-mentee relationship in term of ethics. The findings revealed two themes: autonomy and academic activity. Each theme included sub-categories describing the mentor-mentee relationship in detail (see Figure 1).
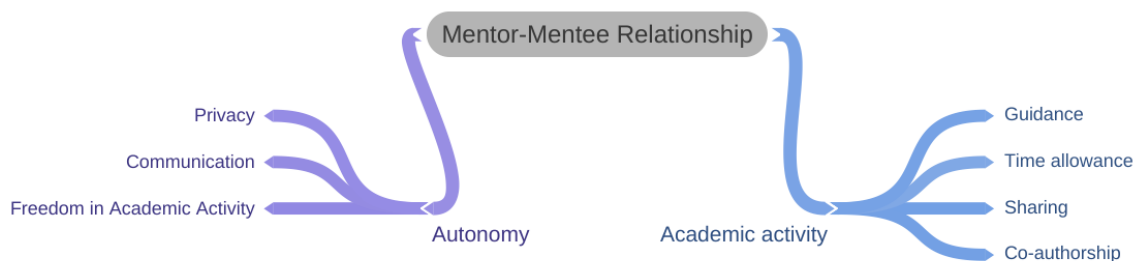
Figure 1. *Concept map of the findings*

AUTONOMY

The autonomy theme comprised three sub-categories: privacy, communication, and freedom for academic activity. Each of the themes is described with direct quotations from the interviews to support them.

Privacy

The participants reported that their academic and personal sharing was confidential in their relations with their mentors, and they felt comfortable about them. For example, Kürşat said that:

"I feel confident about privacy all the time. I mean I was able to talk and discuss with my supervisor. We mainly talked about my academic activities. I know that my supervisor always reassured on privacy and built trust."

Ercan also expressed similar thoughts:

"My mentor is a person I love and respect very much. I have not had any problems with privacy. I mean certainly what happened between us remained between us. I did not hear anything from other people around us about what we talked or discussed. Not my personal issues, not my academic work. I did not hear from anyone else about anything I spoke to with my mentor. I had no problem with this."

Communication

The findings showed that there were two opposite views in terms of mentors' thoughts about mentee's relationship with the other faculty members. Fatma reported that:

"I can freely talk to the other faculty members in the department and get their advices. However, when it is about conducting a study, I feel that I have to get permission from my supervisor. Except that, my supervisor always supported me to attend other courses and share/discuss my thoughts with the other faculty members."

On the other hand, Kürşat said that:

"I was asked to maintain a professional distance from the other faculty members in the department. I think that this was not only my mentor's request, but such a culture was formed in the department. My supervisor decided which courses I would take, and I got to know the other faculty members through those courses. However, academic work with the others was always limited."

Based on the findings, it was concluded that while some mentees did not have professional communication autonomy, the others had such autonomy.

Freedom for Academic Activity

In terms of freedom for academic activity, Erkan stated that "Although we did not have any problem to communicate with the other faculty members, I cannot say that our mentors are OK about our academic sharing and collaborations with the others." After his statement, a probe question was asked to reveal his opinions about his mentor's this attitude. He replied that "a change would increase the quality of our academic activities." Another probe question was asked to obtain his solution to such a problem. He answered this question by saying that "we all need to believe in that science develops more if we collaborate. In other words, if we work together and if we understand that there is no harm in collaboration, this change may happen."

A similar statement was made by Kürşat. He stated that:

"There was always a limitation in working with other faculty members. We, of course, communicated with them in the courses that our supervisor chose for us to take. However, this communication was about the course content. I believe that there should be a limitation in academic activities. This was an unwritten rule in the department. We observed that all faculty members complied with this rule. So, we do not conduct any academic work with the others, I mean during our doctorate education."

On the other hand, Kenan stated that:

"The other faculty members agreed that they conduct academic work with only their own students. Therefore, the other doctorate students have to work only with their supervisors. However, my supervisor supports me to collaborate with the other faculty members. I did not have any problem with that until now."

Similar to Kenan, Ercan defined this issue as one of the biggest problems in academic life. He reported that he did not have any issue about collaboration and stated that:

"My supervisor never restricted my relationship with other faculty members and my academic activities with them. My previous supervisor [referring to his supervisor in Master's education] had restricted me. My current supervisor set me free in this regard. He never intervenes and we did not have any problem about this freedom."

The findings showed that the participants preferred to be free in choosing courses and carry out their academic studies with the other faculty members and students. In addition, the participants considered freedom in academic activities as a problematic issue in graduate education.

ACADEMIC ACTIVITY

The academic activity theme included three sub-categories: guidance, time allocation, and co-authorship.

Guidance

Examples are provided below in regard to participants' views about guidance. The quotes revealed that there was a variation in mentors' guidance behaviors.

Kenan stated that:

"I can say that my supervisor is more interested in my thesis than me. We decided my thesis topic together. He wanted me to choose a topic within the scope of his doctoral thesis. I also wanted to work on that topic. When he finds an article related to my thesis, he sends it to me and asks me to read it. He helps me out about statistical analysis methods. I can say that he thinks of my academic progress more than I do."

On the other hand, Ercan said the following:

"I cannot say he did not contribute; it would be unfair. But he contributed to my academic life less than I expected. At least, he did not complicate my work, which happens a lot in academic life. I mean many students have problems with their supervisors. While sometimes he did not like what I did or what I wrote, he never provided suggestions to make it better. He never gave me an idea about what should I read, how should I write. I know other students who have the same experience. So the problem is disapproving what is done and not providing any clue to improve it; this is the real problem."

Fatma states that:

"I think I now know the framework of conducting a research. But I have no experience in writing an article and submitting it for publication. He wants me to make such submissions, and I try to do it with a concern because I have no experience. But when I have a question, he definitely helps if he has time."

Time Allocation

Participants' views about their supervisors' time allocation behaviors are discussed in this section. Ercan stated that "Actually, he spent time on my academic activities, but this time was not productively used in terms of academic contribution. During this time, he just approved of disapproved what I have done or."

On the other hand, Fatma complained this issue and said that "my supervisor did not allocate time for my academic work. Only when I have questions, he certainly answered them if he had time."

Derya said that: "My supervisor allocates time for me to show him my work. I get answers to my questions. However, I wish he spends more time for my academic development."

Kenan also said:

"I am not only one he has been mentoring and there are other doctorate students as well. He teaches many courses this semester and he may get promotion in his job in a short time. Because of his workload, sometimes he asks me to come another time or do it on my own. I mean he does not discard me. When he was busy, he sometimes asked me to come in a more convenient time or asked me to handle it by myself stating that there was no need for him to contribute."

To sum up, the participants emphasized the importance of time allocation, revealing that the time spent with mentors is critical for mentees in order to present their works to their mentors, to advance their professional competences, and to learn more about academic culture.

Sharing

The participants were asked whether their mentors shared everything they know about the topic they were working on. Some excerpts are presented below.

Ercan said that:

"If there is anything to contribute to the subject I am working on, he will definitely not hide it and share it with me. However, my supervisor was not very interested in the topic I preferred to study. Maybe he did not assume the subjects I worked on. Therefore, as I mentioned before, he did not contribute much to my academic development."

Kenan shared his experience with the following sentence:

"I do not believe he is hiding any knowledge. He always shares what he knows. But several times he told me that "mentee should know more than his mentor because mentee writes the thesis not mentor. So, mentee needs to work hard, to read more, and to search more. This means mentee should have more knowledge of the literature."

Derya, on the other hand, stated that "I think my supervisor is not sharing everything with me to keep some knowledge for himself."

Some participants reported that their mentors help their academic work and share their knowledge and experiences with them. In addition, except for Derya, all participants agreed that their mentors were open to share knowledge.

Co-authorship

Participants were asked about their thoughts on whether they obtain the reward for their labor in scientific studies. Some of the participants' expressions are as follows:

Erkan stated that:

"I believe that the work done in partnership with the mentor and mentee is produced with the effort and performance of the mentee. Of course, it is critical for the mentor to contribute with his knowledge and experience to the work. It is not possible for us to determine the order in which my supervisor and I should be credited as authors. I believe that mentors should prioritize making their mentees the first authors in some publications, as this can serve as a source of motivation for students. However, this can be ignored due to a possibility of promotion in my mentor's position or maybe for other situations. But in general, whatever you call it, maybe academic culture, mentors' personality, or the traditional values, co-authorship is a problematic issue, and this must be overcome."

Kürşat:

"My mentor always puts my efforts at the center in our works. He is a mentor who makes me stand out, especially by showing the work we do in the academic environment. Like an advertisement. With this, I can see that he is different from the other faculty members in the department. In the department, there is a culture in which always mentor is the first author in joint works and mentee is the second. We never discussed this issue. Rather, we followed this usual order. This is a tradition, but we do not now know whether it is fair or ethical. But I think the person who put more effort on the joint work should be the first author of the manuscript."

Fatma also stated that "My supervisor was the mentor I wanted to work with. He respects my work. I do not think he will be unfair. "

Kenan also said that:

 "I am aware that there is an issue about the authorship order in academic life. But my supervisor is always fair. I was the first or second author based on my effort in the work. It is not very reasonable to be a first author just because he is an supervisor."

Some participants stressed the co-authorship issues with their mentors. Erkan stated that he disregarded this problem in order to maintain the mentor-mentee relationship and to provide support for his mentor in terms of possible academic promotion. Similarly, Kürşat considered this issue as a part of department's culture and, as a result, he preferred not to bring it up. On the other hand, Kenan stated that although this was an issue in the department, his supervisor was fair and reasonable.

DISCUSSION & CONCLUSION

This study aimed to examine the mentor-mentee relationship in terms of ethical issues through mentees' perspectives. The results revealed that mentees' autonomy, mentors' guidance and time allocation, and privacy were critical factors that affect the relationship between the mentor and mentee. The findings were discussed under two categories: autonomy and academic activity.

Autonomy

The principle of autonomy is the basis of various ethical rules frequently found in ethics committees. It includes freedom of thought or choice (Kitchener, 1985). In the mentor-mentee relationship, respect for autonomy has a critical importance (Moberg D. J., 2008). Specifically, Shapira-Lishchinsky (2012) states that as the mentor and the mentee gain more autonomy, mentee's success will increase (Akgüç, 2004).

In this context, privacy is considered as a part of autonomy (Sayın, 2013). In order to maintain relationship with other people, privacy is a requirement and a critical aspect (Rachels, 1975). Akgüç (2004), defines privacy as one of the ways of developing one's identity and ensuring self-control, which, in turn, result in self-actualization and autonomy protection. Izgi (2009) asserts that if mentor guarantees full confidentiality in the mentor-mentee relationship, the relationship of trust is more likely to develop. In the mentor-mentee relationship, mentors are expected to encourage the mentee to think aloud, which helps the mentee to develop his thinking skills. Therefore, the mentee should express himself/herself without fear of being reported to a third party (Pask & Joy, 2007). Murray (2001) puts a strong emphasis on trust between the mentor and the mentee. In this study, the participants stated that they trust their mentors in protecting the confidentiality of communication by considering ethical obligations and that they can easily express themselves while sharing their academic or personal issues or questions. This trust-based relationship is important for the development of the mentee.

Some of the participants stated that their communication and freedom of academic activities with the other faculty members were limited by their mentors. ACPA (2018) states that the mentee's freedom of choice and action should not be restricted unless their actions significantly interfere with the well-being of the others or the completion of the institution's mission. On the other hand, Jones (2007) states that the freedom of research is a part of science application principles and scientists' responsibilities regarding their virtues. It is important to recognize that respect for autonomy should not impede the mentee's capacity to exercise their own judgment and reasoning (Moberg & Velasquez, 2004). A talented mentor helps the mentee become self-sufficient so that he does not always seek help from others (Lipscomb, 2013). In their study, Çolak et al. (2017) revealed that professional communication autonomy is an important predictor of job satisfaction. The limitation of academic activities (e.g. course selection, study group in the research to be conducted, communication limit with other academicians) is the biggest obstacle in developing mentees' autonomy in the mentoring relationship and it contradicts the mentoring relationship. There are studies reporting that developmental relationship in which autonomy was

encouraged was not established between mentors and mentees (Arnett, 2002; Beech & Brockbank, 1999; Clarkson & Shaw, 1992). Schlosser and Foley (2008) concluded that there may be limitation problems due to the nature of the mentor-mentee relationship in their study, which is in line with the findings of this study. In a mentoring relationship, it is expected that the mentor will enhance the mentee's autonomy performance and motivate them to cultivate self-regulating behaviors that lead to mastery (Haines, 2003).

Academic Activity

The participants stated that they would like to benefit from the experience and knowledge of their mentors during their doctorate education. It was found that while some participants appreciated their mentors' help in choosing thesis topic, conducting statistical analysis, and writing theses, some reported limited contribution of their mentors. For example, Ercan expressed his opinions as follows:

"My mentor is a person I appreciate very much in terms of human relations. But his academic contribution is limited. You are sending the thesis, or you will be at the thesis monitoring committee, or you will prepare the relevant report or prepare a seminar, I do not think that he is aware of them enough, so maybe my supervisor is the most unaware person about this subject in the jury".

In their study, Seçkin et al. (2014) found that doctorate students had more expectations from mentoring than master's students. In another study, Milner and Bossers (2004) found that mentors' ability to guide mentees and provide feedback for them was at a moderate level. It was also reported that well-developed communication skills contributed to establishing a constructive relationship between mentors and mentees by increasing self-esteem and confidence (Heirdsfield et al., 2008). However, some studies revealed that mentors neglect and unfulfilled expectations (Colvin & Ashman, 2010; Eby & Lockwood, 2005; Kram, 1983; Murray, 2001). The Higher Education Law (Article 22-2547) clearly defines mentors' duties as to set up office hours to meet with their mentees, to help them in necessary matters, and to guide them (YÖK [Law of Higher Education], 1981). Mentors play an important role in the education of mentees and they should provide mentees experience and knowledge that goes beyond what they can learn in a course or textbook. They model students how to conduct high-quality research, how to teach, how to write research papers, how to get funding, and how to survive in the academic life. Mentoring involves strict supervision and teaching between a scientist and his students. Mentor-mentee relationship offers a way to train new scientists and to transfer scientific standards and traditions to new generations. In addition, mentors often write recommendation letters for mentees, help them prepare their curriculum vitae, and prepare them for job interviews in order to help them work in the field of science (Resnik, 2005; Erdem, 2012).

The participants reported the importance of mentors' time allocation. Some of them agreed that their mentors spend time to check out their scientific work; however, they expressed different opinions in terms of mentors' contribution to those works. For instance, Ercan said that "actually he allocates time for me but this time is not effective in terms of contribution." On the other hand, although they spent time together to answer Derya's questions, she expected from her mentor to spend more time for her academic work. Based on those views, it is concluded that while some mentors fulfill their duties in the mentoring relationship, some do not fulfill their obligations. Seçkin et al. (2014) revealed that time allocation and guidance are two critical factors having an influence on mentoring. In his study, Lipscomb (2013) found that mentors develop professional competencies of mentees. In a similar study, Straus et al. (2009) emphasized that lack of time is an obstacle to a productive relationship by both mentors and mentees. Murray (2001) revealed that mentees were unwilling to demand time from a busy mentor. Haines (2003) and Eby and Lockwood (2005) considered lack of time and ineffective feedback as a potential trap of the mentoring relationship. In this context, there are studies in the literature reporting positive and negative opinions about time allocation in the mentoring relationships. Bashi (1991) pointed out the guidelines on the standards for the amount of time mentors and mentees should spend together, as well as the key activities that are essential. As Bashi (1991) suggested, mentoring programs should be designed based on these guidelines. The success of a mentoring relationship depends on dedicating sufficient time to discussing matters that are significant to the mentee. Although time constraints, inadequate guidance, and a lack of information sharing can exist, a mentor-mentee relationship can still be formed, but these challenges may result in difficulties for the relationship.

The participants also mentioned co-authorship issue as one of the ethical problems. They stated the determination of authorship order is influenced by academic culture and the potential for the mentor to advance in their career. However, some of the participants revealed that their mentor was fair and did not neglect mentees'

effort in academic work. Actually, based on the participants' opinions, it is clear that they are not aware of how to determine authorship order. Oğuz (1999) explains this order as follows:

"The first author in the manuscript is the one who poses the research question. The most important part of the scientific research is to reveal the problem worth researching. Sometimes, the person who raised the research question is not the one who writes hypothesis. In this case, the person who writes the hypothesis is the second author. The third one the one who identifies how to test the hypothesis, in other words who designs the research method. The other names are placed based on the rate of their contribution to the study. Merely engaging in the typical and routine practices of a professional does not automatically confer the right to be listed as an author."

In addition, Yılmaz (2012) reported unethical authorship order in published scientific works. One of the most prevalent ethical dilemmas in the world pertains to the violation of authorship rights. The same issue was reported in Turkey by Higher Education Council in 2006. Ruacan (2005) stated that, for whatever purpose, including individuals who are not entitled to authorship among the authors does not align with the principles of scientific ethics and fairness. Malone (1998) considered decision about authorship order as a possible conflict among contributors and suggested that in order to minimize the potential disagreement, authorship issues should be addressed as early as possible in the research process and reviewed as the work progresses.

The influence of mentoring in optimizing career development cannot be ignored. In a mentoring relationship, boundaries should not be excessively lax, as they may lead to misunderstandings, nor too rigid, as they can limit the connection between the mentor and the mentee. Furthermore, if there is confusion or misinterpretation regarding the nature of mentoring, it may hinder the development of an effective mentoring relationship (Benishek et al., 2004).

Such an assessment will likely include a discussion of the diversity elements that exist in the relationship and environment, including but not limited to race, gender, class, sexual orientation, and age. Differences must be discovered and considered rather than undervalued and ignored. When mentors acknowledge and respect these differences, it facilitates the mentee's growth, as it enables them to cultivate their professional skills in accordance with a universal value system, rather than solely adopting the mentor's cultural perspective (Benishek et al., 2004).

As one of the most important cornerstones of scientific and academic life, ethics should be studied, considered, and taught (Ruacan, 2005). Overall, the ethical standards that are expected in a mentoring relationship involve respecting autonomy, refraining from causing harm, promoting the welfare of others, and acting with fairness. When making decisions, we should prioritize what we would choose for ourselves, our loved ones, and everyone else in identical circumstances, while also taking ethical principles into account. Moreover, if our decision could potentially cause harm to someone, we must strive to minimize that harm (Kitchener, 1985). As with any relationship, mentor-mentee relationships may encounter negative situations. To avoid irreparable damage to the relationship, preventive measures should be taken, or, if necessary, a different mentor should be considered.

Mentor-mentee relationships are established for various purposes and may encounter ethical violations or dilemmas. Decisions should be applicable in a broad sense and should be aligned with regulations, ethics, and respect. Principles such as competence and merit, which are based on national and universal values, should be prioritized. Furthermore, the establishment of mentor-mentee relationships should be guided not only by formality but also by sensitivity towards individual needs and feelings.

Limitations

As the research was conducted with qualitative research method, it is not possible to generalize the results. Generalizability of findings is limited with the nature of the participants

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Statements of Publication Ethics

This research was approved by the Fırat University Social and Human Sciences Research Ethics Committee with the decision dated 22.05.2020 and numbered 11/16.

Researchers' Contribution Rate

Authors	Literature review	Method	Data Collection	Data Analysis	Results	Conclusion
Author 1	☒	☐	☒	☐	☐	☒
Author2	☒	☐	☒	☐	☐	☒
Author 3	☐	☒	☐	☒	☒	☐

Conflict of Interest

This study does not have any conflicts of interest.

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Examining the Effect of Structured Roles on Social Presence

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Abstract

The aim of this paper is to evaluate the effect of discussions carried out with structured roles for participants in an online learning environment, on social presence within the framework of the Community of Inquiry (CoI). The study was conducted with qualitative approach. Study participants consisted of 12 bachelors who were doing a Computer Operating course at a Public Education Center. Discussions continued for eight weeks and data were collected throughout this period. Data was obtained performed by analyzing the discussion board, assessing based on participants' role performances, and analyzing the participants' views on the process. It was found that the participants fulfilled the requirements of their respective roles. Structured roles indicated a positive effect on social presence.

Keywords: Online learning, social presence, asynchronous discussions, structured roles.

Çevrimiçi Öğrenme Ortamında Yapılandırılmış Rollerin Sosyal Buradalık Üzerindeki Etkisi

Öz

Çevrimiçi öğrenme için en iyi uygulamaların araştırılmasına ihtiyaç olduğu alanyazında vurgulanmaktadır. Bu çalışmada çevrimiçi öğrenme ortamında, katılımcılar için yapılandırılmış rollerle gerçekleştirilen tartışma etkinliklerinin sorgulama topluluğu (Community of Inquiry-CoI), sosyal buradalık bileşeni çerçevesinde etkisini değerlendirmek hedeflenmiştir. Çalışmada nitel yaklaşım benimsenmiştir. Çalışmanın katılımcıları, Halk Eğitim Merkezi'nde, Bilgisayar İşletmenliği kursuna devam eden, lisans mezunu 12 öğrencidir. Sekiz hafta boyunca sürdürülen tartışma süreci ve sonunda elde edilen veriler incelenmiştir. Tartışma panosu analiz edilmiş, katılımcılar üstlendikleri rollere bağlı olarak haftalık olarak diğer katılımcılar tarafından değerlendirilmiş ve sürece dair görüşleri alınmıştır. Sonuç olarak, farklı rollere bürünen katılımcıların üstlendikleri rollerin gereğini yerine getirdikleri görülmüştür. Elde edilen veriler, yapılandırılmış rollerin sosyal buradalık üzerindeki olumlu etkisine işaret etmiştir. Katılımcılar, çevrimiçi tartışma ortamında etkileşimin sağlandığını ve yeni öğrenmelerin gerçekleştiğini bildirmiştir.

Anahtar kelimeler: Çevrimiçi öğrenme, sosyal buradalık, eşzamansız tartışmalar, yapılandırılmış roller.

INTRODUCTION

Online learning is becoming increasingly common at all levels of education. Online learning, which is predominantly involved in higher education and beyond, is defined as planned teaching and learning activities provided by using a communication channel within an institutional organization without time and place limitations. Discussion sessions in online learning environments offer students various communication or interaction opportunities with synchronous and asynchronous tools (Wolverton, 2018; Butz & Stupnisky, 2017; Keleş, 2018). Most online learning research focuses on asynchronous forms of interaction that enable text-based discussion to take place. With the increasing prevalence of online learning, researchers are shifting more emphasis on the question of how interactions should be designed in an online learning environment. In this context, community of inquiry (CoI) is widely used as a conceptual framework by researchers of online learning. CoI provides a framework for integrating the constructivist approach into the course design, implementation and assessment process. First put forward by Garrison et al. (2000), CoI is widely used by researchers as a theoretical framework in analyzing online learning environments (Garrison et al., 2000; Huang et al., 2019). CoI comprises three components: cognitive, social and teaching presence.

According to Garrison et al. (2000), social presence refers to the ability of participants to identify themselves with the community, communicate purposefully in a safe environment, and develop interpersonal relationships by preserving their individual identities. Cognitive presence is the extent to which learners can construct and validate meaning through continuous reflection and discourse. The teahing presence means the design, facilitation, and direction of cognitive and social processes in order to achieve individually meaningful, educationally useful learning outcomes. This study particularly deals with social presence.

Social Presence

Social presence is a long-debated issue, and a large number of definitions have been made so far by researchers (Annand, 2011). According to Lowenthal and Snelson (2017), researchers have provided several descriptions of social presence. Some studies describe social presence as being there, being real, reflecting, being connected and belonging. Being there is regarded as the degree of salience between two communicators, that is the quality or state of being there; being real refers to the degree to which the person is perceived as real online; reflection is one's ability to socially and emotionally project oneself into the online community; being connected refers to the degree of the feeling, perception, and reaction of being connected to another intellectual entity online; and belonging is defined as the ability to engage in online sessions and a sense of belonging, and to interact with other students and a teacher. Lowenthal and Dunlap (2018) stated that social presence is a popular construct used to describe how individuals interact in online courses. It is suggested that a strong link exists between social presence and learner satisfaction and learning outcomes (Noteboom & Claywell, 2010). It was stated that social presence is an impressive factor for the quality and success of online learning environment experiences (Calli et al., 2013) and is indispensable for collaborative discussions (Mansour et al., 2010; Wei et al., 2012; Gündüz et al., 2018).

Online Discussions

Discussion is an essential technique for students, particularly in the online environment. It is thought that discussions in communities in the online learning environment allow the creation of in-depth meaning and help build students' understanding (Ding et al., 2017). Being asynchronous emancipates students from the constraints of time and space and provides more time for reflection (Hawkes, 2006). Asynchronous online discussions support students' higher-order thinking and active participation (Ding et al., 2017; Rovai, 2007). The most distinctive aspects of asynchronous discussion environments are listed as not allowing loss of data by recording individual messages online, allowing students to send their responses at any time they want, to take their time to read the messages and to review their own messages before and after sending them. In addition, this feature is described as an advantage compared to other environments (Hew et al., 2010). Another benefit of asynchronous discussion environments is that students have enough time to reflect on their own comments as well as their peers' comments while structuring their own thoughts and views (Murphy & Coleman, 2004). In some studies, the feeling of isolation is reported as a challenge faced by learners. Kara et al. (2019) draw attention to the consideration of individual differences in overcoming the difficulties related to learners, ensuring the participation of students in online courses, providing flexible learning opportunities, and employing strategies or techniques that will increase learner-learner interactions.

Structured Roles in Online Discussions

Interaction in asynchronous online environments can be enhanced with specially designed participation protocols such as assigned or structured roles. Assigning roles bear beneficial results in online discussions by providing discussion guidance, taking responsibility for their own learning, and encouraging peer interactions (Jiang, 2017). The roles encourage students to take more responsibility for their own learning by responding to discussion questions, interacting with peers, constructing knowledge, and discussing and negotiating within the time limit available throughout the learning process (De Wever et al., 2008; Strijbos et al., 2004). Moreover, the role assumed by peers in online discussions can encourage students to ask questions and freely challenge the statements of others without being hindered or intimidated (Rourke & Anderson, 2002). Appointing specific roles in discussions helps the teacher without compromising learning (Rourke & Anderson, 2002).

According to Xie et al. (2014), "Appointing students as moderators to lead group activities is a common practice by classroom teachers purely for pedagogical purposes or managing large groups." (p. 12). This common practice requires research into how students work by taking part in discussions. Correia and Davis (2007) found that peer moderation, as opposed to instructor moderation, in online discussions is the most popular collaborative design preferred by online learners. While the majority of research has been on instructor moderation strategies, a limited number of researchers have looked into peer moderation context. Baran and Correia (2009) underline the importance of studies to be carried out based on this. The literature indicates the current need for studies that examine the effects of structured roles for students in online discussions (Xie et al., 2017).

It is of interest to researchers how to design instruction in an online learning environment, and the facilitator role of the learner or constructing a role for the learner is one of these methods. The students can need support when solving a problem or fulfilling a task and they can mutually benefit from each other's knowledge, skills or abilities. There are studies that reveal positive effects of designs that encourage collaboration among students in the online learning environment. In this regard, it was attempted to describe the relationship between structured roles and the social presence component of CoI.

Research Questions

The aim of this study is to analys the effect of structured roles in an asynchronous online discussion environment for students in terms of the social presence component of the CoI framework. To this end, answer was sought to the following questions:

1. What is the relationship between structured participant roles and social presence in asynchronous online discussions?

2. What are the views of the participants about the discussions taking place around structured roles?

METHOD

Participants

The participants of this study consisted of 12 people (8 women and 4 men) enrolled in a Computer Operating course in a Public Education Center. Their age ranges between 23-27 and they are graduates of different disciplines (undergraduate). They have basic technology literacy skills. Demographic data of the participants are given in Table 1. This study was approved by Social and Human Sciences Scientific Research and Publication Ethics Committee.

Table 1. Demographic Data of the Participants

Code Name	Gender	Occupation	Age
P1	Male	Econometrics	25
P2	Male	Economics	23
P3	Female	International Affairs	25
P4	Male	Labor Economics	24
P5	Female	Science Teaching	24
P6	Female	Finance	25
P7	Female	Social Services	24

P8	Female	Turkish Language and Literature	27
P9	Female	Turkish Language and Literature	25
P10	Male	Economics	25
P11	Female	Business Administration	24
P12	Female	Business Administration	23

Research Model

This study was carried out in case study model among qualitative research methods. According to Creswell (2012), case study is an approach in which the researcher explores one or more limited situations over time by using the detailed and comprehensive data gathered from many sources, and subsequently reports the themes related to the situation by describing the situation. A case study is preferable compared to many other research methods as it makes it possible to carry out an in-depth examination of various aspects of education, especially when seeking answers to the questions of "what," "how," and "why" (Kaleli-Yılmaz, 2014). The method was used in this study due to this characteristic.

Procedure

This study was implemented using the Moodle platform. The detailed explanations were provided for the students on how to use Moodle and its mobile version as well as the scope of their roles.

The roles vary in the discussions held in the online learning environment. Beuchot and Bullen (2005) examined the interactions and behaviours of 16 PhD students in an asynchronous online discussion environment. They observed certain types of behaviours including giving support, opposing, revealing/withdrawing, praising, punishing, making/telling jokes, mocking, questioning, defending, offering an opinion, giving advice, asking questions, and requesting. Bardakçı et al. (2014) also analysd the recorded postings made by the participants in an online learning environment throughout a 12-week period, and they identified eight roles as administrator, atmosphere constructor, reminder, information provider, tutorial, opinion provider, problem maker and problem solver. The present study delved into these roles, the prominent roles in the literature (De Wever et al., 2010; Gu et al., 2015; Yilmaz & Karaoglan-Yilmaz, 2019) were taken into account, and the participants' roles were appointed based on their age and education level. These roles are "moderator," "questioner," "source searcher," and "summarise."

Before the main implementation phase, the study was piloted for one week. The discussions started on the first day of the week and ended on the last day. The students drew a lottery to distribute the roles every week and then launched the discussions. Then, they uploaded the task distribution list to the system. The participants who participated in the discussions set up a meeting under the leadership of the moderator before the discussion started so that they could exchange views on what to share and which questions would be appropriate to ask. Then, the source searcher was supposed to determine the materials (video, news, digital document, etc.) related to the subject and consult with other group members. The process continued with the uploading of the materials by the source searcher and the posting of the questions about the discussion on the subject by the questioner. The moderator initiated the discussions. At the end of the discussion, the summariser summarized the topic before winding up the weekly discussion session. During the discussions, the instructor acted as the guide and counsellor, checked the relevance of the uploaded documents, intervened the problems related to the learning management system, and followed up the discussions. The weekly discussion sessions were concluded after the other participants scored/assessed the performance of their peers by using the system.

Data Collection

Interview Form

An interview form was drafted after reviewing the related literature (Yilmaz & Karaoglan-Yilmaz, 2019) and obtaining expert opinions. The interview form contained open-ended items in order to examine social presence in an asynchronous online learning environment, and these items were prepared based on social presence components and indicators (Garrison & Arbaugh, 2007).

Participant Roles Assessment Questionnaire

A questionnaire was designed to rate each participant's role performance from 0 to 5. By using this grid, 5 (five) points were given to refer to excellent performance, while 0 (zero) was given to for inadequate or poor performance.

Discussion Board

For eight weeks, the postings/shares of the participants on the moodle system were analyzed as data. To assess the content and results of discussion boards, which are considered as an important component of online learning, frequency calculation is a widely used technique (Marra et al., 2004). Therefore, the participants' messages were checked and reported with regard to frequency.

Research Ethics

It was made by the Social and Human Sciences Research and Publication Ethics Committee of our university, and the decision approved your study numbered E-81614018-000-233 dated 09.03.2021.

FINDINGS

The findings are presented under relevant headings in the same order as the research questions.

Relationship Between Structured Student Roles and Social Presence

It was found that the online learning environment allowed the participants to send shares about the discussion topics. The findings in this regard are shown in Table 2. The materials shared by the resource seekers in the discussions were classified as documents, photographs, videos, and news. The source searcher, moderator, questioner, and summariser completed the discussions by fulfilling their duties and responsibilities.

Also, it was seen that the moderator chaired the discussion by leading the process, the source searcher shared the relevant materials, and the questioner posted the discussion questions. Other participants joined in the discussions by making contributions as relevant. In other words, the participants provided feedback on all postings the discussion group members sent. Specifically, the questioner's questions were useful for triggering discussions.

Table 2. Findings on Discussion Topics and Shares

Discussion Topic	Document	Video	News Report	No of Questions	No of Persons	No of Comments
Communication Technologies	-	1	1	7	12	66
Protection of Personal Data and Privacy	1	3	1	6	10	57
Protection against Cyber Threats	1	3	3	4	12	43
Security on Mobile Devices	-	3	-	5	12	61
Intellectual Property Rights	-	4	-	6	12	56
Ethics Concerning Artificial Intelligence	-	6	-	5	11	78
The Internet and Network Security	-	5	-	6	12	75
Digital Footprints and Algorithm	1	1	-	6	12	72

The findings reached from the analysis of the Social Presence Assessment Grid are presented in Table 3. The frequencies obtained from this tool revealed that the postings during the earlier weeks mostly fell under the category "affective". In particular, statements suggesting the expression of emotions and self-disclosure were prominent. As another finding, "interactive" and "cohesive" indicators among social presence indicators were rare during the discussions in the earlier weeks, yet an increase was seen under these categories in the following weeks.

The postings of this type were seen to have even a larger weight across the discussions in the 6th week and afterwards.

The participants' messages related to affective qualities were analysed for the corresponding indicators. Firstly, "expression of emotions (A1)" was elicited as evidenced in a statement by participant P9, who was not on duty in Week 1: "*There is an increasing need for computers. The price increase is a very sad situation.*" This respondent was again off duty in Week 2 and said, "*I have never been concerned in that regard.*" These statements imply the presence of expression of emotions. Secondly, "use of humor (A2)" emerged as an indicator in discussions. For example, P4 was off duty in Week 8 and said, "*Downplaying access to digital footprints is like burn your house to fright the mouse away.*" Nevertheless, this indicator occurred less frequently than the other affective sub-categories. Thirdly, "self-disclosure (A3)" occurred during the discussions, and it had the highest frequency of all sub-categories of "affective". As an example, P9 was off-duty in Week 2 and said, "*I don't trust, but this is not a topic of interest to me. It is obvious that it is shared with third parties and institutions, but unfortunately I ignore it.*"

In the following weeks, it was seen that the frequencies of interactive and cohesive messages were gradually increasing. Under the category "interactive", the increase was more marked in sub-categories of "continuing a thread" and "expressing agreement". Similarly, higher frequencies were noted under the category of "cohesive" with regard to "vocatives" and "addresses or refers to the group using inclusive pronouns". Since the participants created a chain thread in response to the other participants' comments and posted their comments under such a thread, the indicator of "continuing a thread (I1)" was obvious. As an example, during Week 1, in reply to the source searcher (P5), the questioner (P12) wrote, "*I don't do any advanced research either. Brand and processor are more important to me.*" This comment shows continuing of a thread. As another indicator, "quoting from others' messages (I2)", occurred during Week 8 only. For example, P6, who assumed no specific role, said, "*Although my friends say that it is possible with a VPN address, I do not think that VPN addresses are that secure either.*" Likewise, "referring explicitly to others' messages (I3)" was seen in the context of clarification during Week 6. As evidence, P5, as the summariser, referred to another participant's message for clarification as follows: "*P8, I would like to say the following on your response of justice, tolerance.*" As another indicator, asking questions (I4) was observed in all weeks. The frequency of this indicator was higher as the questioner and moderator asked questions during the earlier weeks and off-duty participants addressed questions starting from Week 6. An example quotation was recorded during Week 7. An off-duty participant, P6, wrote, "*How are VPN programs different from the applications we use?*" Another indicator was "complimenting, expressing appreciation (I5)". As an example, in Week 7, P9 said, "*P8, thank you so much for the video, it was a very useful one, I downloaded the application immediately and tried it out, it was really reliable, thanks again.*" The last indicator of "interactive" was "agreeing (I6)". This indicator was prevalent during Week 6 and Week 8. For example, P12 as an off-duty participant in Week 6 wrote the following: "*P3, yes, we agree on this issue, I agree with the information you wrote and I think in the same way.*"

The last category, "cohesive", was completed with three indicators. Firstly, "vocatives (C1)" was intensely used starting from Week 6, when participants called out each other by name in their messages. To exemplify, P9 as the moderator in Week 8 wrote the following: "*As P4 said, it would be a useful thing in terms of detecting various terrorist organizations.*" The second indicator, "addresses or refers to the group using inclusive pronouns (C2)" was seen starting with Week 5. During this week, the questioner, P8, wrote, "*This program will not be very functional for us then.*" Likewise, P9 as an off-duty participant, said." *It is very nice to have such videos; they show what is right even to those who are not curious like us.*" The use of pronouns reveals that they felt like a group. Lastly, "phatics and salutations (C3)", as "Hello everyone!" greetings and closures expressions were not observed in any of the discussions.

Table 3 shows the participants' roles week by week, the corresponding indicators of social presence as participants with no specified roles in discussions, and the frequencies of the participants' postings in discussions.

Table 3. Social Presence Indicators and Frequencies of Participants' Shares

Category	Indicator	Moderator (P4)	Questioner (P12)	Source searcher (P5)	Summariser (P8)	P1	P2	P3	P6	P7	P9	P10	P11	Moderator (P3)	Questioner (P2)	Source searcher (P11)	Summariser (P10)	P1	P4	P5	P6	P7	P8	P9	P12	Moderator (P12)	Questioner (P4)	Source searcher (P8)	Summariser (P6)	P1	P2	P3	P5	P7	P9	P10	P11	Moderator (P9)	Questioner (P10)	Source searcher (P3)	Summariser (P1)	P2	P4	P5	P6	P7	P8	P11	P12
Affective	A1									1														1							1								1	1					1	1	1	1	1	
	A2		1				1		1														1				1					4	2				2	1	1				1	1				1		
	A3	4	6	3	10	8	1		3	14	7	3	1	11	11		4	3	7	11	8		10	7	7	3	5	10	3	2	8	5	7	7	4	2	2	9	4	7	5	7	4	9	9	9	21	5	2
Interactive	I1	1	2	2																																		2	1				1	2			1	2	
	I2																																																
	I3																																																
	I4	2	7													6											1	4										2	5										
	I5																																																
	I6		2	1					1																				2					3							1								
Cohesive	C1																																																
	C2	2							1							1													3									1	4	1							2		
	C3																																																
	Total	8	14	8	12	8	1	0	5	14	10	3	1	11	17	K	4	3	8	11	8	K	11	8	7	4	13	12	3	2	12	7	10	8	4	4	3	15	11	12	5	8	6	13	10	10	27	6	2

	Indicator	W5 Moderator (P5)	W5 Questioner (P8)	W5 Source searcher (P7)	W5 Summariser (P4)	W5 P1	W5 P2	W5 P3	W5 P6	W5 P9	W5 P10	W5 P11	W5 P12	W6 Moderator (P11)	W6 Questioner (P9)	W6 Source searcher (P1)	W6 Summariser (P2)	W6 P3	W6 P4	W6 P5	W6 P6	W6 P7	W6 P8	W6 P10	W6 P12	W7 Moderator (P6)	W7 Questioner (P7)	W7 Source searcher(p12)	W7 Summariser (P5)	W7 P1	W7 P2	W7 P3	W7 P4	W7 P8	W7 P9	W7 P10	W7 P11	W8 Moderator (P10)	W8 Questioner (P3)	W8 Source searcher (P2)	W8 Summariser (P9)	W8 P1	W8 P4	W8 P5	W8 P6	W8 P7	W8 P8	W8 P11	W8 P12
Affective	A1	3	1											1	1	1				1			2			1	1		1		2	2		3	2			1		1			6				3	1	1
Affective	A2		1	1													1	1	1	1	1		3	1		1																		3					1
Affective	A3	1	1	1					1								3			1		1	3	4	1	6					2	2	4	1								1	3				1	1	
Interactive	I1				1												4	3	4	4	3	2	4	1	3	1					1			5	4	1	2	1	2	1	2	1	2	3	1		
Interactive	I2																																														1		
Interactive	I3																1																																	
Interactive	I4	1	5				1										5			1			1	5	5						1								2	5	2		1							
Interactive	I5																																				1													
Interactive	I6																6	1	2	3	2	1	2	3	4												1	1	2	3	2	1	2	3	1	1	5	2	5
Cohesive	C1																6	3	4	9	3	3	4	1	4	1					2			5	3					2	1	1	1	1	2	3	1	1	
Cohesive	C2	3							1	3				2	1	1		4	1	13	5	1	15	1	1										6			2	3	3	5		8	4			14	1	3	
Cohesive	C3																																																	
	Total	2	12	1	2	0	1	0	1	9	0	0	3	1	27	2	15	13	31	14	9	K	32	0	7	22	10	6	1	0	12	2	5	21	15	1	0	7	12	12	11	3	23	9	2	5	29	6	12

A1: Expression of emotions A2: Use of humor A3: Self-disclosure I1: Continuing a thread I2: Quoting from others' messages I3: Referring explicitly to others' messages I4: Asking questions I5: Complimenting, expressing appreciation I6:Expressing agreement C1: Vocatives C2: Addresses or refers to the group using inclusive pronouns C3: Phatics, salutations K: Did not participate

The participants' weekly social presence scores were calculated by counting the weeks when they were on duty and off duty. The results are presented in Table 4. As the table shows, social presence scores of seven participants that had specific roles in discussions (P2, P3, P6, P9, P10, and P12), were higher than the scores obtained from weeks when they took part as ordinary participants. Average scores of these participants during their on-duty weeks were partly higher than the other weeks. It can be said that role-taking has a positive effect on the social presence scores of these participants. P1, P3, and P10 had lower mean social presence scores than the others.

Table 4. Participants' Weekly Social Presence Scores

Participant	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Average Social Presence Scores
P1	8 O	3 O	2 O	5 S	0 O	2 Ss	0 O	3 M	2,87
P2	1 O	17 Q	12 O	8 O	1 O	15 S	12 O	12 Ss	9,75
P3	0 O	11 M	7 O	12 Ss	0 O	13 O	2 O	12 Q	7,12
P4	8 M	8 O	13 Q	6 O	2 S	31 O	5 O	23 O	12
P5	8 Ss	11 O	10 O	13 O	2 M	14 O	1 S	9 O	8,5
P6	5 O	8 O	3 S	10 O	1 O	9 O	22 M	2 O	7,5
P7	14 O	0 O	8 O	10 O	1 Ss	0 O	10 Q	5 O	8
P8	12 S	11 O	12 Ss	27 O	12 Q	32 O	21 O	29 O	19,5
P9	10 O	8 O	4 O	15 M	9 O	27 Q	15 O	11 S	12,37
P10	3 O	4 S	4 O	11 Q	0 O	0 O	1 O	7 O	3,75
P11	1 O	0 Ss	3 O	6 O	0 O	1 M	0 O	6 O	2,42
P12	14 Q	7 O	4 M	2 O	3 O	7 O	6 Ss	12 O	6,87

M: Moderator   Q: Questioner   Ss: Source searcher   S: Summariser   O: Other Participant

On the other hand, P4, P5, P7, and P8 obtained higher social presence scores during the weeks when they did not have specific roles. Also, their average social presence scores were partially higher than the other participants. It was found that structured roles did not affect the social presence scores of these participants. In other words, they showed more social presence in their postings compared to the other participants regardless of their position in group discussions. It was seen that questioner tended to yield the highest positive impact on social presence. It was followed by the roles of moderator, source searcher and summariser, respectively. In connection with the last role on the list, three of the participants (P4, P5, P6) got lower social presence points when they acted as summariser. Thus, it can be suggested that summariser was the least influential role in the discussions.

The findings obtained from the Participant Roles Assessment Questionnaires are given in Table 5. As the table shows, the participants were given average scores by their group mates in a range of 2.6 to 4.8 points. The lowest score was earned by P11 as the moderator during Week 6. By contrast, the highest score was received by P8 as the summariser during Week 1. When all of the participants were compared, it was seen that P8 had the highest average. In a similar vein, the highest average score of social presence was also taken by P8. On the contrary side, the lowest average score was calculated for P11. When the social presence scores were compared,

it was seen that the lowest average belonged to the same participant (P11). These findings reveal a concordance between the participants' role assessment scores and their social presence score averages.

Table 5. Participant Roles Assessment Questionnaire Scores by Week

	Week 1				Week 2				Week 3				Week 4			
Role	M	Ss	Q	S	M	Ss	Q	S	M	Ss	Q	S	M	Ss	Q	S
Participant	P4	P5	P12	P8	P3	P11	P2	P10	P12	P8	P4	P6	P9	P3	P10	P1
Score	4,2	4,7	4,7	4,8	3,8	4,5	4,2	4,4	4	4,7	4,2	4,5	4,7	4,5	4,6	4,2

	Week 5				Week 6				Week 7				Week 8			
Role	M	Ss	Q	S	M	Ss	Q	S	M	Ss	Q	S	M	Ss	Q	S
Participant	P5	P7	P8	P4	P11	P1	P9	P2	P6	P12	P7	P5	P1	P2	P3	P9
Score	4	4,1	4	4,5	2,6	3,9	4,4	4,3	4,5	4,5	4,2	4,5	4,3	3,9	4,5	4,4

Participants' Views on Discussions in the Asynchronous Learning Environment

As a result of the analysis of the participants' views regarding the asynchronous discussions, five themes, codes and related frequencies were elicited. The themes were "role", "role rotation", "learning", "feelings", and "interaction" and explained in relation with codes. The findings are presented in Table 6.

Role

Under the first theme, the participants' views on fulfilling their own structured roles during discussions were presented. While some participants defended that they were more active in the discussion sessions they took part in (8), some said the opposite (2), and some others reported being neutral (2). For example, P4 said, "*I was focused on my duty so I couldn't spend much time on the discussion part in the sessions where I took a role, but when I was just a participant, I think that I completely adjusted myself to the discussion and participated very well.*" On the other hand, P1 said, "*I believe that I was more effective in the discussions in which I took a role.*" Lastly, P11 and P12 stated that their position in the discussions did not make a difference to their performances across weeks. P11's opinion was as follows: "*The discussion went on flawlessly in the sessions where I took and didn't take a role. There was no setback.*"

Table 6. Participants' Views on Asynchronous Discussions

Role	F	Role Rotation	F	Learning	F	Feelings	F	Interaction	F
Taking a role	8	Assuming responsibility	3	Comments	6	Excited/Amused	5	Exchanging ideas	11
Not taking a role	2	Management skill	3	Contents	7	Relaxed	2	Comparing ideas	12

Neutral	2	Learning the topic	6	Role	4	Responsible	4	Convergence of ideas	12
		Researching	5			Fine/Happy	4		
		Thinking skill	2			Curious	3		
		Ability to interpret	2			Uneasy	2		
						Distressed/Sad	2		

Role Rotation

This theme was used to summate the participants' views regarding fulfilment of different roles in different discussion sessions. Some respondents found roles' rotating helpful for learning the topics (6), whereas some benefited it in researching (5). This aspect was also approached from other perspectives such as assuming responsibility (3), management skills (3), ability to interpret (2), and thinking skill (2). Each of these points of view is exemplified with quotations below. To start with, P8 said, *"I think it is beneficial for having command of the topics as there is a new topic in every role."* Another participant, P7 said, *"Working on different things contributed to my self-development because some roles required more research and some required more thought."* P11 said, *"Giving a role to the participants provides both a sense of responsibility and the ability to manage the discussion with a different perspective."* Finally, P2 said, *"Being in different roles had effects that led to development and diversity in the mindset."*

Learning

The theme learning was elicited from the views regarding the factors affecting the participants' learning. Some participants claimed that their learning was improved thanks to the contents shared (7), some classified the comments shared as elements facilitating learning (6), and some others pointed to the effect of their given role on learning (4). The following remarks support these sub-themes. P11 said, "*It was instructive because the topics were taught in videos.*" P10 said, "*There were mutual questions and answers in the discussions. Also, thanks to the roles, I was able to learn the topics with the opportunity to research*".

Feelings

This theme was used to reflect the feels the participants had during the discussions. The participants reported a number of feelings such as excited/amused (5), relaxed (2), responsible (4), fine/happy (4), and curious (3). Some negative feelings were also noted such as uneasy (2) and distressed/sad (2). In this regard, P2's view is as follows: "*Sometimes we got tired but we joined and learned in by having fun.*" P6 said, "*I felt responsible for the discussion, I joined in the discussion almost every day, I was curious about and followed the replies of my friends and wrote replies to them.*" Lastly, P7 said, "*Overall, I participated in a relaxed and calm manner. There were times when I was stressed out and sad that I wasn't able to participate adequately some weeks due to other responsibilities in my life.*"

Interaction

As the last theme, the discussions gave away opinions on the content of the interactions between the participants. All of the participants stated that the discussions led by specific roles let them compare different ideas (12) and experience convergence of ideas (12). Almost all of the respondents said that the asynchronous discussion environment allowed for the exchanging of ideas (11). In this regard, P12 said, "*In my opinion, everyone's interaction was good. We shared ideas. We exchanged ideas on how to do this and that, how to do things better. We already responded by commenting on ideas. In reaching the main idea, our summariser was wrapping up the topic. And we were reading this and reaching the conclusion.*"

DISCUSSION & CONCLUSION

According to the results of this study, the participants carried out shared tasks cooperatively, referred to each other's ideas and acted as responsible for each other's learning in sessions when they undertook structured roles. As required by their roles, the participants posted content, including videos, news reports, and documents, and generated and exchanged ideas on these contents. In studies in which social presence is questioned, it is seen

that students use similar content as a source (Keleş, 2018). The literature on online learning environments states that the number of participants affects social presence. Effective communication among a few participants is important for developing social presence (Stodel et al., 2006). In fact, the small size of participants in this study may have facilitated social presence. In the study by Öztürk (2009) on the effect of social presence in online discussions, it was suggested that large groups of students inconvenience online discussions, and thus, future implementations should be conducted with fewer students for higher effectiveness. Role assignment and group size are important design considerations for conducting effective asynchronous online discussion (Luo et al., 2023).

According to Luo et al. (2023), in their comparison of small and medium-sized groups by assigning roles in the online learning environment, found that there was no significant difference in students' overall participation and experiences in asynchronous online discussions. According to Rovai (2007), the ideal number of participants should vary between seven and twelve for the most effective interaction possible in online learning environments. In the current study, the number of participants remained within the recommended limits.

A close look was taken at the social presence scores from the 8-week discussions held in the asynchronous online learning environment after assigning roles. Some participants finished with higher scores than others, and it was noticed that these participants had higher social presence scores regardless of their role-taking status. However, the participants with lower average social presence scores exited with slightly increased social presence scores when they were on duty compared to the rest of the discussion weeks. Unlike those mentioned above, the participants with a medium average social presence score showed a slight increase during the weeks when they were on duty.

Some participants consistently completed the implementation with higher social presence scores in all cases. It was understood that those participants were mostly those who actively participated in discussions and addressed questions. Gündüz et al. (2018) pointed out that the level of social presence differs according to certain variables, such as occupations. In a similar vein, Enfiyeci and Filiz (2019) researched whether social presence changes depending on different occupations, and they found that social presence levels were higher among certain professionals, such as teachers and customer representatives. They thought one possible explanation might be the strong communication skills in those professions. Likewise, in the present study, science teachers, Turkish language and literature teachers, and econometrists obtained higher social presence scores every week, no matter if they were appointed to a specific role.

During the early weeks, the affective category of social presence was more prevalent in the discussion environment. However, it was replaced by interactive and cohesive categories as time progressed. The most frequent indicator throughout the discussions was "self-disclosure" affiliated with the affective social presence category. In the following weeks, the other categories, interactive and cohesive, came to the forefront. Specifically, the most widespread interactive social presence sub-categories were "continuing a thread" and "expressing agreement" and the cohesive ones emerged as "vocatives" and "addresses or refers to the group using inclusive pronouns". The participants acted in cooperation in groups. It is predicted to have pushed the social presence scores upwards. Peterson (2006) found that such responsibilities boost social presence in learning activities. Moreover, the participants' interest increased and they felt responsible for completing the task when they were appointed specific roles (Schifter et al., 2012). Consequently, in this study, the participants were more socially more visible during their "on-duty" weeks compared to the "off-duty" weeks. It was also seen that the questioners enlivened the process, especially by asking questions that encouraged the participants to join in the debates. This, in return, promoted social presence. It must also be noted that the biggest contribution to social presence was lent by the questioner and the most modest contribution by the summariser.

During discussions, emotional interaction develops, enabling the participants to interact and communicate sincerely and helps the participants to undertake collaborative work while fulfilling their responsibilities required by the assigned roles (Baykara-Pehlivan, 2005). Similarly, in this study, the participants often posted messages implying affective, interactive and cohesive categories and indicators during the discussions.

The results reached in this study reveal that social presence was realized to a considerable extent. One possible reason can be the fact that the participants were attending a face to face, formal Computer Operating class at the Public Education Center besides the online sessions required by this study. It is known from previous research that it is better to meet face to face as a means of creating social presence in online environments. Lowenthal and Dunlap (2020) stated that participants who were in contact outside online sessions could adapt to

the online environment more easily than the others, and that previous acquaintance with group members enhanced social presence in online courses. It is possible that group members who have spent time beforehand might get to know each other better, facilitating the establishment and maintaining of social presence within groups (Lowenthal & Dunlap, 2018). The findings of this study are in congruence with the abovementioned research.

In the discussions conducted by participants with structured roles in the asynchronous collaborative online learning environment, the indicators of social presence were mostly revealed. It was demonstrated that meaningful dialogue was stimulated, participation was ensured, and high-quality discourse could be produced around weekly discussion topics. The participants' views showed that all of them found the discussions productive. In addition, they expressed their opinions freely and felt the responsibility of expressing their opinions during the sessions.

Garrison et al. (2010) describe social presence as the ability of participants to identify with the community, communicate consciously in an environment of trust, and develop interpersonal relationships by reflecting their individual personalities. Most of the participants stated that they were comfortable expressing themselves in the discussion sessions. It can be suggested that carrying out discussions in the asynchronous online learning environment by appointing roles can be a powerful means of active participation, generating ideas, sharing/exchanging ideas, comparing ideas, convergence of ideas, and meaningful dialogue.

Jiang (2017) contends that course designs that unearth critical questions and participants' perspectives would support students' participation in online discussions. In this respect, some of the participants here stated that discussions with structured roles increased participation, made it easier for learners to express themselves, and also offered the opportunity to experience multiple perspectives, generate new ideas or rearrange their own ideas on the issue. These findings are in conformity with the conclusions of Jackson et al. (2013). According to Parker (2010), structured roles in online discussions enabled students to experience a stronger sense of commitment and learning in their online discussions. They determined that giving students different roles in online discussion environments can be effective in strengthening their social presence (Şeyh et al., 2023). In summary, the findings obtained through the current study participants' opinions are compatible with the past research mentioned above. In addition, because of the interviews conducted with the participants in our study, although most of the participants thought that role assignment was more effective in discussions, some participants stated that they could not spare time for discussions because they focused on the role in the sessions in which they were assigned a role. There were also participants who stated that they participated more actively in the discussion session when they were not assigned a role. Most of the trainees stated that assigning roles gave them responsibility and encouraged them to research.

When the participant roles assessment scores are examined, it is seen that the participants whose social presence scores were higher than the others also had higher role assessment scores, and those with lower social presence scores obtained lower role assessment scores at the same time. To sum up, there was a concordance between the role assessment scores and social presence scores of the participants.

In the scope of this study, the participants carried out their tasks jointly in discussions when they were given specific roles. Certain participants obtained the highest social presence scores every week in either case of taking or not taking a role, and they possessed the highest social presence averages within the group. On the contrary, the participants with low levels of social presence slightly increased their social presence scores if they were on duty, compared to the weeks when they were not on duty. What is more, the participants with a social presence score close to the mean value had higher levels of social presence when they had specific roles, compared to the other weeks. In earlier weeks of discussions, the indicator of "self-disclosure" was more obvious under the affective category. As weeks followed, the weight shifted towards "continuing a thread", "complimenting, expressing appreciation, and "expressing agreement" as sub-groups of interactive social presence. Similarly, cohesive social presence became more prominent in particular relation with as "vocatives" and "addresses or refers to the group using inclusive pronouns". These results suggest that social presence occurs more in cases where they are appointed roles.

The study seems to provide robust evidence that social presence can be established by discussions in a collaborative online learning environment involving participants with structured roles. It was demonstrated that meaningful dialogues were encouraged, participation was provide, and discussions were enriched as a result of participants' taking of specific roles. All of the participants appreciated the productivity of the discussions. In addition, role-guided discussion sessions allowed the participants to express their views comfortably along with attending to various standpoints, generating new ideas and comparing opposing ideas. Also, there was a correlation between the participants' role assessment scores and social presence scores.

This study exclusively dealt with communications and interactions of the participants in an asynchronous online environment. The entire duration of the Computer Operating course was eight weeks and the study had to be fit into this schedule. For this reason, not every participant was able to take on every role in online discussions. In future studies, the duration of the implementation could be modified so that every participant can experience each of the roles. Again, the template of social presence was used to judge the participants' social presence realization levels in this study. For future insight, attention can be directed at impacts of structured roles within the framework of instructional, cognitive, and especially learning presence, which has lately been a hot topic in the literature. Furthermore, it is recommended to shed light onto how participants' personality traits, self-regulation skills, and digital competencies affect their social presence in the future. A closer look can be taken at the relationships between personality traits and roles.

Statements of Publication Ethics

This study is based on the master's thesis of the first author. Thus, ethical approval was obtained.

Conflict of Interest

The author has no conflicts of interest.

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The Relationship between University Students' Social Media-Specific Epistemological Beliefs and Technology Addiction

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Abstract

The current study explores the relationship between university students' social media-specific epistemological beliefs and technology addiction levels. This study was conducted using a correlational survey model with 350 university students at a state university in Turkey. SPSS-23 software was used to analyze the data. The findings highlighted that the relationship between university students' social media-specific epistemological beliefs and technology addictions is above average and high. The social media-specific epistemological beliefs of pre-service teachers differed significantly according to gender, department, grade, longest place of residence, and father's educational status. Technology addictions differed significantly according to gender, department, and longest place of residence before starting university. The study found a significant and positive relationship between university students' social media-specific epistemological beliefs and technology addictions. The simplicity and certainty of social media-based knowledge and the source of knowledge were significant predictors of technology addiction. The data of the study will contribute to the literature on social media-specific epistemological beliefs and technology addiction and will shed light on future studies. Instead of knowledge and comprehension activities, it is suggested to create learning environments in which individuals actively participate in practices with activities that will enable the evaluation of application analysis, synthesis, and cognitive skills.

Keywords: Technology addiction, social media addiction, epistemological beliefs, social media-specific epistemological beliefs.

Üniversite Öğrencilerinin Sosyal Medyaya Özgü Epistemolojik İnançları ile Teknoloji Bağımlılığı Arasındaki İlişki

Öz

Bu çalışma, üniversite öğrencilerinin sosyal medyaya özgü epistemolojik inançları ile teknoloji bağımlılık düzeyleri arasındaki ilişkiyi incelemektedir. Bu çalışma, Türkiye'de bir devlet üniversitesinde öğrenim gören 350 üniversite öğrencisi ile ilişkisel tarama modeli kullanılarak gerçekleştirilmiştir. Verilerin analizinde SPSS-23 yazılımı kullanıldı. Bulgular, üniversite öğrencilerinin sosyal medyaya özgü epistemolojik inançları ile teknoloji bağımlılıkları arasındaki ilişkinin ortalamanın üzerinde ve yüksek olduğunu vurgulamıştır. Öğretmen adaylarının sosyal medyaya özgü epistemolojik inançları cinsiyete, bölüme, sınıfa, uzun süre yaşanılan yere ve baba eğitim durumuna göre anlamlı farklılık göstermektedir. Teknoloji bağımlılıkları cinsiyete, bölüme ve uzun süre yaşanılan yere göre anlamlı farklılık göstermektedir. Çalışma, üniversite öğrencilerinin sosyal medyaya özgü epistemolojik inançları ile teknoloji bağımlılıkları arasında anlamlı ve pozitif bir ilişki bulmuştur. Sosyal medya temelli bilginin ve bilgi kaynağının basitliği ve kesinliği, teknoloji bağımlılığının anlamlı yordayıcılarıdır. Sonuç olarak çalışmanın verileri sosyal medyaya özgü epistemolojik inançlar ve teknoloji bağımlılığı ile ilgili literatüre katkı sağlayacak ve bundan sonraki çalışmalara ışık tutacaktır. Bilgi ve kavrama etkinlikleri yerine uygulama analiz, sentez ve bilişsel becerilerinin değerlendirilmesine olanak sağlayacak etkinliklerle bireylerin uygulamalara aktif olarak katıldıkları öğrenme ortamlarının oluşturulması önerilmektedir.

Anahtar kelimeler: Teknoloji bağımlılığı, sosyal medya bağımlılığı, epistemolojik inançlar, sosyal medyaya özgü epistemolojik inançlar.

INTRODUCTION

The most striking feature in such a cyber age with the penetration of technology into every aspect of today's human life is the speed of digital transformation. While digital transformation is increasing with technological improvements everywhere, using technology in the business world, education, communication, healthcare, etc. is a necessity for countries. The need for using technology in many areas made access to technology very simple. This situation has brought about the fact that almost everyone has computers and the internet at home and in offices, and it has also made smartphones a part of human life. However, the improvements in technology and the indispensable use of technology have made technology addiction a problem (Akkaş, 2019; Demirci et al., 2014; Ektiricioğlu et al., 2020; Gerhart, 2017; Hamissi et al., 2013; Karadağ and Kılıç, 2019).

In general terms, one of the problems that arise with the increasing use of technology and which is a distinctive kind of non-substance addiction is technology addiction (Turel et al., 2011). According to Beard (2005), technology addiction is the destruction of the emotional and mental psychology of the person due to excessive use of technology. Griffiths (2005) and Turel et al. (2011) also define technology addiction as a dependence resulting from the use of technological devices at a level that produces typical behavioral addiction symptoms (e.g. (i) salience, (ii) conflict, (iii) withdrawal, (iv) relapse, (v) tolerance, and (vi) mood modification). While technology has various uses, there are also various types of addiction. In this case, one of the most common of these is social media addiction which is increasing in the 21st century (Esmaeili Rad and Ahmadi, 2018; Simsek et al., 2019). This equals 58.7 percent of the world's population and also there is a 10% increase observed compared to January 2021 (We Are Social, 2022). Social media, which allows individuals to be active and share from anywhere at any time, regardless of geography, language, religion, race, gender, or any economic or cultural discrimination, is one of the most common areas of technology (Çiftçi, 2018; Durmuş et al., 2018; Obee, 2012). Social media environments allow individuals to produce various content related to their areas of interest, supply the content of the media, be socially active, and transfer knowledge (Yıldız-Durak, 2019). Social media environments, which enable an individual or collective global communication and can be used in all areas of life, have thus become an indispensable part of our lives (Tutgun-Ünal and Deniz, 2020). Since people are freer to express themselves and make comments on social media, establishing two-way communication becomes easier in this way. In this context, while it is possible to see social media in almost every area of daily life in the cyber age, the purposes of individuals' use of social media may differ in many respects. Although these purposes differ, communicating with family and friends (Boyd and Ellison, 2007), having fun (Lin et al., 2013; Wang et al., 2014), and accessing information (Kim & Park, 2013), and educational uses (Yıldız-Durak & Saritepeci, 2019) come to the fore. One of the features that can be considered the biggest advantage and disadvantage of the widespread use of social media is the ease of access to information because social media environments offer users the opportunity to share all kinds of information. However, such a diversity of information enables us to have information about a subject quickly and it becomes difficult to reach the right information. In this context, the epistemological beliefs of human beings examine the source of knowledge are important in terms of evaluating information because of the suspicion of the reliability of knowledge and knowledge sources in social media environments (Atman-Uslu & Yıldız-Durak, 2022). Schommer (1994) defines epistemological beliefs as philosophical assumptions about the nature and acquisition of knowledge or the source, scope, and limits of knowledge. Today, the internet generally provides young people, especially university students, with many environments and new opportunities to access information, share information, and sources of information. Yengin (2019) indicated that there has emerged a social media-addicted generation who create a new identity for themselves on social media to meet with friends, those who do not have a social life except for their mobile phones. Since social media enables easy access to information today, the importance of social media-specific epistemological beliefs is increasing. Thus, it is of great importance to conduct studies on social media-specific epistemological beliefs.

Although there are many studies on epistemological beliefs when the relevant literature is investigated (Bråten et al., 2019; Chiu et al., 2013; Deng et al., 2014; Kılıç-Çakmak et al., 2015; Lee et al., 2012), a limited number of studies have been found examining social media-specific epistemological beliefs (Atman-Uslu & Yıldız-Durak, 2022; Celik, 2020; Celik et al., 2021; Geçgel et al., 2020). Different from the previous studies carried out to date, the analysis of social media-specific epistemological beliefs and technology addiction together reveals the difference in this study. Especially for university students to become more qualified individuals in society, it is significant to have social media-specific epistemological beliefs, which are the platforms where university students constantly reach information. Investigating the relationship between university students' epistemological beliefs and different variables to ensure effective teaching and learning is also crucial. In this context, this study explores the relationship between university students' technology addictions and social media-

specific epistemological beliefs. The dependence of individuals, especially university students, on technology and social media in particular increases as technology improves. Since individuals can easily have information about any subject while spending time on social media, social media use for educational purposes is increasing from day to day. The prevalence of this situation brings up the relationship between individuals' technology addictions and social media-specific epistemological beliefs. Considering that social media is most common among high school and university students (Allen et al., 2014; Sahin, 2018; Saputri and Yumarni, 2023; Simsek et al., 2019; Tkacová et al., 2022), determining the relationship between university students' technology addictions and social media-specific epistemological beliefs will contribute to the literature.

Epistemological beliefs, which determine the attitudes and behaviors of individuals in learning and are influential in determining the learning approaches of students, have the power to predict academic success. In particular, epistemological beliefs are decisive for organizing learning, setting standards, and criteria, and evaluating what has been learned. The belief that the accuracy of the information is questionable and to support it from different sources is increasing. Epistemological beliefs increase students' comprehension skills and contribute to using and transferring information with different features (Mason et al., 2008). It is possible to determine epistemological beliefs for practical applications such as choosing a learning model suitable for subjects and concepts that will touch different points in a part of human life, applying prior knowledge, supporting it with applications, and presenting it to students. When the educational level increases, the epistemological perspectives of individuals become stronger (Hofer & Pintrich, 1997). Hence, it is significant to highlight the social media-specific epistemological beliefs of university students and to examine the university students' relationship with technology addiction and social media-specific epistemological beliefs.

The Significance of the Study

There are many studies on epistemological beliefs (Bråten et al., 2019; Chiu et al., 2013; Deng et al., 2014; Karaoğlan-Yılmaz & Kılıç-Çakmak, 2016; Lee et al., 2012). When the epistemological beliefs were examined in terms of demographic information, remarkably different results were obtained in the studies. For example, Topkaya (2015) found significant differences in the epistemological beliefs of social studies and science and technology pre-service teachers according to the variables of gender, department, and grade. Significant differences were found in favor of women according to gender, but social studies teacher candidates were found in favor of first graders between first and fourth grades. However, Conley et al. (2004) also found no significant interactions in terms of epistemological beliefs between gender Contrary to this, there were significant differences in the epistemological beliefs of undergraduate students in terms of gender and department (Hakan & Münire, 2012). These inconsistent findings regarding the epistemological beliefs of university students in the literature also revealed the motivation to conduct a study based on demographic variables. However, a limited number of studies examining social media-specific epistemological beliefs were found (Atman-Uslu & Yıldız-Durak, 2022; Celik, 2020; Celik et al., 2021; Geçgel et al., 2020). Different from previous studies, examining social media-specific epistemological beliefs and technology addiction together reveals the difference in this study. For university students to become more qualified individuals in society, they need to have social media-specific epistemological beliefs, which are the platforms they constantly use even in lessons and constantly access information. It is also significant to explore the relationship between university students' epistemological beliefs and various variables (gender, department, grade, longest place of residence before starting university, and mother's & father's educational level) to ensure effective teaching and learning.

The Aim of the Study

This quantitative study aims to investigate the relationship between university students' technology addictions and social media-specific epistemological beliefs. In line with these purposes, the current study aims to answer the following research questions guiding the study:

Research Questions

1) What are the technology addiction levels and social media-specific epistemological beliefs of university students?

2) What are the mean scores of the university students' social media-specific epistemological beliefs scale sub-dimensions?

3) What are the mean scores of the university students' regarding the sub-dimensions of the technology addiction scale?

4) Do university students' technology addictions and social media-specific epistemological beliefs differ according to gender, department, grade, longest place of residence before starting university, and mother's & father's educational level?

5) Is there a relationship between university students' technology addictions and social media-specific epistemological beliefs?

METHOD

Research Design

This study which aims to analyze the relationship between university students' technology addictions and social media-specific epistemological beliefs employs a correlational survey model. The correlational survey model is used to examine whether two or more variables have a relationship in a current situation without the intervention of the researcher (Fraenkel & Wallen, 2012). In this model, the researcher does not affect the process except for the application of the tools necessary to collect the data.

The sample consists of Computer Engineering, Food Engineering, Civil Engineering, Economics, Business Administration, Molecular Biology and Genetics, Nursing, and Anesthesia departments at Çanakkale Onsekiz Mart University, which are randomly identified. Considering the difficulty of reaching all the university students in the universe, the sampling method was used. In this context, 350 university students were identified by a simple random sampling method. Incorrect and incomplete data were excluded from the analysis and the data of 327 university students were analyzed. Participants' demographics are given in Table 1.

Table 1. Participant Demographics

Gender	f	%
Female	207	63.30
Male	120	36.69
Grade	**f**	**%**
English Preparation Class	57	17.43
1st	98	29.96
2nd	68	20.79
3rd	56	18.04
4th	48	14.67
The Longest Place of Residence before Starting University	**f**	**%**
Village	32	9.78
District	119	36.39
City center	174	53.21
Department	**f**	**%**
Computer Engineering	38	11.62
Food Engineering	44	13.45
Civil Engineering	35	10.70
Economics	51	15.59
Business Administration	38	11.62
Molecular Biology and Genetics	43	13.14
Nursing	44	13.45
Anesthesia	32	9.78

When the sample of the study is examined, 207 (63.30%) university students are female and 120 (36.69%) are male. 57 of the students were in the English preparation class (17.43%), 98 in the 1st year (29.96%), 68 in the 2nd year (20.79%), 56 in the 3rd year (18.04%), and 48 in the 4th year (14.67%). 32 (9.78%) of the university students were living in the village before starting to university, 119 (36.39%) in the district, and 174 (53.21%) in the city center. 38 (11.62%) of the university students are studying in the departments of Computer Engineering,

44 (13.45%) in Food Engineering, 35 (10.70%) in Civil Engineering, 51 (15.59%) in Economics, 38 (11.62%) in Business Administration, 43 in Molecular Biology and Genetics (13.14%), 44 in Nursing (13.45%), and 32 in Anesthesia (9.78%).

Data Collection

The data of the current study were collected using a three-part questionnaire including a personal information form with 7 questions about the participants' demographics. The "Social Media-Specific Epistemological Beliefs Scale" by Çelik (2020) was used in the second part. This scale is thought to represent social media-specific epistemological beliefs and consists of a total of 15 items and 3 factors. The scale, which consists of five questions in all dimensions, is a 5-point Likert. The Cronbach alpha reliability coefficient value for the mean score of the scale was .793. Cronbach alpha of reliability of the sub-dimensions of the scale was .634 for simplicity and certainty of social media-based knowledge (SCK), .691 for the source of knowledge (SK), and .694 for justification for knowing (JK). .60 and above is considered acceptable reliability (Çokluk et al., 2021).

In the third part, the "Technology Addiction Scale" by Güçlü (2015) was used to determine the variables that affect the technology addiction of undergraduate students. The technology addiction scale also consists of 4 sub-dimensions including "deprivation", "difficulty in control", "breakdown in functioning" and "social exclusion". The scale consists of 10 questions in the first dimension, 9 questions in the second dimension, 5 questions in the third dimension, and 8 questions in the fourth dimension. The Cronbach alpha reliability coefficient was found as .954. The reliability was found as .833 for the deprivation, .882 for the difficulty in control, .883 for the breakdown in functioning, and .897 for the social exclusion.

Data Analysis

Incomplete and erroneous data were removed from 350 data collected from university students, and 327 data were analyzed. The analyzes of the collected data were completed using the SPSS-23 program. Skewness and kurtosis values which were analyzed to explore whether the data showed a normal distribution is reported in Table 2.

Table 2. The Skewness, Kurtosis and Standard Deviation Values

	N	Kurtosis	Skewness	Std. Deviation
Social Media-Specific Epistemological Beliefs	327	-.142	.070	.65
Technology Addiction	327	-.409	-.939	.81

The skewness and kurtosis values in Table 2 show that the values for the Social Media-Specific Epistemological Beliefs scale range from -0.142 to 0.070, while the values for the Technology Addiction scale range from -0.409 to -0.939 and are among the values that show normal distribution (Tabachnick & Fidell, 2013). The Correlation (Pearson) technique was used to identify the relationship between university students' technology addictions and social media-specific epistemological beliefs. The independent sample t-test was conducted to test whether university students' technology addictions and social media-specific epistemological beliefs changed according to gender. In this context, university students and technology addictions and social media-specific epistemological beliefs were taken according to their department, grade, longest place of residence before starting university, and mother's and father's education levels, which are thought to be effective. These variables were examined with the ANOVA test (Aslan, 2017; Bacanlı-Kurt, 2010; Ekinci and Tican, 2017; Eroğlu and Güven, 2006; Işıksal et al., 2007; McGee et al., 2000; Sapancı, 2012; Taşdemir and Boysak, 2017).

Research Ethics

Participants were informed about data collection and analysis before participating in this study. They then signed consent forms stating that they agreed to participate in the study. Also, the participants were informed that the collected data and the information of the participants are kept confidential and participation in the research is voluntary.

FINDINGS
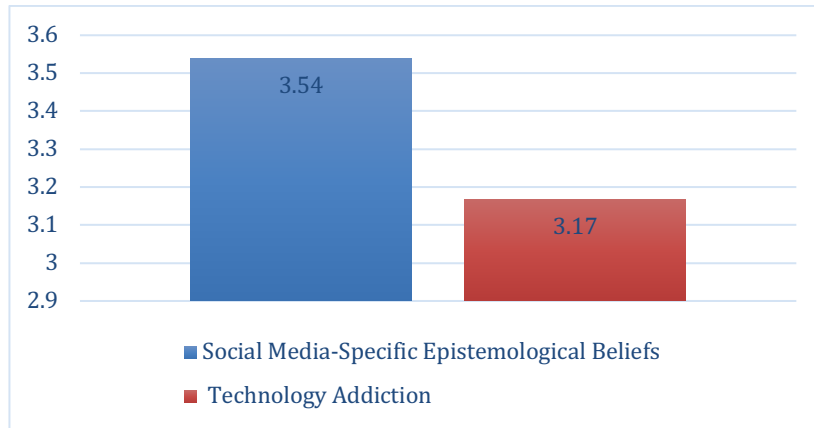
Figure 1. *Social Media-Specific Epistemological Beliefs and Technology Addiction Levels of University Students*

Technology addiction levels and social media-specific epistemological beliefs of university students are above average. The mean score of university students on the scale of social media-specific epistemological beliefs is ($\bar{X}$= 3.54) and the mean score on the technology addiction scale is ($\bar{X}$= 3.17).
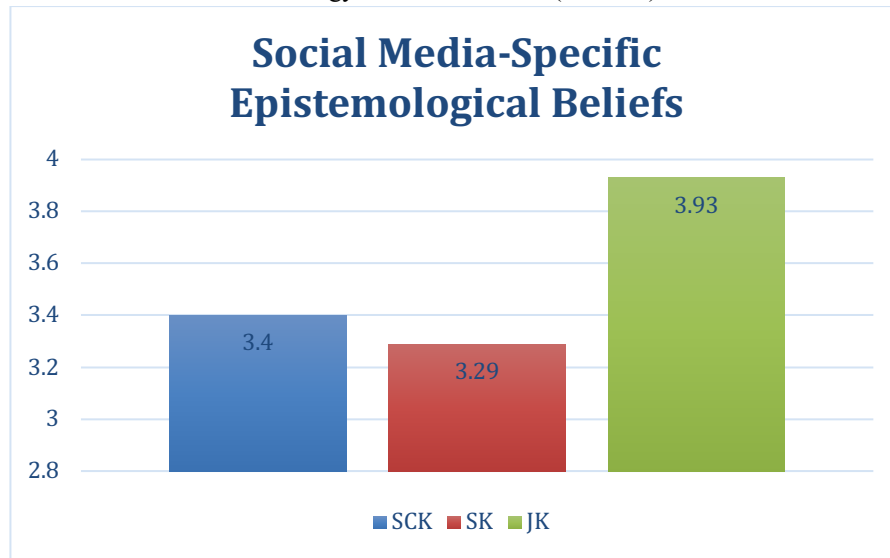
Figure 2. *University Students' Social Media-Specific Epistemological Beliefs*

The social media-specific epistemological beliefs of the university students were analyzed in three dimensions: "SCK, the SK, and JK". While university students had the highest average score in the dimension of JK ($\bar{X}$= 3.93) from the social media-specific epistemological beliefs scale, they had the lowest point average in the SK ($\bar{X}$= 3.29).
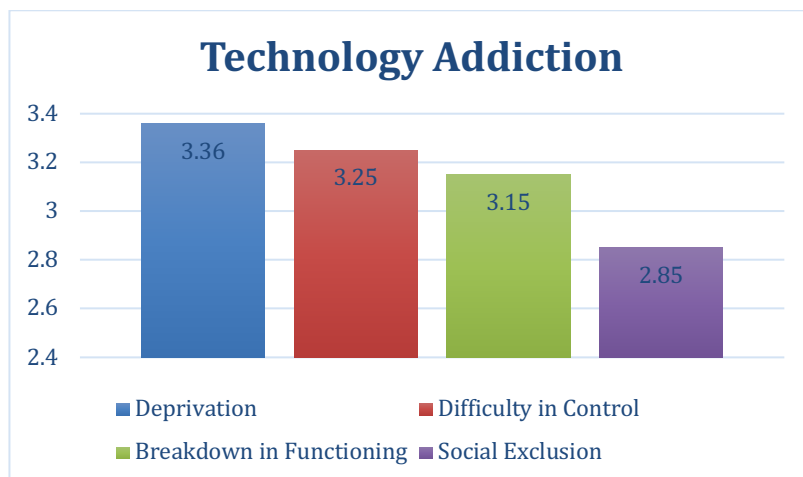
Figure 3. *Technology Addictions of University Students*

Technology addictions of university students participating in the research were analyzed by considering them as four dimensions: "deprivation, difficulty in control, breakdown in functioning, and social exclusion". University students had the highest mean score in the deprivation ($\bar{X}$= 3.36) dimension of the technology addiction scale, and the lowest score average in the social exclusion ($\bar{X}$= 2.85) dimension.

Table 3. T-test Results on Social Media-Specific Epistemological Beliefs and Technology Addictions of University Students by Gender

	Gender	N	$\bar{X}$	Std. Deviation	df	t	*p*
Social Media-SpecificEpistemological Beliefs							
	Female	207	3.63	.58	325	3.43	.001
	Male	120	3.38	.73	206,83	3.23	
Technology Addiction							
	Female	207	3.27	.85	325	2.44	.015
	Male	120	3.01	.97	223.45	2.35	

The t-Test results indicate a significant difference between the university students' social media-specific epistemological beliefs and their technology addiction scale scores according to gender ($p<.05$). Female university students' ($\bar{X}$= 2.82) scale mean scores of social media-specific epistemological beliefs are higher than male university students ($\bar{X}$= 2.56). Female university students ($\bar{X}$= 2.72) have higher technology addiction scale mean scores than male students ($\bar{X}$= 2.54).

Table 4. ANOVA Test Results on Social Media-Specific Epistemological Beliefs and Technology Addictions of University Students by Department

	Variance	Sum of squares	Mean of squares	df	F	*p*	Significance
Social Media-Specific Epistemological Beliefs	Between groups	21.65	3.09	7	14.52	.000	Economics
	Within groups	27.68	.213	130		.000	
	Total	49.33		137			
Technology Addiction	Between groups	28.90	4.12	7	6.20	.000	Economics

Within groups	86.48	.66	130	
Total	115.38		137	

Table 4 indicates a significant difference between university students' technology addictions and social media-specific epistemological beliefs according to the department (p<.05). The economics department students ($\bar{X}$= 4.26) have higher scale point averages of social media-specific epistemological beliefs and technology addictions ($\bar{X}$= 3.88) than other students. According to the results of the Tamhane test, social media-specific epistemological beliefs and technology addictions were high in favor of the university students of the Econometrics department.

Table 5. ANOVA Test Results on Social Media-Specific Epistemological Beliefs and Technology Addictions of University Students by Grade

	Variance	Sum of squares	Mean of squares	df	F	p	Significance
Social Media-Specific Epistemological Beliefs	Between groups	5.521	1.380	4	3.27	.012	1st grade / 4th grade
	Within groups	135.629	.421	322			
	Total	141.149		326			
Technology Addiction	Between groups	1.890	.473	4	.566	.687	---
	Within groups	268.753	.835	322			
	Total	270.644		326			

There is a significant difference in university students' social media-specific epistemological beliefs (p. >0.05), but no significant difference is found in technology addiction levels (p>.05). According to the results of the Scheffe test, the social media-specific epistemological beliefs were high in favor of fourth-grade students.

Table 6. ANOVA Test Results on Social Media-Specific Epistemological Beliefs and Technology Addictions by the Longest Place of Residence before Starting University

	Variance	Sum of squares	Mean of squares	df	F	p	Significance

Social Media-Specific Epistemological Beliefs	Between groups	13.93	6.96	2	17.66	.000	City center/ village
	Within groups	127.04	.395	322			City center/ town
	Total	140.98		324			
Technology Addiction	Between groups	5.70	2.850	2	3.49	.031	City center
	Within groups	262.369	.815	322			
	Total	268.096		324			

Table 6 expresses a significant difference between the students' social media-specific epistemological beliefs and their scores in technology addiction according to longest place of residence before starting university (p<.05). According to the results of the Scheffe test, the social media-specific epistemological beliefs were high in favor of the students living in the city center for a long time. The technology addiction of university students is high in favor of students living in the city center before starting university.

Table 7. ANOVA Test Results on Social Media-Specific Epistemological Beliefs and Technology Addictions of University Students by the Mother's Educational Status

	Variance	Sum of squares	Mean of squares	df	F	p	Significance
Social Media-Specific Epistemological Beliefs	Between groups	.153	.051	3	.117	.950	---
	Within groups	140.99	.437	323			
	Total	141.14		326			
Technology Addiction	Between groups	5.557	1.852	3	2.257	.082	---

	Within groups	265.087	.821	323			
	Total	270.644		326			

In Table 7, the results of the One-Way Analysis of Variance (ANOVA) show no significant difference between the university students' social media-specific epistemological beliefs and the scores of the technology addictions according to the mother's educational level (p>.05).

Table 8. ANOVA Test Results on Social Media-Specific Epistemological Beliefs and Technology Addictions of University Students by the Father's Educational Status

	Variance	Sum of squares	Mean of squares	df	F	p	Significance
Social Media-Specific Epistemological Beliefs	Between groups	4.818	1.606	3	3.805	.011	Bachelor's degree/ secondary school
	Within groups	136.331	.422	323			
	Total	141.149		326			
Technology Addiction	Between groups	5.587	1.862	3	2.270	.080	---
	Within groups	265.056	.821	323			
	Total	270.644		326			

Table 8 shows a significant difference between the scale scores of university students regarding their social media-specific epistemological beliefs according to their father's educational level (p<.05). According to the results of the Games Howell test, the social media-specific epistemological beliefs were higher in favor of students with undergraduate fathers. According to the ANOVA results, there is a significant difference between the scale scores of university students regarding their technology addictions according to the father's educational status, a significant difference is not found (p>.05).

Table 9. Results of Correlation Analysis between University Students' Technology Addictions and Social Media-Specific Epistemological Beliefs

	Social media-specific epistemological beliefs	Technology addiction
Social media-specific epistemological beliefs	1	.654**
Technology addiction	.654**	1

According to Table 9, a linear correlation analysis was performed to determine whether there is a significant relationship between university students' technology addictions and social media-specific epistemological beliefs specific.

There is a significant and positive relationship between university students' technology addictions and social media-specific epistemological beliefs (r=.654, p<.01).

Table 10. Regression Analysis between the Sub-Dimensions of University Students' Social Media-Specific Epistemological Beliefs and Technology Addiction

Model	B	Standard Error	ß	t	p	Tolerance	VIF
Constant	.737	.227		3.243	.001		
SCK	.430	.064	.406	6.752	.000	.664	.353
SK	.355	.059	.357	6.019	.000	.655	.319
JK	-.049	.049	-.040	-.997	.320	.074	-.056
R= 0.708		R²= 0.501					
(F(3-320) = 107.02)		p<0.01					

Table 10 shows how the simplicity and certainty of social media-based knowledge, SK, and JK predict technology addiction. SCK, SK, and JK show a significant relationship (R²=.501, p<.00) with technology addiction (F (3-320) = 107.02, p<.01). These three variables together explain 50% of technology addiction. According to the technology addictions of university students and SCK, SK, and JK, the correlations are 0.66 with simplicity and certainty of social media-based knowledge, .65 with the source of the knowledge, and .07 for justification for knowing. When the correlation between the dimensions of students' technology addictions and social media-specific epistemological beliefs are examined separately, the correlation is .35 (p= .000) for SCK, .32 (p=.000) for the source of the knowledge and -.05 (p=.32) for JK. According to the standardized regression coefficients, the order of importance of the predictor variables on technology addictions is the simplicity and certainty of social media-based knowledge (β= .406), SK (β= .357), and JK (β= -.040). Considering the significance tests of the regression coefficients, SCK and SK are significant predictors of technology addiction. On the other hand, justification for knowing the sub-dimension has no significant effect on the technology addictions of university students.

DISCUSSION AND CONCLUSION

Social media-specific epistemological beliefs and technology addictions scale mean scores of university students were above the average and high. While the students had the highest mean score in the JK dimension from the social media-specific epistemological beliefs scale, they had the highest in the deprivation dimension in the technology addiction scale. Similar to these results, Yılmaz (2016) explored teachers' internet-specific epistemological beliefs in terms of various variables and teachers' internet-specific epistemological beliefs were at a moderate level. Tezci et al. (2016) investigated the influence of pre-sevice teacher's epistemological beliefs on teaching methods, and the results showed that epistemological beliefs based on effort and learning ability had a significant effect on constructivist teaching. In the study, there is a high level of a significant relationship between university students' technology addictions and social media-specific epistemological beliefs. In addition to the high-level relationship, a linear regression analysis was conducted. According to the results of the analysis, university students' social media-specific epistemological beliefs significantly predict students' technology addiction. Similar to this finding, Chiu et al. (2013) analyzed students' internet use purposes, as well as the relationships between internet-specific epistemological beliefs and related dimensions and self-regulated learning activities. According to the results, students' access to academic knowledge from the internet, readiness for self-regulated learning, and internet-based understanding of knowing were positively related to internet-specific epistemological beliefs. Also, internet-specific epistemological beliefs were negatively related to the simplicity of internet-based knowledge and the source of internet-based knowledge. In studies discussing the relationship between pre-service teachers' epistemological beliefs and academic achievement, epistemological beliefs differed

according to the department (Arslantaş, 2016; Chiu et al., 2016). Another study revealed a significant relationship between social media-specific epistemological beliefs and information-seeking strategies, and information literacy structure has a direct effect on information-seeking strategies (Atman-Uslu & Yıldız-Durak 2022). Kalaman et al. (2019) explored the internet-specific epistemological belief levels and internet usage patterns of secondary school students.

Chai et al. (2006) conducted a study to identify the epistemological perspectives of teachers in Singapore. Bråten et al. (2019) developed a scale to measure the epistemological beliefs about the justification of internet-based knowledge. Al-Menayes (2015), Hamissi et al. (2013), and Şimşek, et al. (2019) examined the relationship between technology addiction, and time spent in virtual environments, the emotional intelligence of university students. According to the findings of this study, 38.3% of the students had high technology addiction levels. Kırık et al. (2015) identified the social media addiction level of teenagers in Turkey and gave suggestions for the prevention of addiction by presenting the current studies on the subject in Turkey. The inverse relationship was found between the level of technology addiction and emotional intelligence. The importance of digital literacy education is emphasized in the study, which focuses on the importance of using technology correctly and efficiently. Altin & Kivrak (2018), Cao et al. (2020), Haand & Shuwang (2020), Köse & Doğan (2019), Liu & Ma (2020), Tutgun-Ünal & Deniz (2020), Zhao & Zhou (2021) highlighted that social media is effective in communication, well-being, and burnout level, and the results were revealed by comparing social media addiction levels according to various variables. Technology addiction is thought to be a determining factor because social media-specific epistemological beliefs have an impact on internet use and social media usage preferences.

When the social media-specific epistemological beliefs and technology addictions of university students regarding gender were examined in the current study, female students had higher scale scores. In the studies with similar results, gender was effective on technological addiction and women's technological addictions had a higher mean score, especially in the dimension of social media use (Balcı & Gulnar, 2009; Eryılmaz & Çukurluöz, 2018; Shaw & Black, 2008). Especially people's technology addictions are related to gender and time spent on the internet (Potas et al., 2022). Jamir et al. (2019) argued having a personal computer and mobile phone has a significant effect on the causes of technology addiction and stated that male students have higher technological addictions. Yorulmaz et al. (2017), on the other hand, highlighted that gender does not make a significant difference. Since women spend more time with social media and men use the internet more in the context of computer games, their epistemological beliefs in social media affect social media and internet use.

The social media-specific epistemological beliefs scale means scores of university students differ significantly according to their department. The epistemological beliefs of the students studying in the department of economics are higher; however, the 4th graders have higher scale mean scores than the other graders. Parallel to these results, Fail & Karasu-Avcı (2019), Kanadlı & Akbaş (2015), and Tumkaya (2012), revealed similar results. Depending on gender and grade, there is a significant difference between epistemological beliefs depending on effort and epistemological beliefs depending on ability. According to the longest place of residence before starting university, the social media-specific epistemological beliefs and technology addictions of the students living in the city center are higher. According to the mother's educational status, there is no significant difference between the social media-specific epistemological beliefs and technology addiction levels of university students. However, according to the father's educational status, the student's social media-specific epistemological beliefs are significant in favor of the students whose father's educational level is a bachelor's degree. Similarly, Paulsen & Wells (1998) explored that women have more sophisticated beliefs about the nature of learning, but men have more sophisticated beliefs about the nature of knowledge. Jheng et al. (1993) and Schommer (1990) also support the finding that epistemological beliefs increase as the level of education increases. The finding about the father's educational status may be related to the fact that men have more detailed beliefs about the nature of knowledge. Therefore, fathers can be the leading role models for children and child-rearing attitudes are effective on epistemological beliefs along with many gains that can be acquired within the family. In the study conducted by Özçelik-Demir (2021), the technology addiction of students whose parental education level increases, technology addiction is lower. On the other hand, Bulut & Yılmaz (2019) determined that the epistemological beliefs of the students studying at science high schools did not differ significantly according to the variable of parental education level.

Epistemological beliefs have different contextual characteristics, so it is crucial to support the literature and the data obtained as a result of the study with observations and interviews suitable for qualitative research to reach more comprehensive results. It can be useful to determine the models based on the epistemological understanding of societies with different cultural characteristics following our own cultural and social characteristics and to examine epistemological beliefs in this context. Belief and trust in the SK and authority have various

characteristics in different societies. Interdisciplinary studies can be carried out together to question the reasons that different epistemological beliefs can be found in different disciplines and the reasons behind them.

Limitations

The findings are limited to the students of Canakkale Onsekiz Mart University who participated in the study. The relationship between university students' social media-specific epistemological beliefs and technology addiction levels should be examined in detail through qualitative studies. Qualitative and quantitative studies can be carried out with various variables that are thought to affect epistemological belief. In addition, the study can also be carried out with students with different education levels.

Statements of Publication Ethics

We hereby declare that the study has no unethical issues and that research and publication ethics have been observed carefully. This research was conducted with the Ethics Committee approval of Canakkale Onsekiz Mart University Ethics Committee, dated 13/06/2022 with 12/32 decision no.

Researchers' Contribution Rate

Both authors contributed equally to the study.

Conflict of Interest

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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Nonverbal Behavior Training Program: A Pilot Study on Psychological Counselors

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Abstract

This paper aims to develop a training program on observing and interpreting nonverbal behaviors and evaluating its effects on counselors. The Nonverbal Behavior Training Program (NOBET) consists of theoretical, observational skills development, and writing hypothesis and testing hypotheses modules. Seven counselors (M_{age}=29.57; SD=7.11) from Türkiye, one male with at least two years of experience, participated in the study to evaluate the program's effectiveness. Personal information form, JACFEE photo set, Momentary expression recognition test, and Nonverbal behavior knowledge level assessment test were used to collect the study's data. The results showed a significant difference between the participants' scores from the Nonverbal behavior knowledge level assessment test (z= -2,366, p<.05) and the Momentary expression recognition (z= -2,201, p<.05) test before and after the experiment, but no significant difference for JACFEE (z=-1.682, p>.05). In light of the findings, what is needed for the development of NOBET is discussed.

Keywords: Nonverbal behavior, nonverbal behavior training program (NOBET), counselor

Psikolojik Danışmanlar için Sözsüz Davranış Eğitim Programı Pilot Çalışması
Öz

Bu çalışmada sözsüz davranışların gözlemlenmesi, yorumlanması ve psikolojik danışmanlar üzerindeki etkilerinin değerlendirilmesine yönelik bir eğitim programı geliştirmeyi amaçlamaktadır. Sözsüz Davranış Eğitim Programı (SÖDEP), kuramsal, gözlem becerisini geliştirme, hipotez yazma ve hipotezleri test etme modüllerinden oluşmaktadır. Programın etkililiğini değerlendirmek için çalışmaya Türkiye'den en az iki yıl deneyimli biri erkek olan yedi psikolojik danışman (Mage=29.57; SD=7.11) katılmıştır. Araştırmanın verilerinin toplanmasında kişisel bilgi formu, JACFEE fotoğraf seti, Kısa Süreli İfadeleri Tanıma Testi ve Sözsüz Davranış Bilgi Düzeyi Değerlendirme Testi kullanılmıştır. Sonuçlar, katılımcıların Sözsüz Davranış Bilgi Düzeyi Değerlendirme Testi (z= -2,366, p<.05) ve Kısa Süreli İfadeleri Tanıma Testi (z= -2,201, p<.05) ön-test ve son-test puanları arasında anlamlı bir fark olduğunu gösterirken; JACFEE için anlamlı bir fark olmadığını göstermektedir (z=-1.682, p>.05). Bulgular ışığında SÖDEP'in geliştirilmesi için nelerin gerekli olduğu tartışılmıştır.

Anahtar kelimeler: Sözsüz davranış, sözsüz davranış eğitim programı (SÖDEP), psikolojik danışman

INTRODUCTION

Nonverbal behavior is any behavior independent of verbal meaning (DePaulo & Friedman, 1998; Matsumoto & Hwang, 2013). For example, nonverbal behaviors such as pointing at an object without verbal expression, displaying emotional expressions through facial muscles, regulating interpersonal distance in the presence of another person, and choosing clothes. The definition of nonverbal behaviors includes facial expressions, nonverbal components of voice, body movements, touch, and interpersonal distance (Ambady & Weisbuch, 2010). Communicating through nonverbal behaviors is also called nonverbal communication (Ambady & Weisbuch, 2010). Another definition of nonverbal communication is "the transfer and exchange of messages in any and all modalities that do not involve words" (Matsumoto & Hwang, 2013, p. 4).

Nonverbal communication has a significant impact on human interaction. Individuals' awareness and recognition of nonverbal and verbal expressions are essential to strengthen their interactions. For example, it may be necessary to establish empathy (Rogers, 1957) to recognize the client's current emotional awareness and what they are not saying. In this regard, Ekman and Friesen (2003) state that the inadequacy of words in recognizing the clients' emotions, not being aware of how they feel, and the inability to describe their feelings may be the reasons for focusing on nonverbal behaviors. When clients feel aporetic feelings (Jurist, 2005), when they do not know what they are feeling, when the counselor realizes this situation and shares it with the client, it may contribute to the advancement of the therapeutic process. Reflecting on the client's emotions is one of the main tools in the counseling process (Hutchison & Gerstein, 2012).

Literature Review

Researches are nonverbal behaviors seems to focus predominantly on emotions (e.g., Panić et al., 2022; Staff et al., 2021). One important reason is that emotions are universal and innate (Darwin, 1872). Emotions for which there is substantial evidence to be universal and innate are happiness, anger, disgust, surprise, sadness, fear, and contempt (Ekman, 1971; Ekman & Friesen, 1971; Ekman & Friesen, 1986; Ekman & Heider, 1988; Ekman et al., 1969; Matsumoto & Ekman, 2004; Matsumoto & Willingham, 2009; Matsumoto et al., 2013). Some researchers report that there is evidence for the assumption that shame is also universal emotion (Izard, 1977; Kollareth et al., 2018). Shame is an affect that has been extensively discussed by many theorists (i.e., Izard, 1977; Schore, 1994; Tomkins, 1962). These expressions can be seen in short duration in the face. If an emotional expression occurs for longer than one second in the face, it is a macro-expression; if it occurs in less than one second, it has been defined as a micro-expression (Matsumoto & Hwang, 2013).

Recognizing emotional expressions contributes to understanding human nature (Benecke et al., 2007). This process is even more critical in situations that concern the health of individuals (Roter et al., 2006). For example, physicians who pay attention to gaze and body posture, dimensions of nonverbal behaviors, have increased their empathy levels with their patients (Brugel et al., 2015). In other words, it is easier for doctors who strengthen nonverbal communication with their patients to empathize. In education, the effect of teachers' nonverbal behaviors on students is emphasized (Babad, 2007). It has been reported that effective communication by the counselor in counseling sessions improves the client's recovery and adapts to facilitating and increasing self-awareness (Adigwe & Okoro, 2016). The basis of effective communication is counselors' verbal and nonverbal communication skills. In counseling, the interaction with the clients is communicated mainly verbally. However, when the information obtained through verbal communication is insufficient, the counselor should understand the client's nonverbal reactions (Yang, 2018). Thus, it contributes to the client's ability to formulate their problem. Observing nonverbal behaviors and raising awareness about nonverbal behaviors enrich the interaction with the client (Foley & Gentile, 2010). Studies show that focusing on and recognizing nonverbal behaviors increases therapeutic alliance and client knowledge acquisition (Dowell & Berman, 2013; Paulick et al., 2018; Philippot et al., 2003; Salazar Kämpf et al., 2021). Another important aspect of being aware of nonverbal behaviors is that it can occur unconsciously (Ekman & Friesen, 1968). For example, it is a significant finding for a counselor who observes these behaviors of a client unaware of their nonverbal behaviors in counseling. This observation can mediate the client's gaining insight (Bibring, 1957).

The Significance of the Study

Formal training to improve the ability of mental health professionals and medical doctors' ability to recognize clients' verbal and nonverbal behaviors is limited (Sheeler, 2013). In some training, it was preferred to use only training materials for recognizing emotions, such as METT and SETT (e.g., Endres & Laidlaw, 2009). The Nonverbal Behavior Training Program (NOBET) differs from METT and SETT. First, the photographs in the

training content are of people from Türkiye. According to the "in group advantage" view by Elfenbein and Ambady (2002), the content of perceiving these expressions increases if they are from the same culture as the customer views in the image. Another difference between NOBET is that it considers nonverbal communication with verbal communication. The third difference is the availability of the interpretation skill module. This module targets rooms aiming to interpret by providing assumptions with their opinions and observations.

In undergraduate and graduate education, emphasis is placed on how mental health professionals put their clients' feelings into words (verbalization). In other words, there were no lessons/courses under specific titles such as nonverbal communication and recognizing emotional expressions in Türkiye (YÖK, 2022). A study investigated the skills of counseling and guidance undergraduate students and counselors to identify emotions in facial expressions. There was no significant difference between the two groups (counseling students vs. counselors). In other words, undergraduate students and counselors do not differ according to the recognition of emotions (Hutchison & Gerstein, 2012). Therefore, training mental health professionals to recognize the nonverbal expression of emotions may facilitate their ability to formulate the client's problem in the therapeutic process. This can be possible with skill training for identifying nonverbal behaviors.

The Aim of the Study

Based on all these, no comprehensive training on nonverbal behaviors with proven validity has been found in Turkish culture. The studies discussed psychoeducational programs for recognizing emotions and training to improve knowledge about nonverbal behaviors. However, no training has been found for writing and testing hypotheses by considering both a training program and nonverbal behaviors. Therefore, the current study aims to improve counselors' skills of recognizing and using nonverbal behaviors in their professional practice.

Research Questions

The hypotheses are as follows:

1. NOBET improves counselors' knowledge level about nonverbal behaviors.

2. NOBET improves the counselors' ability to recognize macro-expressions.

3. NOBET improves the ability of counselors to recognize momentary emotional expressions

METHOD

Research Design

This research used a poor experimental design among quantitative research methods (Fraenkel et al., 2012). Experimental designs can be examined in two categories true experimental and poor experimental. The model of the study was a single-group pre-test-post-test design. This model is seen in Table 1.

Table 1. The poor experimental design of this study

Pretest	Process	Posttest
JACFEE photo set	Nonverbal Behavior Training Program (NOBET)	JACFEE photo set
Momentary Expression Recognition Test		Momentary Expression Recognition Test
Nonverbal Behavior Knowledge Level Assessment Test		Nonverbal Behavior Knowledge Level Assessment Test

Participants

The participants of the study are seven specialist counselors. Six participants were female, and one was male (M_{age}=29,57; SD=7,11). Two participants have been working for two years, two for five years, one for six years, one for seven years, one for eight years, and one for twenty years. In addition, two participants are Ph.D. candidates in the counseling department. Participants were included in the study according to the following criteria:

1. To be working in the field of counseling and guidance undergraduate.

2. To have a master's degree in counseling and guidance or at least two years of professional experience.

3. Actively seeing clients/patients (counseling, psychotherapy, and interviews other than these).

4. Not to have received any training besides undergraduate or graduate/specialty education through non-verbal communication.

Data Collection

JACFEE photo set. Japanese and Caucasian Facial Expression of Emotion (JACFEE), developed by Matsumoto and Ekman (1988), is one of the most frequently used photo sets in the literature. In this study, 56 stimuli were selected by selecting an equal number for seven emotions and neutral expressions (i.e., happiness, sadness, surprise, fear, disgust, anger, contempt, and neutral) from the 130-photo version of JACFEE. All stimuli were reliably coded ($r = .91$) with the Facial Action Coding System (Ekman & Friesen, 1978). The score obtained from this screening tool is related to whether the participants recognize the emotions in the stimulus. The true response for each stimulus is 1, and the false response is 0. Therefore, the score that can be obtained from the scale varied between 0-56. Since the photos in this photo set are universal, it has not been adapted to Turkish culture.

Momentary Expression Recognition Test (MOERT). Researchers developed this test to evaluate expressions of less than one-second duration. Halberstadt's (1986) method was used to develop the test. Thus, it is aimed to increase the ecological validity of the test. This method asks subjects to re-experience an emotional event and talk about it. By the way, a task was given by the researcher so that the subjects could feel the emotions. This task is, for example, "I want you to remember an event or situation that disgusts you. You may or may not share this event with me. I'm only asking you to bring to your mind a memory that you are disgusted with." When the task was given, the subjects' face was video recorded. After asking the participants about universal emotions (Ekman, 1971; Izard, 1977; Tomkins, 1962), the researcher analyzed video recordings frame by frame. The facial action coding system developed by Ekman and Friesen (1978) was considered in the analysis of the videos. According to this coding system, each action is called an action unit (AU). Muscle movements are numbered. For example, raising the inner eyebrows is described as AU1. As a result of the analysis, it was determined that fear and surprise did not show basic facial movements. One reason for this, for example, for the surprise, may be that the facial expression signals of the surprise do not occur because there is no natural situation in which the person is surprised; that is because he remembers the event later. In this regard, Ekman (2007) states that if momentary emotions such as surprise occur slowly, these emotions will not be triggered. As a result of these analyses, the stimuli in the test show six emotions: happiness, anger, disgust, sadness, contempt, and shame. The stimuli showing these emotions comprised 14 subjects, nine females and five males.

Nonverbal Behavior Knowledge Level Assessment Test (NOBEKLAT). Researchers developed this test to evaluate the theoretical module of NOBET. The test aimed to determine the level of understanding of the subjects in the theoretical module of NOBET. This framework has 25 multiple-choice questions in the test, with four options. A question has one correct answer. Therefore, the more correct answers are given in the test, the higher the participant's score will receive. In other words, the increase in correct answers in the test indicates that the level of theoretical knowledge is high.

The process of the Nonverbal Behavior Training Program

NOBET has been developed considering the modular training program design (Demirel, 2021). Its theoretical foundation is based on the research of Ekman (2007), Izard (1977), Mehrabian (1972), Frijda (1986), and Hall (1966). The content of NOBET, which consists of three modules, is explained below:

1. Theoretical training

    a. Introduction to nonverbal behavior science

    b. Emotion and its neurobiology

    c. The facial expression of emotions

    d. Eye movements and gaze

    e. Voice

    f. Gestures and body movements

    g. Touch behavior

    h. The perception of the environment

    i. Interpersonal distance

      j.   Nonverbal behavior and behavior analysis in routine and private settings

2. Skills training

      a.   Observation skills

      b.   Skills to recognize emotional expressions

3. Interpreting training

      a.   Writing hypotheses

      b.   Testing to hypotheses

The first theoretical training module aims to teach basic knowledge about nonverbal behavior and communication. In this process, NOBET – Handbook was developed by the researcher. One of the aims of this Handbook, which includes current studies, is to provide the participants with theoretical knowledge about nonverbal behavior.

The second module aims to increase the participant's observation skills in the light of theoretical knowledge. The skill module is divided into the ability to observe and recognize emotional expressions. In the observation skill, the participants were allowed to observe the environment, person, or objects in detail by watching the video recordings prepared by the researcher. Recognizing expressions aims to increase the ability to determine the stimuli's emotions in the video recordings prepared by the researcher. A total of 200 momentary expressions videos were studied throughout the training. In other words, it aims to improve the ability to recognize momentary expressions.

The last module aims to increase the participants' interpretation skills by combining theoretical knowledge and knowledge from the skill training. For this, the video recording of the interviews prepared by the researcher was watched, and the participants were divided into small groups to observe each other and interpret their behaviors. For example, it aims to develop the ability to hypothesize the nonverbal behaviors they see in the video according to the context and how to test this hypothesis. Scientific research methods were used to develop this skill. For example, when a gesture that occurs during a speech is detected in the video, many hypotheses were written together by the counselors by asking what the meaning of this gesture could be in the context. Later, a discussion was created by the researchers about how these hypotheses could be tested. In other words, the individual's behavior was analyzed with the same method as scientific research should be conducted. After completing the three modules, the participants could video-record an average ten-minute interview with a volunteer. The researcher supervised participants who had videos. In this way, the participants were supervised in recognizing nonverbal behaviors (i.e., facial expression, voice, body posture, etc.) in the video records, writing hypotheses, and testing hypotheses.

After the design of NOBET was completed, opinions were received from two experts in the field. Various revisions were made per the suggestions, and the program was planned to last 56 hours. However, in the pilot study, it was determined that 48 hours might be sufficient. During the pilot study, the researchers discussed possible revisions of NOBET in the development process by receiving feedback from the participants in each session. In evaluating the effectiveness of NOBET, the first module was assessed with NOBEKLAT, the second with JACFEE and MOERT, and the third with supervision.

Procedure

The personal information form, JACFEE, Momentary Expression Recognition Test, and Nonverbal Behavior Knowledge Level Assessment Tests were applied by online interviews with each participant. Subsequently, a two-month training with the participants was planned for NOBET. The training was conducted online. At the end of two months, the relevant screening tools were carried out again. The pretest and posttest results of the participants were analyzed.

Data Analysis

Wilcoxon signed-rank test was used to analyze the pretest and posttest data with SPSS 25.0 package program. Analysis results are seen in the results section.

Research Ethics

Before starting the research, necessary permissions were obtained from Ethics Committee. The informed consent form was presented to the participants by the researcher. Participants' names were kept anonymous.

FINDINGS

This section analyzes the participants' JACFEE photo set, Momentary expression recognition test, and Nonverbal behavior knowledge level assessment test pretest and posttest scores. Table 2 shows the average and standard scores of the relevant screening tools. In addition, Figure 1 shows the participants' percentage of pretest and posttest mean scores. According to Figure 1, participants' JACFEE scores increased by up to 5%, MOERT scores by up to 13%, and NOBEKLAT scores by up to 16%.

Table 2. Descriptive statistics on pretest and posttest results

Variables	n	x̄	SD
Pretest			
JACFEE	7	49,14	3,80
MOERT	7	12,85	4,18
NOBEKLAT	7	16,14	1,95
Post-test			
JACFEE	7	51,85	1,67
MOERT	7	16,71	3,40
NOBEKLAT	7	20,14	1,57
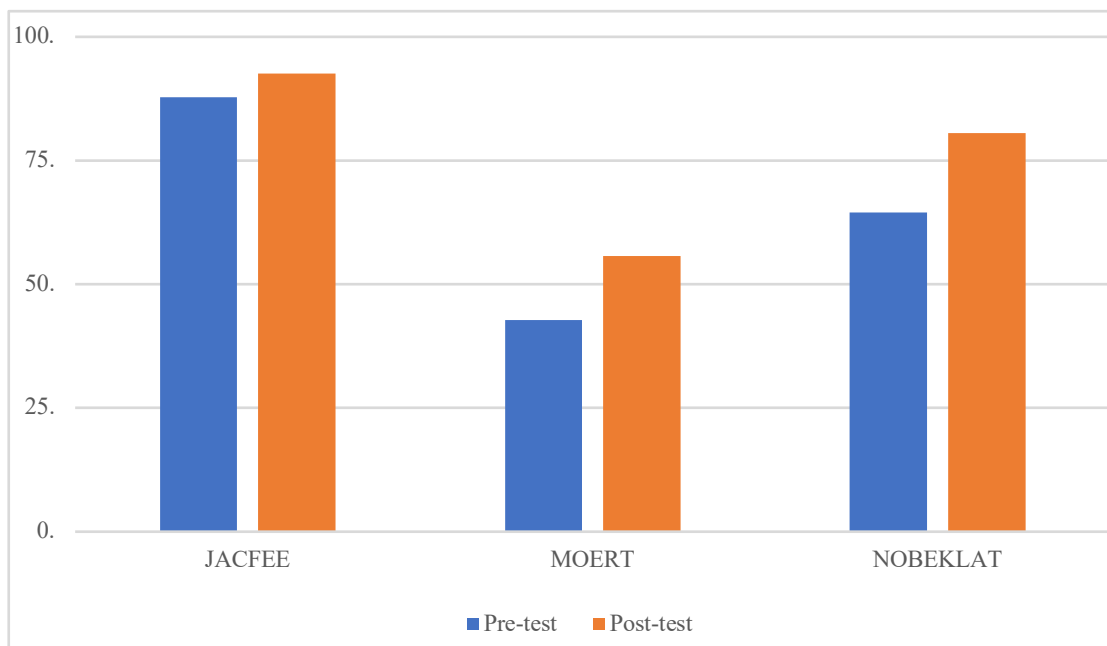
Figure 1. *Percentage (%) of pretest and posttest mean scores*

Table 3 shows the data analysis results before and after the nonverbal behavior training program. According to the Wilcoxon Signed Ranks Test results, the training scores of the participants from the Nonverbal behavior knowledge level assessment test (z= -2,366, $p<.05$) and the Momentary expression recognition test (z= -2,201, $p<.05$) before and after the program are between there is a significant difference. There is no significant difference between the participants' JACFEE pretest and posttest scores (z=-1.682, $p>.05$). According to these findings, it can be said that the pilot study increased the participants' knowledge levels of nonverbal behavior and their ability to recognize momentary expressions.

Table 3. Poor experimental study's Wilcoxon Signed Ranks test results

Variables	n	Mean Rank	Sum of Rank	z	p
Posttest/Pretest JACFEE					
Negative Ranks	2	2,50	2,50	-1,682	.09
Positive Ranks	5	3,70	18,50		
Posttest/Pretest MOERT					
Negative Ranks	1	1,00	1,00	-2,201*	.02
Positive Ranks	6	4,50	27,00		
Posttest/Pretest NOBEKLAT					
Negative Ranks	0	,00	,00	-2,366*	.01
Positive Ranks	7	4,00	28,00		

*Note: *p<.05*

DISCUSSION AND CONCLUSION

In this paper, a training program for analyzing nonverbal behaviors was developed, and the effectiveness of NOBET was evaluated as a pilot study. The findings showed that NOBET increases the knowledge level of participants' nonverbal behaviors and their ability to recognize momentary expressions. However, there was no significant effect on the recognition levels of macro expressions.

Training programs for recognizing emotions enable individuals to improve emotion recognition skills quickly (Chen et al., 2018; Endres & Laidlaw, 2009). It is known that individuals with psychological problems show a deficit in recognizing emotions (Gao et al., 2021; Griffin et al., 2021; Krause et al., 2021). Emotion recognition training materials aim to improve these individuals' emotion recognition skills (Russell et al., 2006). Therefore, it is used for various purposes to improve emotion recognition skills. The ability to recognize momentary expressions, such as micro-expressions, develops quickly with training materials (e.g., METT, SETT). Our preliminary study showed that counselors' ability to recognize momentary emotional expressions is improving. Therefore, this finding is consistent with previous research (Endres & Laidlaw, 2009). When the pretest and posttest scores of the skills to recognize momentary expressions are considered, it is seen that it has increased from 40% to 55%. However, we expected it to be at least around 80%. One of the reasons it was not what we expected could be the inability to devote a full day, or eight hours, to the module on momentary expressions. As well as it may take, an additional practice could not be conducted to improve the practice of recognizing momentary expressions to the participants. Most short-term stimuli (micro-expressions) developed as training material only allow use during NOBET. However, it was thought that after the second module with the participants participating in NOBET, a practice could be done with the researchers at the beginning of each lesson. This is one of the revisions in NOBET.

There is no supporting finding supporting our other hypothesis that NOBET improved the counselors' ability to recognize macro expressions. Although the JACFEE mean score of the group increased when the arithmetic averages in the pretest and posttest were considered, this difference was not statistically significant. One of the reasons for this may be that the ability to recognize emotions in facial expressions is higher in mental health groups that require human relations than in other occupations (Arpita, 2012). Since the study participants had at least two years of professional experience, their experience observing clients may have improved. Another reason there was no significant difference may be that one of the study participants received training on emotions.

When the pretest and posttest scores of the relevant participant were examined, it was determined that he had an accuracy score of over 90%. For this reason, it can be mentioned that the participant's skill affects the research results. Another reason there is no statistical difference may be the small sample size.

Finally, we found that it supports our hypothesis that NOBET improved the knowledge level of counselors about nonverbal behavior and communication. The achievement test measured the evaluation of the first module, in which the theories and research related to nonverbal communication science were comprehensively discussed. This finding is significant because sufficient time has been devoted to each lesson in the theoretical module. Therefore, the level of nonverbal behavior knowledge of the participants improved.

Implications

This pilot study has evidence supporting that the ability to recognize and analyze nonverbal behaviors is a feature that can be improved (increasing the level of knowledge and recognizing macro and micro-expressions). Due to the methodological difficulties of directly measuring NOBET's other dimensions, such as voice, body posture, and gestures, could not be evaluated with a quantitative research design. The evaluation of these dimensions was carried out through the supervision given by the researchers. In addition, using qualitative research methods can provide important data in evaluating the effectiveness of NOBET. Therefore, mixed designs can be used to evaluate the effectiveness of NOBET. Implementing the training on relatively larger sample groups can provide significant findings in determining the efficacy of NOBET.

No comprehensive training has been found for recognizing nonverbal behaviors and improving the ability to read people's behaviors. This study is aimed to fill this gap in the literature. NOBET, developed and tested for effectiveness, is the first pilot study to be comprehensively discussed in Türkiye.

Limitations

This pilot study has limitations. First, it is not to generalize the research findings because the poor experimental design was preferred. Second, the sample size of the study was small. Third, since NOBET was developed for the first time, the shortcomings of NOBET will be applied to the next training.

Statements of Publication Ethics

This study is based on the first author's Ph.D. thesis (in progress). Ethical approval was obtained from Hacettepe University Ethics Committee (Date: 04.12.2022).

Researchers' Contribution Rate

The first author contributed to writing, analyzing, and applying the training program of the paper. The second author contributed to writing and supervising the paper.

Conflict of Interest

None.

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Impact of Anger Management Program on High School Students' Levels of Anger

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Abstract

This is an experimental study aimed at investigating how anger management education affects anger expression and trait anger of high school students. For this purpose, the study was conducted with 162 high school students in Zonguldak, Türkiye during the 2014-2015 academic year. An experimental group and a control group, each of which included 15 people, were formed among 30 students who were identified to have a high level of anger and who volunteered to participate in the study. The education program was administered to the experimental group once a week for 10 weeks. The study revealed significant differences in the experimental group's anger scores except for anger-in, yet no difference was observed in the control group. The follow-up assessment carried out later yielded similar results.

Keywords: Adolescence, anger, anger management training program.

Lise Öğrencilerine Yönelik Hazırlanan Öfke Denetimi Programının Öğrencilerin Öfke Düzeylerine Etkisi

Öz

Bu çalışma; lise öğrencilerine yönelik hazırlanan öfke denetimi programının öğrencilerin öfke ifade tarzları ve sürekli öfkelerine etkisinin incelendiği deneysel bir çalışmadır. Bu amaçla çalışmada Zonguldak İlinde bir liseye giden 162 öğrenci ile çalışılmıştır. Araştırma 2014-2015 eğitim-öğretim yılında gerçekleştirilmiştir. Araştırmada öfkesi yüksek ve çalışmaya katılmak isteyen toplamda 30 öğrenci belirlenmiş ve 15'er kişilik kontrol ve deney grubu oluşturulmuştur. Çalışmada deney grubunda yer alan öğrencilere haftada bir defa 10 hafta süre ile hazırlanan program uygulanmıştır. Çalışmanın sonucunda; programdan faydalanan öğrencilerin öfke puanlarında öfke içte puanı hariç anlamlı farklılıklar olduğu görülmüştür. Kontrol grubundaki öğrencilerde ise herhangi bir değişme olmadığı görülmüştür. Daha sonra yapılan izleme ölçümünde de aynı yönde sonuçlar olduğu saptanmıştır.

Anahtar kelimeler: Ergenlik, öfke, öfke denetimi eğitim programı

INTRODUCTION

The majority of people in the world, no matter what religion, ethnic origin, or mentality they have, want to live in an atmosphere of peace and happiness. However, when we look at the historical periods, we witness that the events, wars and destructions constantly have repeated themselves and continued to the present day. The negative effect of these great events on human psychology cannot be denied. In addition, the consequences of seemingly simple problems can sometimes be very serious. For example, a negative reaction to a driver requesting road in traffic can result in injury or even death. What comes to mind here is that what is the basis of events that seems traumatic or simple.

The anger as an emotion is the main reason of the events that we can consider as a reflection of aggression and violence. Anger can be defined as an emotion that arises in situations such as frustration, being ignored, being wronged (Kulaksızoğlu, 2001; Yazgan, 2007), not being able to reach one's desires and needs, and causes reactions such as anger and aggression (Köknel, 1997; Taylor, 1988). Anger can appear in various ways in daily life, for instance at home, at work (Öztürk, 2012), in a cafe, in traffic (Özbay, 2008), and can disturb the individual. One of the places where anger is experienced is the school environment. In general, schools have an important role in terms of gaining terminal behaviors and raising individuals who are beneficial to society. However, undesirable situations such as anger and aggression can also be encountered in schools. Since anger lays the groundwork for situations that may result in injury, harm or even death, it is beneficial to develop students' awareness of this emotion. In addition, students can be taught how to control anger in a healthy way through prevention studies and education programs. In the study, the effect of the anger management program, prepared for high school students regarding their anger levels, is examined.

The Significance of the Study

Human beings have several basic emotions, such as happiness, sadness, fear and hatred, which they experience many times throughout their lives. One of these basic human emotions is anger (Lopez & Thurman, 1986; Özyeşil, 2012). Although anger as an emotion firstly calls a negative meaning to mind, nevertheless it has been stated in the studies that anger is essentially beneficial. It was also emphasized that anger is neither a good nor a bad emotion. What is really important here is the change of people's reactions to anger. From childhood to old age, the individual may face many situations that contain anger. Even though anger is observed at all stages from childhood to old age, the period with the most obvious and destructive effects is adolescence. After a long period of childhood, the individual suddenly enters adolescence, which is an unstable and irregular phase (Yavuzer, 2005). In this period, identity conflict experienced especially for identity formation and achievement continues as an important process (Garrett, 1995). In this period, individuals need appropriate role models in order to express themselves correctly. Adolescents can learn how to express their anger properly, especially when adults serve as appropriate role models for anger and other issues. On the contrary, adolescents who witness adults' improper reactions, especially in the presence of anger, lack the chance to learn these skills and are likely to give inappropriate reactions in situations causing anger due to improper experiences they observe in adults (Güçray, 2001).

If behaviors such as injury, aggressive behavior, swearing, punching occur as a result of anger, of course, this emotion will call to mind that it is negative (Gümüş Şekerci, Terzi, Kitiş & Birimoğlu Okuyan, 2017). For this reason, it is beneficial for individuals who experience emotional turmoil and constant tides, especially during the turbulent adolescence period, to have the ability to control their anger. In this respect, this research is important in helping adolescents to internalize the concepts of anger and expression styles and, to cope with anger in a healthy way.

Moreover anger is an increasing problem in schools. When the programs developed to prevent anger are examined, it is observed that they differ from each other in content. In the present study, by including issues such as "recognition of emotions, causes of anger, changes in human body due to anger, dimensions of anger, anger expression methods, irrational thoughts, ABCDE theory, restructuring irrational beliefs, alternative thoughts, anger management methods, problem solving skills, taking responsibility, communication skills, empathy, I-you language", previous studies were referred to and a program was developed considering the subjects lacked in those studies. In this respect, this study is considered to be important. In addition, this study may contribute to other studies in our country in terms of recognizing the anger, its causes, knowing its dimensions, and expressing it in a positive way.

The Aim of the Study

The aim of this study; is to examine the effect of anger management training program prepared for high school students regarding their anger levels.

The study tests the following hypotheses:

1. The experimental and control groups' pretest mean scores indicate no significant difference.
2. The experimental and control groups' posttest mean scores show a significant difference in favor of the former group.
3. The experimental and control groups' pretest – follow-up test mean scores show a significant difference in favor of the former group.
4. The experimental group's pretest and posttest mean scores differ significantly.
5. The control group's pretest and posttest mean scores do not differ significantly.
6. The experimental group's pretest and follow-up test mean scores differ significantly.
7. The control group's pretest and follow-up mean scores do not differ significantly.

Literature Review

Throughout the world, humanity strives for survival in a violence spiral caused by a variety of events (wars, vandalism, acts of terrorism, mass actions) and copes with violence-based negative situations every year. Archaeological and historical remains indicate that violence dates back to hunter-gatherer societies that lived 25000 years ago. It is also observed that violence was common among Greek, Egyptian and Roman societies (2000-3000 years ago), and has continued to exist in the last two centuries and in today's societies. The aforementioned events, which are referred to as reflections of aggression and violence are based on anger, one of the most primitive human emotions. Anger has been considered as the breath of life in literary works or mythological tales since ancient times (Orozco, 2004).

The concept of anger has a variety of definitions in the literature. It is defined as "A reaction of aggression, wrath, rage, fury expressed when blocked, hurt or intimidated" in the dictionary Türk Dil Kurumu (TDK), (2022), whereas Kısaç (2005) refers to anger as emotions that one feels when he/she faces unfair behaviors, assaults or threats. Lerner (2015) addresses anger in the context of individuals' personality and rights, and notes that it can be considered as a message that warns people when they cannot achieve their goals and meet their needs as they are emotionally worn out or their rights are violated. Lowth (2015) also defines anger as a way to release mental and emotional pressure.
Gentry (2007), on the other hand, has a broader perspective and describes anger as an emotion that is kept in reserve for enemies to be used, when necessary, precedes or frequently accompanies aggressive behaviors and triggers the fight-or-flight response of the nervous system.

Anger is a natural emotion that is generally characterized as negative and cannot be prevented most of the time. Soykan (2003) specifies that anger may be harmful both for the individual and for the others around when it is out of control. Relevantly, Öztürk (2012) also states that anger appears in many places (workplace, market, street, traffic, etc.) as a negative emotion. One of these places where anger is experienced is school environment. The school environment may lead to the feeling of anger since it may also cause students to have some anxiety (academic processes, physical or behavioral experiences) by its nature (Fryxell & Smith, 2000). If students do not learn to control their anger at school, it may lead to aggressive behaviors. The transformation of anger into violent behavior may cause many problems in the individual's quality of life (Paull & Gerhart, 2019). Especially a sudden outburst of anger is indicated as a significant risk factor for school violence (Helman, 2010). Therefore, anger-related behavioral problems have become an issue for teachers and counsellors to deal with at schools (Sütcü, 2006, p.5). According to Sabatino (1997), traditional intervention and punishment methods adopted to control the anger in children and adolescents are inconvenient and far from leading to a conclusion, and punitive and inhuman treatment methods reinforce anger even more with tough behavior control manners. In addition, studies indicate that unhealthy discharging of anger (verbal or physical violence) does not relieve the individual, yet increases rage and aggression, contrary to the common belief (Sülün, 2013, p.42).

Just as its nature and dose, the way of expressing anger can also vary from person to person. Expressing anger is typically the direct and uncontrolled projection of the emotion to cope with the stress of anger-provoking

elements (Starner & Peters, 2004). When anger is expressed in a proper and desirable way, it may yield positive results (relaxing, getting rid of problems, expressing oneself in a healthy way and establishing good relationships), whereas the contrary case may result in some negative consequences (aggression, grudge, hatred, stress) (Öztürk, 2012, p.8). Individuals express anger in various ways such as holding in (anger-in), releasing (anger-out) or controlling (anger control). Westermayer (2001) describes anger-in as suppressing or repressing rage or directing it towards oneself. Individuals who hold their anger in may mask their rage with passive reactions in the form of avoiding communication, withdrawing, frowning, sulking, or they may want the other people to read their minds and understand that they are angry (Westermayer, 2001, as cited in Gök, 2009, p.3). Individuals can also express their anger by releasing, as well as holding in. Release of anger can be in various ways, including verbal expression (yelling, arguing, cursing) and aggressive behavior (hitting, throwing or breaking something, beating, slamming the door) (Navaro, 2003, p.150). The most effective and healthy way for an individual to express anger may be recognizing the emotion, properly presenting his/her feelings and opinions about events and people, and expressing them without hurting others (Akmaz, 2009, p.50). This situation, which can be referred to as anger management, is not hiding or suppressing anger, but describing it correctly. Anger management can be defined as the process of learning measures to be taken to calm down and cope with anger (Fossum, Handegård, Adolfsen, Vis, & Wynn, 2016). Individuals need to recognize their anger to protect themselves from its adverse effects and to express it in a positive manner (Özyeşil, 2012, p.323). Therefore, identifying the sources and antecedents of anger is important for mental health and learning how to control and cope with anger without losing oneself (Sülün, 2013, p.42).

Anger management methods are referred to in many studies. Morganett (2005) mentions a three-stage path for adolescents to follow in anger management and describes these ways as "being aware of behaviors that may hurt oneself and/or others, learning the skills and techniques to replace these hurtful behaviors, and practicing until new and more adaptive behaviors become usable in real life". Moreover, Karip (1999) exemplifies anger management methods as talking instead of cursing or shouting, drinking water, leaning back while sitting, trying to listen to the other party, paying attention to body organs, avoiding gestures, and choosing a calm and quiet environment (Karip, 1999, as cited in Önem, 2010, p.71). Furthermore, Gültekin (2008) states that methods including individual or group counseling, muscle relaxation techniques, and drug therapy can be used. Fink (2010) also emphasizes the importance of relaxation methods (relaxation exercises starting from the eye, neck, head, then arm and pectoral muscles, back, legs, back of the neck, facial muscles, and muscles in the upper part of the head). In addition, Feindler and Star (2003) notes that individuals need anger management methods such as problem solving, effective communication and assertiveness education.

Individuals should have the ability to control and change their behavior in order to manage their anger (Özmen, 2004, p.5). Unfortunately, there are a limited number of programs (individual or group counseling) that can be administered for anger-related problems in our country. It is of great importance to prevent these problems, and at least by raising awareness, to teach students that this emotion is natural and controllable. With the education program developed in this study, it was aimed that the participating students would become aware of emotions, specifically anger, understand the antecedents of anger and their self-control mechanisms during and following the state of anger, adopt these as behaviors in their lives, and help other individuals.

METHOD

Research Design
The pretest posttest control group design, an experimental research model, was adopted in the research (Karasar, 2003, p.97). In the pretest-posttest control group design, the participants are administered a measurement before and after the experimental procedure in relation to the dependent variable (Büyüköztürk, 2001). Anger management education was identified as the independent variable, and the participants' scores in the "State-Trait Anger Expression Inventory" (STAXI) (trait anger, anger-in, anger-out, anger control) as the dependent variable.

Table 1. Experimental Design of the Study

Group	Pre-test	Program	Post-test	Follow-up test
Experimental	STAXI	Anger Management Training Program(AMTP)	STAXI	STAXI
Control	STAXI		STAXI	STAXI

As observed in Table 1, the "State-Trait Anger Expression Inventory (STAXI) was administered to the experimental and control groups before the implementation. Following the pretest, the "Anger Management Training Program" (AMTP) consisting of 10 sessions was delivered to the experimental group. The control group received nothing in the process. After the implementation, posttest and follow-up test were administered to the experimental and control groups.

Table 2. Distribution of the Groups by Gender

Group	N	Female	Male
Experimental	15	8	7
Control	15	7	8

Study Sample

The study sample consists of 162 high school students in Zonguldak, Türkiye. STAXI was administered to these students as the pretest. The arithmetic mean of the students' scores was found by scoring each sub-scale. If the trait anger, anger-in and -out scores were above the mean, and the anger control score was below the mean, it was considered that the student had low-level anger management. Using random sampling, 15 of these students (8 females, 7 males) were assigned to the experimental group, and the remaining 15 (7 females, 8 males) to the control group. Parent permission forms were obtained from the students who were willing to participate in the study. While forming the groups, the students were matched considering their genders, and these students were randomly assigned to two groups.

Table 3. Inclusion and Exclusion Criteria

The inclusion criteria within the scope of the study are;
- Being a student with a high score in trait anger, anger-in, anger-out and low score in anger control,
- Willingness to participate in the study,
- Having parent permission to participate in the study,
- Having no learning difficulties,
- Being able to attend the training sessions regularly.

The exclusion criteria are;
- Having below-average low scores in State-Trait Anger Expression Inventory pretest
- Reluctance to participate in trainings

Table 4. Workflow Chart

Scanning	The number of students having the pretest (n=162)

Suitability	The number of students excluded based on the exclusion criteria (n=132)
Inclusion	The number of students included in the study based on the inclusion criteria (n=30)

Data Collection Tool

State-Trait Anger Expression Inventory (STAXI)

In the study, STAXI developed by Spielberger, Jacobs, Russell, and Crane (1988) and adapted into Turkish language by Özer (1994) was utilized to determine high school students' level of anger. The inventory consists of 10 items for trait anger, and 8-item sub-scales for each style of anger expression including anger-in, anger-out, and anger control (Özer, 1994). Regarding the scale's internal consistency, the item-total correlations were calculated to be between .14 and .56, and the Cronbach's Alpha values to be between .73 and .84 (Özer, 1994).

In the reliability analysis of the Turkish version of the inventory, alpha values were observed between α: .67 and α: 92; anger control values between α: .80 and α: .90; anger-out values between α: .69 and α: .91, and anger-in values between α: .58 and α: .76. The relevant values are within acceptable limits, and consistent with those of the original inventory (Gürbüz, 2008, p.44).

Personal Information Sheet

The researcher designed a personal information sheet for the participants to fill in relevant information on age, gender, department of study, grade level, family (alive-dead/biological-step) and number of siblings.

Data Analysis

SPSS 18.0 software was used to analyze the research data. Since the scores obtained from the measurements of the group members in the study were not normally distributed, and the number of subjects in the experimental and control groups was 30 (thirty), non-parametric statistics were used in the data analysis (Büyüköztürk, 2012). To identify the level of significance in the differences in the results obtained from experimental and control groups in line with the purposes of the study, Mann Whitney U-Test and Wilcoxon Signed Rank Test (SRT) were administered for the statistical operations. The former was utilized to test whether the scores obtained from two unrelated samples differed significantly (Büyüköztürk, 2014, p.165), and the latter to test how significant the difference was between the scores of two related samples (Büyüköztürk, 2014, p.174). The level of significance was estimated as 0.05.

Implementation of the Anger Management Training Program (AMTP)

AMTP was initiated in the second term of the 2014-2015 school year (10 February-30 April) and completed in two and a half months. First, STAXI was administered to 162 students who were attending high school at the time. As a result, the experimental and control groups, each including 15 people, were formed on a voluntary basis among the students who scored high in trait anger, anger-in and -out, and low in anger control. The duration of the sessions was determined to be 75 minutes, and they were held between 15:30-16:45 every Wednesday, considering the lessons of the students. Group sessions were utterly accomplished by the students. However, sometimes, one or two students failed to be present in the sessions for various reasons, yet they received the necessary explanations and their homework. Upon completion of all sessions, the posttest was administered, and then the certificates of participation were distributed to the students. Two months after the implementation, a follow-up test was carried out for the experimental and control groups.

The program developed consists of ten sessions. The contents of the sessions are as follows:

In the first session, the purpose and objectives of the program are introduced, and group rules are set. Also, information on adolescence and emotional development in this period is given. In the second session, the concepts of emotion, thought, and behavior are defined, and the concept of anger is introduced. In the third session, the reasons for anger and the changes in human body caused by anger are mentioned. In the fourth session, information about theoretical explanations, irrational beliefs of human beings and the "ABC" theory are presented. In the fifth session, activities are performed regarding the development of rational thinking styles by restructuring irrational beliefs and thoughts affecting the occurrence of anger, and understanding the A-B-C of anger. In the sixth session, the concepts of communication, empathy, and I-You language, which are prominent in anger management, are presented. In the seventh session, problem solving skills are discussed. In the eighth session, anger management methods are again addressed, and various activities are carried out. In the ninth session, the concept of

responsibility is associated with anger, and its importance is explained. The reflection of anger management methods on daily life is also discussed. Finally in the tenth session, closure activity is performed.

Research Ethics

Ethical processes related to the study and the program prepared were taken into consideration. After the anger management training program was prepared, opinions were received from three expert faculty members about the program. In accordance with the opinions, the final form of the program has been given. Before the program was implemented in schools, necessary permissions were obtained from the Directory of National Education. In addition, parental consents were obtained from parents for the related students. Consent was also obtained from the students who were to participate in the research, whether they would participate in the research voluntarily or not.

FINDINGS

The research findings for each hypothesis are presented in this section.

The results regarding the first hypothesis (The experimental and control groups' pretest mean scores indicate no significant difference.) are as follows:

Table 5: Results of Mann Whitney-U Test for STAXI Pretest Mean Scores

Dependent Variable	Group	N	Rank Mean	Rank Total	U	P
Trait Anger	Experimental	15	16.00	240.00	105.000	.755
	Control	15	15.00	225.00		
Anger-out	Experimental	15	16.53	248.00	97.000	.519
	Control	15	14.47	217.00		
Anger-in	Experimental	15	18.60	279.00	66.000	.053
	Control	15	12.40	186.00		
Anger Control	Experimental	15	15.03	225.50	105.500	.768
	Control	15	15.97	239.50		

As observed in Table 5, the experimental and control groups' mean scores in the pretest for trait anger (U=105.000, p>.05), anger-out (U=97.000, p>.05), anger-in (U=66.000, p>.05) and anger control (U=105.500 p>.05) do not differ significantly. It can thus be stated that both groups were similar in trait anger, anger-out and -in, and anger control variables prior to implementation, which indicates that the hypothesis has been confirmed.

The results regarding the second hypothesis (The experimental and control groups' posttest mean scores show a significant difference in favor of the former group.) are presented below:

Table 6: Results of Mann Whitney-U Test for STAXI Posttest Mean Scores

Dependent Variable	Group	N	Rank Mean	Rank Total	U	P
Trait Anger	Experimental	15	8.97	134.50	14.500	.000
	Control	15	22.03	330.50		
Anger-out	Experimental	15	9.20	138.00	18.000	.000
	Control	15	21.80	327.00		
Anger-in	Experimental	15	13.93	209.00	89.000	.327
	Control	15	17.07	256.00		

Anger Control	Experimental	15	20.90	313.50	31.500	.001
	Control	15	10.10	151.50		

As observed in Table 6, the experimental group differs significantly from the control group as regards the posttest mean scores for trait anger (U=14.500, p<.05), anger-out (U=18.000, p<.05) and anger control (U=31.500, p<.05). This result indicates that the trait anger, anger-out and anger control mean scores of students attending the education program are significantly different from those of the students who were not involved in the program. As a result, the hypothesis has been confirmed partially, regarding the trait anger scale, and anger-out and anger control sub-scales. However, as observed in Table 2, the posttest anger-in mean scores show no difference in favor of the experimental group (U=89.000, p>.05). It is inferred from this result that the program was not helpful for the anger-in scores of students attending the anger management education program, which indicates that "anger-in" part of the hypothesis has not been confirmed.

Here are the results regarding the third hypothesis (The experimental and control groups' pretest – follow-up test mean scores show a significant difference in favor of the former group.):

Table 7: Results of Mann Whitney-U Test for STAXI Pretest & Follow-up Mean Scores

Dependent Variable	Group	N	Rank Mean	Rank Total	U	P
Trait Anger	Experimental	15	8.83	132.50	12.500	.000
	Control	15	22.17	332.50		
Anger-out	Experimental	15	9.00	135.00	15.000	.000
	Control	15	22.00	330.00		
Anger-in	Experimental	15	15.00	225.00	105.000	.755
	Control	15	16.00	240.00		
Anger Control	Experimental	15	21.97	329.50	15.500	.000
	Control	15	9.03	135.50		

It is observed in Table 7 that the pretest and follow-up trait anger mean scores show a significant difference for the experimental group (U=12.500, p<.05), anger-out (U=15.000, p<.05) and anger control (U=15.500 p<.05), and the values are correspondingly maintained in the posttest mean scores. Accordingly, the hypothesis has been confirmed for trait anger, anger control and anger-out scales. However, it is also observed in the table that the experimental and control groups' anger-in mean scores indicate no significant difference in favor of the former group in pretest and follow-up (anger-in U=105.000, p>.05). Therefore, the hypothesis has not been confirmed for "anger-in sub-scale".

The results regarding the fourth hypothesis (The experimental group's pretest and posttest mean scores differ significantly.) are as follows:

Table 8: Results of Wilcoxon SRT for Experimental Group's Pretest & Posttest Mean Scores

Dependent Variable	N	Rank Mean	Rank Total	z	P
Trait Anger Pretest – Posttest					
Negative Rank	14	8.50	119.00	3.362	.001
Positive Rank	1	1.00	1.00		
Equal	0	-	-		
Anger-out Pretest – Posttest					
Negative Rank	14	7.50	105.00	3.301	.001

Positive Rank	0	.00	.00		
Equal	1	-	-		
Anger-in Pretest – Posttest					
Negative Rank	10	8.45	84.50	2.01	0.04
Positive Rank	4	5.13	20.50		
Equal	1	-	-		
Anger Control Pretest – Posttest					
Negative Rank	0	.00	.00	3.41	.001
Positive Rank	15	8.00	120.00		
Equal	0	-	-		

Table 8 presents "Wilcoxon SRT" results for whether the experimental group students' pretest and posttest mean scores for the sub-scales including trait anger, anger-out, anger-in and anger control show a significant difference or not. According to the analysis results, the mean scores for trait anger (z=3.362, p<.05), anger-out (z=3.301, p<.05), anger-in (z=2.01, p<.05) and anger control (z=3.41, p<.05) differ significantly, which shows that the hypothesis has been confirmed.

The results regarding the fifth hypothesis (The control group's pretest and posttest mean scores do not differ significantly.) are as follows:

Table 9: Results of Wilcoxon SRT for the Control Group's Pretest & Posttest Mean Scores

Dependent Variable	N	Rank Mean	Rank Total	z	P
Trait Anger Pretest – Posttest					
Negative Rank	4	8.88	35.50	1.07	.284
Positive Rank	10	6.95	69.50		
Equal	1	-	-		
Anger-out Pretest – Posttest					
Negative Rank	8	5.63	45.00	.474	.635
Positive Rank	6	10.00	60.00		
Equal	1	-	-		
Anger-in Pretest – Posttest					
Negative Rank	3	8.50	25.50	1.402	.161
Positive Rank	10	6.55	65.50		
Equal	2	-	-		
Anger Control Pretest – Posttest					
Negative Rank	7	6.64	46.50	.378	.706
Positive Rank	7	8.36	58.50		
Equal	1	-	-		

Table 9 demonstrates the "Wilcoxon SRT" results for whether the control group students' pretest and posttest mean scores for the four sub-scales exhibit a significant difference or not (no program was provided). The analysis results have revealed that the control group students' mean scores for trait anger (z=1.07, p>.05), anger-out (z=.474, p>.05), anger-in (z=1.402, p>.05) and anger control (z=.378, p>.05) do not differ significantly, thus showing that the hypothesis has been confirmed.

The results regarding the sixth hypothesis (The experimental group's pretest and follow-up test mean scores differ significantly.) are as follows:

Table 10: Results of Wilcoxon SRT for the Experimental Group's Pretest & Follow-up Mean Scores

Dependent Variable	N	Rank Mean	Rank Total	z	P
Trait Anger Pretest – Follow-up Test					
Negative Rank	14	7.50	105.00	3.302	.001
Positive Rank	0	.00	.00		
Equal	1	-	-		
Anger-out Pretest – Follow-up Test					
Negative Rank	13	8.77	114.00	3.073	.002
Positive Rank	2	3.00	6.00		
Equal	0	-	-		
Anger-in Pretest – Follow-up Test					
Negative Rank	10	7.50	75.00	1.421	.155
Positive Rank	4	7.50	30.00		
Equal	1	-	-		
Anger Control Pretest – Follow-up Test					
Negative Rank	1	4.50	4.50	3.159	.002
Positive Rank	14	8.25	115.50		
Equal	0	-	-		

In Table 10, the results of Wilcoxon SRT are presented, in regard to if the experimental group's pretest and follow-up test mean scores for the four sub-scales show a significant difference. The analysis results have revealed that the participating students' pretest and follow-up test mean scores differ significantly for trait anger (z=3.302, p<.05), anger-out (z=3.073, p<.05) and anger control (z=3.159, p<.05). Considering these results, it can be stated that anger management education program maintained its effectiveness on the mean scores for trait anger, anger-out and anger control, and the hypothesis has been confirmed as regards the relevant scales. Yet, there isn't a significant difference in the anger-in mean scores (z=1.421 p>.05), which shows that the hypothesis has not been confirmed regarding "anger-in sub-scale".

The results regarding the seventh hypothesis (The control group's pretest and follow-up mean scores do not differ significantly.) are as follows:

Table 11: Results of Wilcoxon SRT for the Control Group's Pretest & Follow-up Mean Scores

Dependent Variable	N	Rank Mean	Rank Total	z	P
Trait Anger Pretest – Follow-up Test					
Negative Rank	4	8.13	32.50	1.569	.117
Positive Rank	11	7.95	87.50		
Equal	0	-	-		
Anger-out Pretest – Follow-up Test					
Negative Rank	5	5.40	27.00	1.908	.056
Positive Rank	10	9.30	93.00		
Equal	0	-	-		
Anger-in Pretest – Follow-up Test					
Negative Rank	4	6.00	24.00	1.512	.131
Positive Rank	9	7.44	67.00		
Equal	2	-	-		
Anger Control Pretest – Follow-up Test					
Negative Rank	6	5.83	35.00	.736	.462
Positive Rank	7	8.00	56.00		
Equal	2	-	-		

In Table 11, the results of Wilcoxon SRT are presented, with regard to if the control group's pretest and follow-up test mean scores for the four sub-scales show a significant difference or not. The analysis results have revealed that the control group students' pretest and follow-up test mean scores do not differ significantly for trait anger (z=1.569, p>.05), anger-out (z=1.908, p>.05), anger-in (z=1.512, p>.05) and anger control (z=.736, p>.05), which indicates that the hypothesis has been confirmed.

DISCUSSION AND CONCLUSION

This research aims to present the effects of anger management education program on high school students' trait anger and anger expression. For this purpose, experimental and control groups were formed, and their mean scores obtained from the pretest, posttest and follow-up test were compared. Hypotheses were put forward suggesting that the pretest and posttest mean scores for the inventory to be administered at the end of the education program would be significantly different in favor of the experimental group and the relevant effect would also be retained in the follow-up test. It was observed from the results that trait anger, anger-out and anger control mean scores were significant in favor of the experimental group, yet there was no statistical difference in the anger-in scores (4th hypothesis – except for the anger-in sub-scale). In the follow-up assessment carried out two months after the study, similar results were obtained regarding the scores for each sub-scale, and the situation remained the same. In addition, the relevant scores of the control group, who were not exposed to any kind of process, indicated no difference at a significant level, and the result was retained in the follow-up test.

Considering the hypotheses in the study;
1. "The experimental and control groups' pretest mean scores indicate no significant difference." hypothesis has been confirmed.

2. "The experimental and control groups' posttest mean scores show a significant difference in favor of the former group." hypothesis has been confirmed for trait anger, anger-out and anger control, yet it has not been proven correct for anger-in since the relevant scores showed no significant difference.

3. "The experimental and control groups' pretest – follow-up test mean scores show a significant difference in favor of the former group." hypothesis has been confirmed for trait anger, anger-out and anger control, but it has not been proven correct for anger-in since the relevant scores showed no significant difference.

4. "The experimental group's pretest and posttest mean scores differ significantly." hypothesis has been confirmed since the relevant scores were found to be significant.

5. "The control group's pretest and posttest mean scores do not differ significantly." hypothesis has been confirmed by the results obtained.

6. "The experimental group's pretest and follow-up test mean scores differ significantly." hypothesis has been confirmed for trait anger, anger-out and anger control, yet it has not been proven correct for anger-in because the relevant results showed no significant difference.

7. "The control group's pretest and follow-up mean scores do not differ significantly." hypothesis has been confirmed considering the results obtained.

It is observed in the literature that the findings of studies where anger management education program was carried out and STAXI was administered are similar to the findings of this study (Bedel, 2011; Çekiç, 2009; İskit, 2019; Sütcü, Aydın & Sorias, 2010). However, contrary to the other studies, the anger-in sub-score in the 4th hypothesis here (the difference between the experimental group's pretest & posttest scores) was significant, and the hypothesis was confirmed. The other results for the anger-in sub-scale were parallel to those of similar studies, and no significant difference was encountered.

The results of the anger management education program developed by Esen et al. (2016) for secondary school students revealed that the program had a significant effect on trait anger and anger-out scores, yet there was no change in anger-in scores. According to the authors, the reason why anger-out scores were significant was that the program focused on anger-out because anger usually had the risk of harming others, and they emphasized that activities for anger-in dimension should also be included in future studies. Moreover, in the cognitive behavioral education program developed by Gümüş Şekerci et al. (2017), there was a significant change in the anger control score at the end of the program, and the training was effective, but there was no change in the anger-in and anger-out scores. In this respect, it was stated that the activities should be continued and extended over a period of time. Relevantly, Bilge (1996) also noted in her study that anger varied from society to society, from culture to culture. Especially in such societies as ours, it is not considered normal when the younger display anger to the elder, the women to the men, and the subordinate to the superior; even when they feel anger, it is an issue. Therefore, individuals may hold in their anger instead of releasing it. Also in the present study, there was no significant change in anger-in scores. Similar to other studies, it is believed that activities that can help with proper anger expression (I-you language activities, stories and visuals) were not adequate, and the activities should be maintained with an expert and extended over a longer period of time.

Besides, considering the research results in the literature, where anger management education program is provided and STAXI is administered, a significant decrease is observed in the experimental and control groups' trait anger, anger-in and -out scores, yet a significant increase in the anger control scores (Akgül, 2000; Eldeleklioğlu & Duran, 2005; Genç, 2007; Gürbüz, 2008; Öz, 2008; Özmen, 2004; Sütcü, 2006). These results are in parallel with those of the present study. However, the experimental and control group anger-in scores and the experimental group pretest and follow-up test scores in the relevant studies are different from those in the present study. Besides, it is observed that anger management education programs about anger control conducted under various names and using different inventories have significant effects on and are helpful for the experimental group (Akdeniz, 2007; Gebeş, 2011; Gültekin, 2008; Kaplan, 2007; Özbay, 2008).

The results of the anger management education programs carried out abroad using STAXI have revealed significant differences in favor of the experimental group, as in the present findings (Escamilla, 2000). Again, in anger management education programs developed abroad under various names, it is noted that pretest - posttest scores show significant differences, and the education program is effective (Breslin, 2004; Briscoe, 2001; Campbell, 2004; Coonerty Femiano, 2008; Colletti, 2000; Johansen, 2005; Nickerson, 2003; Sharp, 2003; Udrow, 2009).

In the study by Farisandy and Hartini (2020) on the effect of anger management education program on adolescents' aggressive behaviors, a one-group pretest-posttest quasi-experimental design was used. In the study conducted with 15 adolescents using the aggression scale, it was identified that the anger management program

developed was effective in increasing the level of knowledge about aggression (different types of emotion, positive and negative emotions, expression of emotion and different types of aggressive behavior), raising awareness, and reducing aggressive behaviors (awareness of anger, understanding inappropriate behaviors in anger expression, and ability to use anger management in daily life).

Steffgen (2017) developed an anger management education program for table tennis players. In the study, the experimental and control groups consisting of 18 people received a six-session training of cognitive relaxation and coping skills with respect to their social skills for two months, in company with an expert group leader, and the groups were compared. Considering the measurements, it was concluded that the program was effective, and unlike the control group, the experimental group showed a significant decrease in both table tennis-specific anger reactions and negative anger-out expression. This is also in parallel with the present study regarding the effectiveness of the program. Nevertheless, considering the results of the foreign studies with anger management education programs, no significant differences have been observed in some studies (Alvarez, 1997; Lawson, 2009). They show no similarity to the present study. It is also observed in some research that follow-up assessment has been conducted at varying times as in this study (Akdeniz, 2007; Bedel, 2011; Gebeş, 2011; Gültekin, 2008; Sharp, 2003; Sütcü, Aydın & Sorias, 2010).

It is considered that teaching and developing anger management skills, raising awareness of these skills, and acquiring coping skills for anger situations that can be encountered in all areas of life will substantially contribute to the healthy and compliant adolescent behaviors. For this reason, it is important to make anger management trainings more common among schools and families. With this study, it is aimed to help adolescents raise awareness of anger problems that can often be experienced during puberty. Today anger-related problems are experienced in almost every part of the society, and any individual may be exposed to this kind of anger situations, which are often encountered especially on social media, television or web pages. These platforms constitute a disadvantage in the spread of anger and learning of violent behaviors, yet they can be turned into an advantage. It was observed that the videos and visuals used in the study attracted the students' attention. In this context, videos, short films or successive short-term anger management education programs are considered important in observing the antecedents, the state and the consequences of anger. In addition, considering the students' developmental periods, this kind of programs can be developed and implemented starting from the early years. Even young people and adults who are excluded from formal education can be provided with this kind of programs by public education centers and non-governmental organizations. In addition, since the program developed within the scope of the study is aimed at anger management of high school students, it can be recommended that school counselors, especially those working at high schools, administer this program to students with anger problems. Indeed, this is not something held only by school counselors. For this kind of social skill programs to be implemented by school counselors, it is essential that necessary updates should be made in the regulation on counseling services. Considering the study results, it is believed that the anger management education program developed can have a long-lasting and permanent effect on high school students' trait anger and anger expression.

Limitations

The findings of the study are limited to the items measured by the "Trait Anger - Anger Expression Style Scale". The research findings are limited to the high school students included in the research. The scope of the research is limited to the resources that the researcher could access. The findings can only be generalized to similar groups. Besides, the findings obtained from the research are limited to the anger management program, which was developed by the researcher and served as the independent variable of the research.

Statements of Publication Ethics

This research has been conducted based on the PhD thesis of the first author. Thus, approval was taken for the thesis, and this article's data was used from the same study. The permission for research was granted by the Provincial Directorate of National Education, dated 22.01.2015, numbered 45865702/605.01/699182-45865702/605.01/621182. This study was presented as an oral presentation at (INES-4) (International Academic Research Congress-4-2018).

Conflict of Interest

The author has no conflicts of interest.

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An Investigation of Motivation Sources and Problems of the Learners of Turkish as a Foreign Language

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Abstract

This study mainly investigates the motivation sources and problems of learners of Turkish as a foreign language (TFL). For this aim, participants (*n*=100) from Turkish language centres in Türkiye were recruited through convenience random sampling. Within the framework of the socio-educational model and self-determination theory, the participants were asked to complete a scale on motivation sources and problems. The collected data were coded and analysed through SPSS. The results indicated no statistically significant difference in terms of motivation sources and problems. When items were examined separately, the highest mean of the leaners' answers was in communication need. Communication with the community is one of the components of Gardner's integrative motivation. This leads us to think that learners of Turkish as a foreign language mainly have integrative motivation. When the results were compared by gender, statistically significant difference was found in one item of motivation problems subdimension. Male participants were found to think language learning is an ability and females are much better on this issue.

Keywords: Turkish as a foreign language, instructed SLA, language learning motivation, motivation sources, motivation problems

Yabancı Dil Olarak Türkçe Öğrenenlerin Motivasyon Kaynakları ve Sorunlarının İncelenmesi
Öz

Bu çalışma yabancı dil olarak Türkçe öğrenenlerin motivasyon kaynaklarını ve bu süreçte yaşadıkları problemleri belirlemeyi amaçlamaktadır. Bu amaçla, katılımcılar (*n*=100) Türkiye'deki Türkçe dil merkezlerinden amaca uygun tesadüfi örneklem yöntemiyle seçilmiştir. Sosyo-eğitimsel model ve öz belirleme teorisi çerçevesinde katılımcılardan motivasyon kaynakları ve sorunlarına yönelik bir ölçek doldurmaları istenmiştir. Toplanılan veri kodlanmış ve SPSS programı aracılığıyla analiz edilmiştir. Sonuçlar, motivasyon kaynakları ve sorunları açısından istatistiksel olarak anlamlı bir fark olmadığını göstermiştir. Maddeler ayrı ayrı incelendiğinde, en yüksek ortalamaya sahip olan madde öğrencilerin iletişim kurma ihtiyacı olarak belirlenmiştir. Toplumla iletişim kurabilmek için o toplumun dilini öğrenmek Gardner'ın bütünleştirici motivasyonun bileşenlerinden biridir. Bu durum, Türkçeyi yabancı dil olarak öğrenenlerin ağırlıklı olarak bütünleştirici motivasyona sahip olduklarını düşündürmektedir. Sonuçlar cinsiyete göre karşılaştırıldığında, motivasyon sorunları alt boyutunun bir maddesinde istatistiksel olarak anlamlı bir farklılık bulunmuştur. Erkek katılımcıların dil öğrenmeyi bir yetenek olarak değerlendirdikleri ve kadınların bu konuda daha başarılı olduklarını düşündükleri belirlenmiştir.

Anahtar kelimeler: Yabancı dil olarak Türkçe, motivasyon, motivasyon kaynakları, motivasyon sorunları

INTRODUCTION

Language acquisition is a dynamic process that demands learners to have the skills to comprehend and produce an utterance. Motivation plays a pivotal role in second language acquisition, serving as a driving force that propels learners to overcome challenges, persist in their studies, and ultimately achieve proficiency in a new language (Dörnyei, 2009). It enables learners to achieve their long-term goals in educational contexts. Second language (L2) motivation is a multifaceted construct including environmental and cognitive factors as well as featured personality and social dimensions. Gardner (1985) stated that L2 motivation consists of three components as motivational intensity, desire to learn the language and an attitude towards the act of learning. Crookes and Schmidt (1991) tackled the motivation in terms of the goal orientation by second language learners. One recent definition of motivation comes from Alizadeh (2016) as a combination of learners' desire and attempt by setting the goals to learn a language and acquiring the relevant attitudes towards the target language. Increasing motivation can be a powerful tool to aspire students even in unfavourable circumstances. The best teaching method or lesson design may not yield the desired outcomes because of lack of motivation.

Motivation Theories

One of the first well-known theory of motivation is Gardner's socio educational theory. The socio-educational model encompasses a combination of cognitive and affective factors in defining motivation (Gardner, 1985). In the socio-educational model of Gardner (1985), he defines motivation in two categories as instrumental and integrative. Instrumental motivation is seen as a tool to have high life standards like getting a job or having a high salary and passing the course. That is, learners acquire a language to reach a specific goal like pursuing a career or reading a specific genre. However, integrative motivation refers to the affiliation to be a part of the community by speaking the target language and communicating with the members of the community. Integrative motivation consists of both attitudes towards language learning and language group, and the willingness level of learners to interact with the members of that group (Dörnyei, 2005).

Self-determination theory developed by Deci et al. (1989) defines two types of motivations as intrinsic and extrinsic. Intrinsic motivation describes the level of internal enjoyment of the learners, while extrinsic motivation refers to external rewards such as receiving good scores or applause from the environment. This theory has three basic components as autonomy, competence, and relatedness. As the focus in intrinsic motivation on learners themselves as the regulators of their behaviours, the notion of autonomy occurs. The definition of autonomy made by La Guardia (2009) as learner initiated and controlled actions, is parallel with intrinsic motivation. The students who practice autonomy-support activities have higher level of intrinsic motivation and this reflects on their academic performance (Black & Deci, 2000). Competence is the person's feelings about the mastery or proficiency level in the target language. Relatedness, on the other hand, is the notion to be accepted by the others. It can be said that intrinsic motivation is based on autonomy and competence while extrinsic motivation is based on relatedness. This theory has a great place in motivational psychology (Dörnyei, 2003). In an educational setting, it is highly suggested that permanent learning is possible if learners are intrinsically motivated. Vansteenkiste et al. (2006) found that intrinsically motivated learners engage in the activities more, maintain their focus on the learning material and deeply understand the concepts, while learners with extrinsic motivation have difficulty in learning concepts. However, Thohir (2017) proposed that learners in an EFL context are mostly motivated by external factors.

Another important theory of motivation is self-efficacy theory by Bandura (1986). It basically refers to someone's perception of their own capabilities to fulfil certain tasks. This determines the choice of activities, the level of desire, the rate of effort and the persistence on the goal. People with low self-esteem care the success about their performance. People with high self-esteem, on the other hand, behave in a determined and confident way to maintain the challenging task. Another important theory of motivation that has an effect on students' performance in academic settings is the attribution theory (Weiner, 1972). The causal attributions affect the learners' activities of achievement, the effort they make, and the reactions by learners when they have failures. Attributions also influence rewards and punishments process, so indirectly influence the performance of the learners.

The recent model of motivation proposed by Dörnyei et al. (2006) suggests that learners are motivated to fill in the gap between their actual self and ideal self, so they have instrumental motivation in the beginning of their language learning process like passing the proficiency test, but their overall goal is to be integrated into the L2 speakers and their cultures. From this point of view, Dörnyei describes motivation as the vigorous combination

of goals of learners set for their future direction (Ideal L2 Self) and others (Ought to L2 Self) and their opinions towards the actual learning environment (L2 Learning Experience). However, within the scope of this study, we approach motivation through the perspectives of Gardner's socio-educational model and Deci et al.'s self-determination theory.

The Significance of the Study

Second language motivation studies are important as motivation is a driving force for learners to take the initiative of their learning. When the literature is examined, it is clearly seen that most studies have been conducted to determine the types of motivation of the learners of English as a foreign and/or second language. However, Türkiye has been attracting learners' attention globally over the years. The data in council of higher education of Türkiye showed that 125138 foreign learners had started studying in Türkiye in 2018 (Higher Education Information Management System, 2018) and the last update in the number of foreign learners in Türkiye is 162011 (Higher Education Information Management System, 2023). Most of these learners are being enrolled in Turkish language centres. The studies conducted to measure the level of motivation are intensified in motivation sources of TFL learners (Abubakarı, 2016; İbili, 2015; Mohamed, 2019, Tunçel, 2014). However, there are almost no studies to determine both the motivation sources and the problems of TFL learners. Yılmaz & Arslan (2014) conducted a study to determine the motivation sources and problems of TFL leaners, but the participants were limited to TFL learners studying in Turkish language Teaching and Research Centre in Çanakkale Onsekiz Mart University. Therefore, there was a need to conduct a study to discuss both motivation sources and problems of TFL learners from different Turkish language centres. Overall, this study is crucial for creating effective teaching strategies, promoting learner retention, and fostering a positive and motivating learning environment that supports learners in achieving their language goals.

The Aim of the Study

Guilloteaux and Dörnyei (2008) scrutinized the motivational strategies employed in education and divided into two categories as (a) educational interventions implemented by teacher to reveal and guide the students' motivation and (b) the strategies implemented by students through their goals to determine their own motivation levels. This study aims to examine b group motivation resources of TFL learners within the framework of the socio-educational model and self-determination theory and their problems that restrict their motivation. In addition, the current study also aims to determine differences in motivation resources and problems across gender.

Research Questions

The main research question is determined as "What are the motivation resources of learners of Turkish as a foreign language and the motivational problems encountered according to the opinions of those who learn Turkish as a foreign language and do these differ across gender?". This question produces four different questions that we look for answers throughout this study.

1. What are the motivation resources of learners of Turkish as a foreign language in their educational process?

2. What are the motivational problems of learners of Turkish as a foreign language in their educational process?

3. Do the motivation resources of learners of Turkish as a foreign language differ across genders?

4. Do the motivational problems of learners of Turkish as a foreign language differ across genders?

LITERATURE REVIEW

The studies in the literature on motivation have been mainly conducted to investigate the motivation sources of learners in a second or foreign language learning environment. Dörnyei (1990) conducted a study with Hungarian learners to determine the characteristics of integrative and instrumental motivation in a typical foreign language territory and found that instrumental reasons may have great place rather than integrative ones in a foreign language setting. Li (2014) conducted another study with 132 Chinese EFL learners to understand which components of L2 motivation self-system is more effective in an EFL and ESL context. The results suggested that ESL learners have stronger self-images as they are proficient users of the language, but EFL learners have instrumental motivation. Al Othman & Shuqair (2013) investigated the impact of motivation of English language learners in Gulf States and stated that motivation has a key role in language learning. They emphasized the role of

integrative motivation and recommended that tasks should be authentic to promote students' interest, as the artificial tasks can be more challenging for learners to deal with, and they can decrease the level of learners' internal motivation. They also mentioned the importance of boosting intrinsic motivation as well as integrative motivation by placing various activities into the classroom environment. In Obediat's study (2005), Malaysian students were found to have integrative motivation towards learning Arabic, as they have positive views on being bilingual and integrating into Jordanian community. Although the results of this study demonstrated that learners are motivated to learn Arabic by integrative factors, there are also instrumental factors that create lots of benefits for them. In the same study, they also compared the results in terms of gender, and no significant difference was found. Saito et al. (2017) examined the role of motivation in speaking skills of 40 Japanese university students in EFL context. They mentioned that EFL learners in Japan are driven by two goals as short term and long term, but they use their short-term goals to reach their long-term goals, to participate in the international community. It can be inferred that Japanese university students have both instrumental and integrative motivation to access their idealized engagement in international community. As a result of this study, they found that the learners with a certain motivation form showed great improvement in their oral skills over one semester.

Kimura et al. (2001) studied on the types of motivation that 1027 Japanese EFL learners have. The results showed that learners have intrinsic motivation to study English for some instrumental factors like studying overseas, and some integrative ones like knowing other cultures. Tok & Yığın (2013) conducted a study on motivation sources of 57 TFL learners studying in Çanakkale Onsekiz Mart University Turkish Language and Teaching Centre. They found that TFL learners have both instrumental motivation generating from the reasons like economy, education, tourism, politics and marriage and integrative motivation generating from the reasons like history, affinity, and religion. In another study carried out in the same context with 111 students to determine motivation sources and problems, Yılmaz & Arslan (2014) found that the biggest motivation sources of participants as intrinsic motivation and the biggest motivation problem resulted from external factors. Shamiry and Al Fuad (2020) conducted a study to figure out the role of intrinsic and extrinsic motivation in Arabic learners English learning process, it was found that few numbers of students have intrinsic motivation, and they mostly learn English with external reasons. Özgür and Griffiths (2013) researched the relationship between the motivation and the achievement of Turkish EFL learners and they employed four types of motivation as integrative, instrumental, intrinsic and extrinsic motivation. The results displayed that most students were driven by instrumental motivation whereas intrinsic motivation was found to have strong correlation with successful test performance. Jiao et al. (2022) conducted a study on middle school students' motivation in second language learning environment during COVID 19 by focusing on internal structure, gender, and the effect of motivation on learners' L2 achievement. Results indicated that intrinsically motivated learners have better performance in English language learning.

When the studies on motivation are examined by gender, considerable number of studies in language learning environment have shown that female students' level of motivation is higher than their male counterparts' (e.g., D'Lima et al., 2014; Jiao et al., 2022) and females have more positive views toward the speakers and the culture of the target language (Khong, et al., 2017). That could be because female students invest much effort in language learning (Oga-Baldwin & Nakata, 2017) and are extrinsically motivated (You et al., 2016), they receive better academic performance. All these findings strengthen the stereotypical view that "Girls are better than boys at learning a language." (Heinzmann, 2009). As opposed to these studies, Akram & Ghani (2013) conducted a study on the relationship between gender and motivation of 240 twelfth grade Pakistani student who learn English for 11 years and found no statistically significant differences by gender in terms of motivation. They reported that male students' integrative motivation was dominant compared to their female counterparts, this may be because males in Pakistan are expected to pursue a career. In another study by Khong et al., (2017) with 448 university students learning Spanish as a foreign language in Malaysian context, the participants were found to have both integrative and instrumental motivation and no statistically significant result emerged in terms of gender.

METHOD

This study employs quantitative research design. Quantitative research design is a systematic and structured approach that involves the collection and analysis of numerical data to answer research questions or test hypothesis. It relies on statistical methods and aims to provide objective and generalizable findings (Creswell&Creswell, 2017). As this design allows for the measurement of variables, establishing relationships

between them, and drawing conclusions based on statistical significance (Hair et al., 2019), it becomes appropriate for the aim of this study.

Participants

This study consists of learners studying in Turkish language centres in Türkiye between 2018-2019. The participants are chosen by convenience random sampling. The participants are chosen through an online group that are specifically constructed for TFL learners in Turkish language centres in Türkiye. The sample includes 100 participants and 50 of them are males and 50 of them are females. The equal distribution of gender creates a convenient context for statistical analysis. The participants with B1 and B2 level of proficiency are recruited for the study, as they have an experience in learning Turkish. They study in different faculties (e.g., Faculty of Literature, Education, Science, Economics, Communication, Management, Engineering, Arts, Water Sciences, Social Faculty of Sciences) in different universities. The participants are from 35 different countries (e.g., Afghanistan, Bangladesh, Benin, Bosnia and Herzegovina, Burkina Faso, Algeria, China, Ethiopia, Morocco, Palestine, Ghana, South Korea, India, Iraq, Iran, Japan, Cameroon, Montenegro, Kazakhstan, Kyrgyzstan, Congo, Lebanon, Mali, Egypt, Mozambique, Pakistan, Poland, Serbia, Slovakia, Somalia, Syria, Turkmenistan, Jordan, Yemen, Greece), so the data obtained may have generalizable results. However, the participants do not show equal distribution by countries, this limits the findings of the research. 44% of the participants state that they learn Turkish with their own desire, while learning Turkish is mandatory for the others. This shows they have the motivation to learn Turkish.

Data Collection Tool

As the data collection tool, a demographic questionnaire was used in the first part of data gathering process. This questionnaire includes questions related to the participants' gender, nationality, the faculty and department where they study. In line with the aim of this study, a five-point Likert scale developed by Acat and Demiral (2002) for learners of English in Türkiye was employed by adapting it into TFL context in the second part of the study. After the scale was developed, expert opinions were taken. The scale was prepared in three languages as Turkish, Arabic and English by considering the participants' demographic information. In this process, backward translation method was employed. Two experts translated the items to the target languages and then, two different translators translated them into the original language. This version of the items was compared to the original ones and a careful analysis was conducted to examine any discrepancies or differences in meaning arose. After the necessary revisions were completed, expert opinions were taken again, and data collection tool was finalised. This scale measures participants' motivation sources and problems in the process of learning Turkish and includes 27 items in total, 16 items are related to their motivation sources and 11 items are related to motivation problems.

When the scale is examined by motivation sources, the items 1,2,6, and 15 measure the participants' intrinsic motivation, item 3 is prepared through competency in self-determination theory and measures intrinsic motivation, as well. Items 4,9, and 14 measure extrinsic motivation, items 5 and 16 measures integrative motivation and items 7, 8, 10 and 11 measure instrumental motivation. Item 12 is prepared through Weiner's achievement theory and measures extrinsic motivation and item 13 is prepared through Gardner's motivation theory of educational context and measures instrumental motivation. The reliability of the scale is shown in table 1 below.

Table 1. Reliability Statistics of Motivation Resources and Problems Scale

Subdimension/Scale	The Number of the Items	Cronbach's Alpha Reliability Coefficient
Motivation Resources	16	0.955
Motivation Problems	11	0.845
Total Scale	27	0.892

When table 1 is examined, the overall scale and the motivation problems subdimension are determined as very good in terms of reliability. The motivation sources subdimension is also determined as highly reliable.

Data Analysis

The scale was applied through Google Forms and all the items were made compulsory to complete. The data obtained from 100 participants were transferred into Microsoft excel and after necessary coding was completed, the data was analysed through IBM SPSS 22.0.

In the first part of the results section, descriptive and demographic statistics of the participants were reported. In the second part, frequency analysis, the item means, and standard deviation were calculated and reported to determine the total trend of sample in the motivation sources and problems subdimension. The third part of the results includes the statistical analysis of differences by gender and total scores in terms of motivation sources and problems subdimension. The items were measured on an ordinal scale and total values were not normally distributed, so a non-parametric test was used in this part of the study. The Mann Whitney U test was used as it measures the statistical significance of the differences between two groups on the mean rank.

Research Ethics

Ethical principles were followed during every stage of the study. The necessary permissions from the participants were taken and they all agreed to participate the study voluntarily.

FINDINGS

In this section of the paper, the frequency analysis results of motivation sources and problems subdimensions were calculated and reported.

The Frequency Analysis of Motivation Sources Subdimension

The scale items in motivation sources subdimension were prepared to determine 4 types of motivation as integrative and instrumental motivation in socio-educational model and intrinsic and extrinsic motivation in self-determination theory. To answer research question 1, motivation sources subdimension frequency distribution, mean and standard deviation values are shown in table 2.

Table 2. Motivation Resources Subdimension Frequency Analysis

Motivation Resources	Totally disagree		Disagree		I am not sure		Agree		Totally agree		$\bar{X}$	SD
	n	%	n	%	n	%	n	%	n	%		
1. I learn Turkish as I enjoy.	14	14	7	7	13	13	32	32	34	34	3.7	1.4
2. I learn Turkish willingly.	15	15	8	8	12	12	31	31	34	34	3.6	1.4
3. I think I have the abilities to learn Turkish.	13	13	7	7	23	23	25	25	32	32	3.6	1.4
4. Learning Turkish enables me to be accepted by the community.	16	16	8	8	18	18	25	25	33	33	3.5	1.4
5. Learning Turkish helps me communicate with more people.	14	14	5	5	3	3	18	18	60	60	4.1	1.5
6. If I learn Turkish, I will easily access to printed sources related to my interests.	15	15	8	8	14	14	20	20	43	43	3.7	1.5
7. Learning Turkish will help me find a job easily in the future.	9	9	9	9	17	17	27	27	38	38	3.8	1.3
8. I'm learning Turkish to get higher salary.	15	15	13	13	21	21	27	27	24	24	3.3	1.4
9. I'm learning Turkish to live comfortably.	12	12	6	6	15	15	22	22	45	45	3.8	1.4
10. Learning Turkish helps me develop my career.	12	12	7	7	13	13	32	32	36	36	3.7	1.3
11. The abilities that I gain through Turkish learning process make me gain the prestige among my friends.	14	14	10	10	26	26	23	23	27	27	3.4	1.4
12. If I know I receive an award, I will be more willing to learn Turkish.	11	11	15	15	17	17	29	29	28	28	3.5	1.3
13. The materials that I use while studying should be attractive.	10	10	7	7	13	13	27	27	43	43	3.9	1.3
14. The willingness of the team that I study together affects me.	9	9	13	13	21	21	29	29	28	28	3.5	1.3
15. The learning process meeting my expectations increases my willingness.	6	6	11	11	20	20	37	37	26	26	3.7	1.2
16. Knowing that I will use the language that I learnt motivates me.	11	11	9	9	10	10	27	27	43	43	3.8	1.4

When table 2 is examined, it was determined that the learners of Turkish as a foreign language agreed to the items about motivation sources generally. When the items are compared, the highest mean score was calculated with the frequency of 4.1 in the item 5 *"Learning Turkish will help me communicate with more people*." This shows that the motivation sources of most TFL learners are communication which is one of the basic components of integrative motivation in Gardner' socio-educational model. In addition, the second highest mean score was reported as item 13 *"The materials that I use while studying should be attractive."* with the frequency of 3.9. Attractive materials increase the motivation of learners in the educational context and students develop positive attitudes towards the course. This affects the level of their instrumental motivation and students try to do their best to pass the target course.

The Frequency Analysis of Motivation Problems Subdimension

To answer research question 2, motivation problems subdimension frequency distribution, mean and standard deviation values are calculated and shown in table 3.

Table 3. Motivation Problems Subdimension Frequency Analysis

Motivation Problems	Totally disagree		Disagree		I am not sure		Agree		Totally agree		$\bar{X}$	SD
	n	%	n	%	n	%	n	%	n	%		
1.The difficulties that I encountered before are originated as I don't know Turkish.	18	18	17	17	21	21	21	21	23	23	3.1	1.4
2.I tried to learn Turkish but I couldn't, and I think I cannot do again.	58	58	15	15	8	8	8	8	11	11	2.0	1.4
3.To learn a language is an ability and I lack this ability.	43	43	20	20	15	15	12	12	10	10	2.3	1.4
4.I cannot focus on learning because of my responsibilities in the family.	48	48	18	18	13	13	7	7	14	14	2.2	1.5
5.I will be more willing to learn Turkish if I have good results.	13	13	9	9	23	23	24	24	31	31	3.5	1.4
6.The reason that I cannot learn Turkish is that I don't do my best.	29	29	26	26	17	17	18	18	10	10	2.5	1.3
7.I cannot learn Turkish because I become nervous, and I forget easily.	33	33	24	24	15	15	13	13	15	15	2.5	1.4
8.The language problems that I encounter make me tired.	19	19	21	21	28	28	20	20	12	12	2.9	1.3
9.The expectations on learning a language are so high and this affects me negatively.	23	23	23	23	22	22	15	15	17	17	2.8	1.4
10.I don't learn Turkish, I just memorise it.	37	37	20	20	16	16	16	16	11	11	2.4	1.4
11.The pressure of the people affects my learning process.	19	19	26	26	23	23	18	18	14	14	2.8	1.3

When table 3 is examined, it was found that TFL learners disagreed with the items about motivation problems generally. However, when the items are compared, there are two important findings. Most of the participants stated that they are not sure about item 1 *"The difficulties I encountered before are originated as I don't know Turkish."* in this scale with the frequency of 3.1. This result shows that some of the participants may have experienced some problems as they did not know Turkish, and this may urge them to learn Turkish. Item 5 *"I will be more willing to learn Turkish if I have good results."* is also significant with the mean frequency of 3.5. This value shows that learners' achievement motivation should be increased. The learners who discover that they could learn Turkish will be motivated to do better.

The Difference Analysis

In this part of the study, the results were evaluated by gender in terms of motivation sources and problems subdimension to answer research questions 3 and 4. For this aim, Mann Whitney U test was implemented, and the results were shown in tables 4 and 5.

Table 4. Mann Whitney U Test Statistics Examining Differences in Motivation Resources by Gender

Motivation Resources	Gender	N	$\bar{X}$	$\bar{r}$	z	sig.
1. I learn Turkish as I enjoy.	Female	50	3.860	54.530	-1.446	0.148
	Male	50	3.440	46.470		
2. I learn Turkish willingly.	Female	50	3.700	52.680	-0.781	0.435
	Male	50	3.520	48.320		
3.I think I have the abilities to learn Turkish.	Female	50	3.740	54.490	-1.421	0.155
	Male	50	3.380	46.510		
4.Learning Turkish enables me to be accepted by the community.	Female	50	3.520	51.280	-0.278	0.781
	Male	50	3.500	49.720		
5.Learning Turkish helps me communicate with more people.	Female	50	4.180	53.950	-1.351	0.177
	Male	50	3.920	47.050		
6.If I learn Turkish, I will easily access to printed sources related to my interests.	Female	50	3.640	50.310	-0.069	0.945
	Male	50	3.720	50.690		
7.Learning Turkish will help me find a job easily in the future.	Female	50	3.860	52.630	-0.766	0.444
	Male	50	3.660	48.370		
8.I'm learning Turkish to get higher salary.	Female	50	3.420	52.460	-0.693	0.489
	Male	50	3.220	48.540		
9.I'm learning Turkish to live comfortably.	Female	50	4.060	55.160	-1.700	0.089
	Male	50	3.580	45.840		
10.Learning Turkish helps me develop my career.	Female	50	3.900	53.420	-1.051	0.293
	Male	50	3.560	47.580		
11.The abilities that I gain through Turkish learning process make me gain the prestige among my friends.	Female	50	3.360	49.880	-0.220	0.826
	Male	50	3.420	51.120		
12.If I know I receive an award, I will be more willing to learn Turkish.	Female	50	3.420	49.250	-0.443	0.657
	Male	50	3.540	51.750		
13. The materials that I use while studying should be attractive.	Female	50	4.040	54.120	-1.317	0.188
	Male	50	3.680	46.880		
14.The willingness of the team that I study together affects me.	Female	50	3.440	48.090	-0.856	0.392
	Male	50	3.640	52.910		
15.The learning process meeting my expectations increases my willingness.	Female	50	3.820	54.390	-1.396	0.163
	Male	50	3.500	46.610		
16.Knowing that I will use the language that I learnt motivates me.	Female	50	3.840	50.950	-0.164	0.870
	Male	50	3.800	50.050		
Motivation Resources for Learning Turkish	Female	50	3.738	52.880	-0.821	0.412
	Male	50	3.568	48.120		

$\bar{X}$=mean, $\bar{r}$: mean rank

When table 4 is examined, it was determined that there is no statistically significant difference between males and females in terms of motivation sources.

Table 5. Mann Whitney U Test Statistics Examining Differences in Motivation Problems by Gender

Motivation Problems	Gender	N	$\bar{X}$	$\bar{r}$	z	sig.
1.The difficulties that I encountered before are originated as I don't know Turkish.	Female	50	3.120	50.020	-0.169	0.866
	Male	50	3.160	50.980		
2.I tried to learn Turkish but I couldn't, and I think I cannot do again.	Female	50	1.860	49.240	-0.486	0.627
	Male	50	2.120	51.760		
3.To learn a language is an ability and I lack this ability.	Female	50	1.940	43.680	-2.469	0.014**
	Male	50	2.580	57.320		

4.I cannot focus on learning because of my responsibilities in the family.	Female	50	1.940	45.950	-1.673	0.094
	Male	50	2.480	55.050		
5.I will be more willing to learn Turkish if I have good results.	Female	50	3.520	50.730	-0.082	0.935
	Male	50	3.500	50.270		
6.The reason that I cannot learn Turkish is that I don't do my best.	Female	50	2.380	46.800	-1.311	0.190
	Male	50	2.700	54.200		
7.I cannot learn Turkish because I become nervous, and I forget easily.	Female	50	2.420	48.250	-0.799	0.424
	Male	50	2.640	52.750		
8.The language problems that I encounter make me tired.	Female	50	2.900	51.500	-0.353	0.724
	Male	50	2.800	49.500		
9.The expectations on learning a language are so high and this affects me negatively.	Female	50	2.620	46.770	-1.314	0.189
	Male	50	2.980	54.230		
10.I don't learn Turkish, I just memorise it.	Female	50	2.260	47.220	-1.171	0.242
	Male	50	2.620	53.780		
11.The pressure of the people affects my learning process.	Female	50	2.660	47.230	-1.153	0.249
	Male	50	2.980	53.770		
Motivation Problems for Learning Turkish	Female	50	2.511	46.270	-1.460	0.144
	Male	50	2.778	54.730		

*Indicates statistical difference at a *p<.05 (**p<.01, ***p<.001) level, $\bar{X}$=mean, $\bar{r}$: mean rank

When table 5 is examined, it was determined that there is a statistically significant difference between females ($\bar{r}$=436.80) and males (=$\bar{r}$573.20) in item 3, *"To learn a language is an ability and I lack this ability."* in motivation problems subdimension (p<.01). The males' mean rank value shows that they agree with this statement more and think learning a language requires an ability and their ability to learn a language is limited.

DISCUSSION AND CONCLUSION

The current study aimed at investigating the motivation sources and problems experienced by learners of Turkish as a foreign language. For this aim, 4 main types of motivation as integrative and instrumental motivation in Gardner's socio-educational model and intrinsic and extrinsic motivation in Deci et al.'s self-determination theory were employed in data collection process.

The results showed that students' highest motivation source is to communicate with the society. Communication is one of the elements in integrative motivation, so it is possible to say that TFL learners dominantly has integrative motivation. The researchers in educational field advocated the role of integrative motivation in the performance of learners (e.g., Al Othman & Shuqair, 2013; Obediat, 2015). The results also showed that learners learn Turkish to have better education and job opportunities, this indicates that instrumental motivation is the second motivation resource for TFL learners. This result is line with Dörnyei (1990)'s study in a foreign language environment. The mixture of these two types of motivation supports what Brown (2000) proposed before. He emphasised that the students who have integrative motivation can also have instrumental motivation. When the results are examined in the lights of self-determination theory, intrinsic factors are not found to be effective in their motivation. Moreover, extrinsic factors, such as expectations of others, the attitudes in learners' close circle and responsibilities in the family, have lower means. Therefore, it would be appropriate to say that the main motive for learners of Turkish is driven by integrative motivation to communicate with the society.

The motivation problems subdimension results indicated that learners experienced some difficulties in the past as they did not know Turkish. We can infer that personal experiences have an effect on motivation of learners of Turkish.

Gender is found to have no effect on motivation sources subdimension for the learners of Turkish. This result contradicts with the most studies comparing gender and finding the motivation of females to be higher towards learning a foreign language (e.g., D'Lima et al., 2014; Jiao et al., 2022). However, in the motivation problems subdimension, males stated that language learning is possible if someone has the ability, and females are more likely to have this ability. The ability is closely related to intrinsic motivation in self-determination theory, and we can say that males' intrinsic motivation is lower when compared to females.

Suggestions for Educational Contexts

This study reveals that learners who live in Türkiye and learn Turkish as a foreign language have been affected by all four factors as integrative, instrumental, intrinsic and extrinsic. It is difficult to define an exact motivation type the students have, but the teachers and administrative staff should be aware of these 4 types of motivation. In the preparation stage of the curriculum, these factors should be kept in mind, and this would motivate the students and develop their performance. In the lights of the results from the current study, suggestions for language teachers and administration are listed below.

1. The activities should be prepared to create a classroom environment that stimulates students to learn Turkish to increase their intrinsic motivation. Wlodkowski (1984) stated that learning activity starts due to the need of students to learn, but maintaining the attention or being involved in learning occurs if the learning environment is stimulating.

2. Teachers should be educated about individual differences and acknowledged that motivation is one of the components of individual differences.

3. The learners should keep the effort even when they fail. Teachers should be careful while reacting the mistakes made by students. They should also be careful about their verbal or non-verbal messages as they are obvious signals of their reactions towards mistakes (Ray, 1992). The learners who develop high self-esteem know how to overcome the mistakes and do not give up (Bandura, 1986). It is necessary for language teachers to make the learners feel they could achieve some good results.

4. The materials used in language teaching should attract students' attention, students should enjoy the activities so that their intrinsic motivation could increase. Students reach the highest level of motivation when the things (in this context, it can be activities) mean something in their life (Ray, 1992).

Limitations

Current study is limited to the data obtained from the learners who studied in B1 and B2 level groups in preparatory schools in Türkiye between 2018-2019. The number of the participants and gender distribution enabled meaningful data, but the demographic background of the participants was not similar to each other. Also, the age of the participants, where they come from and the department where they study, were different from each other. The study to be conducted with the same number of participants from similar demographic backgrounds will provide more consistent and homogenous results.

As the method of the study, only quantitative design was adopted. Supporting this design with qualitative data collection tools like (semi) structured interviews will enable learners to express themselves better and motivational resources and problems will be understood much better. Also, this mixed design will not limit the learners with the options, they can propose other factors that were not determined beforehand, and this will help researchers have comprehensive perspectives.

This study employs only the opinions of learners, but the teachers are the best observers. They realize the students' reactions to the activities or the teaching methods much more carefully. Also, including the administrative staff in the research process will help to obtain viable results. Therefore, further studies that triangulate the data will contribute to interpretation of results and increase the applicability and efficiency of the suggestions.

Statements of Publication Ethics

As the authors of this study, we declare that we obeyed the principles of publication ethics. As the data for the current study started to be gathered in 2018, ethics committee exemption form was added in the attachments.

Researchers' Contribution Rate

This study was produced from the first author's master thesis accepted in 2019. The data gathering process and analysis were completed by the first author. The findings were interpreted with the contribution of the second author. Overall, the whole research process was supervised by the second author.

Conflict of Interest

This study has no conflict of interest.

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Investigation of Computer Literacy and Web 2.0 Tools Usage Levels of Classroom Teachers

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Abstract

The aim of this study is to determine whether the computer literacy levels of classroom teachers differ according to gender, education level, taking computer courses and professional seniority and their use of web 2.0 tools. General scanning model was used in the research. The participants of the research are 300 classroom teachers working in the central district of Tokat. The data of the research were obtained through a sociodemographic information form, a computer literacy scale, and a questionnaire about the use of Web 2.0 tools. Percentage, arithmetic mean, standard deviation, t-test for independent samples and one-way analysis of variance were used in the analysis of the data. As a result of the research, it was determined that the computer literacy level of classroom teachers differed significantly according to gender, education level, and computer-related education, and there was a low significant difference according to professional seniority. The Web 2.0 tools that classroom teachers are most aware of are Facebook, MSN, video sharing sites, diaries, Wiki, and podcasts, respectively. While classroom teachers mostly use MSN and video sharing sites for communication purposes, they use Wiki and Podcast for informational purposes and diaries for professional purposes. In general, it has been observed that the level of computer literacy is high. In-service training courses can be given to classroom teachers so that classroom teachers can use technology effectively in the educational environment. Technology-related groups can be formed between schools close to each other and knowledge and experience can be shared among teachers. Primary school teacher candidates should be informed in depth about Web 2.0 tools in education faculties. The use of these tools for educational purposes inside and outside the classroom should be increased.

Keywords: Computer literacy, primary school teacher, web2.0 tools

Sınıf Öğretmenlerinin Bilgisayar Okuryazarlık ve Web 2.0 Araçlarını Kullanım Düzeylerinin İncelenmesi

Öz

Bu araştırmanın amacı sınıf öğretmenlerinin bilgisayar okuryazarlığı düzeylerinin bazı değişkenlere göre farklılık gösterip göstermediğini ve web 2.0 araçlarını kullanma durumlarını belirlemektir. Araştırmada genel tarama modeli kullanılmıştır. Araştırmanın katılımcılarını Tokat ili merkez ilçesinde çalışan 300 sınıf öğretmeni oluşturmaktadır. Araştırmanın verileri sosyodemografik bilgi formu, bilgisayar okuryazarlık ölçeği ve Web 2.0 araçlarını kullanım durumlarına yönelik anket ile elde edilmiştir. Verilerin analizinde yüzde, aritmetik ortalama, standart sapma, bağımsız örneklemler için *t*-testi ve tek yönlü varyans analizi kullanılmıştır. Araştırma neticesinde sınıf öğretmenlerinin bilgisayar okuryazarlık düzeylerindeki anlamlı farklılığın cinsiyete, eğitim düzeyine, bilgisayarla ilgili eğitim alma durumlarında olduğu,düşük düzeyde farklılığın ise mesleki kıdemde olduğu belirlenmiştir. Sınıf öğretmenlerinin en fazla haberdar olduğu Web 2.0 araçları sırasıyla Facebook, MSN, video paylaşım siteleri, günlükler, Wiki, podcastlardır. Sınıf öğretmenleri Facebook, MSN ve video paylaşım sitelerini en çok iletişim amacıyla kullanırken, Wiki ve Podcast'ı bilgi edinme amacıyla, günlükleri mesleki amaçla kullanmaktadırlar. Genel olarak bilgisayar okuryazarlık düzeylerinin ise yüksek olduğu görülmüştür. Sınıf öğretmenlerinin eğitim ortamında teknolojiyi yetkin olarak kullanabilmesi için hizmetiçi eğitim kursları verilebilir. Birbirine yakın okullar arasında teknoloji ile ilgili gruplar oluşturulup öğretmenler arasında bilgi, tecrübe paylaşımı sağlanabilir. Web 2.0 araçlarıyla ilgili eğitim fakültelerinde sınıf öğretmeni adayları derinlemesine bilgilendirilmelidir. Bu araçların sınıf içinde ve dışında eğitsel amaçlı kullanımı artırılmalıdır.

Anahtar kelimeler: Bilgisayar okuryazarlık, sınıf öğretmeni, web2.0 araçları

INTRODUCTION

It is an undeniable fact that humanity has been very busy with technology both today and in the past. According to Bybee (2000), more than forty percent of the 100 major events that shaped the 20th century were related to technology in one way or another. Especially in the age of technology and information, changes that drag humanity into different worlds such as adaptation of technology to various parts of technology and digital technologies bring with it research and discussions (Aydın & Silik, 2018).

Technology and its applications have emerged as a result of man's controlling and directing nature, which embodies all the concepts of thinking, understanding and putting into action (Satıcı, Akkuş, & Alp, 2009). Technology has continuously developed and changed since mankind began to cultivate the earth and utilize fire. Human beings have also encountered and started to use technology in their daily lives. Transportation and communication tools have been among the most used technologies. In the field of transportation; automobiles, ferries, ships, trams and airplanes in the field of communication; products such as television, radio, telephone and internet have become the most necessary elements in people's daily lives. These tools constitute only one dimension of technological literacy and technology. This trend has compelled people to understand the world of technology and to utilize it in the fastest and easiest way possible. It makes it necessary to be aware of technological change (Bacanak et al., 2003). It is necessary to keep up with these developments and changes in order to lead a better quality and comfortable life (Bektaş & Semerci, 2008). It is an undeniable fact that technological developments and changes are of great benefit to human life in every aspect. Technology is a holistic scheme that includes different elements such as economic, social, moral, social and cultural values (Aydın, 2009).

The field of education is an area where technology should be utilized the most. At this stage, education should ensure that individuals are raised in a way to meet their own needs and the needs of society. In this respect, all societies in the world, primarily developed countries, are striving to provide their citizens with a qualified and quality education by actively using technology (NoNE, 2004). Our country has also taken various steps to keep up with technological innovations and changes. The most important and fundamental of these steps is the extension of primary education to 8 years and making it compulsory in 1997. The Ministry of National Education "Basic Education Law" started to open information technology classrooms in all primary schools to improve the quality of compulsory education, which increased to 8 years (Akkoyunlu & Yılmaz, 2005). In this way, schools were enriched and equipped technologically. In 2005, all schools were asked to set up websites to enable faster access to and sharing of information about schools (Özdener & Çakar, 2007). In 2006, in the Journal of Communiqués, the qualifications that teachers should have within the scope of information technologies were published under the name of "General Qualifications for the Teaching Profession". Our dependence on technology continues to increase day by day. The field of education is an area where technology should be used the most. At this stage, education should ensure that individuals are raised in a way to meet their own needs and the needs of society. In this respect, all societies in the world, primarily developed countries, are striving to provide their citizens with a qualified and quality education by actively using technology.

The use of technology in education enables the development of a generation that understands, uses, researches, active, curious and conscious (Altun, 2003; Gerçek et al. 2006; Koseoğlu et al. 2007). Societies need to be integrated with technology in order to complete their development, keep up with the age and have a high cultural level. Conscious use of technology will bring about development. Individuals need to be technologically equipped in order to become modern, developed individuals. The people who will provide this knowledge, skills and attitudes are undoubtedly teachers who are the cornerstone of education (Akkoyunlu, 1995). In order for the professional groups in the society to be well-educated and well-equipped individuals, first of all, teachers should be given the best education suitable for our age. In order to raise enlightened generations, priority should be given to educational institutions as in every innovation. In this way, light will be shed on technologically advanced new generations (Varol, 2001).

In order for educators to become technologically equipped, they must first gain ability to use a computer, which is one of the most important technological tools, in other words, they must be computer literate. Individuals with this literacy can use computer programmes, access the information they want on the computer or the internet. Teachers and students should utilize computer technologies effectively in the realization of learning and at every stage of teaching. Because the use of computer technology-based teaching environments is getting more and more important. In order to actively use these environments based on computer technologies, teachers and students need

to acquire skills such as knowing and using these technologies. Individuals with these skills are called computer literate.

Individuals need mentors and guides to help them access accurate information. In order to understand and guide the new generations of our digital age correctly, first of all, teachers need to be aware of the technologies of our age, to be able to actively use the computer, which is one of the most important of these technologies, and to believe in and trust themselves in this context, in other words, to be computer literate. Technology offers teachers various tools to transfer knowledge more permanently and effectively. In order to use these tools, it is necessary to be technologically literate. Therefore, in this study, the technological literacy levels of classroom teachers, who are the cornerstones of education, and their level of use of Web 2.0 tools will be determined and it will be revealed whether these literacies differ according to various factors. Thus, a contribution will be made to the related literature and the literature on teacher education. For this reason, in this study, the computer literacy and Web 2.0 tools usage levels of classroom teachers will be determined and whether these literacies differ according to various factors will be revealed. Thus, it is aimed to contribute to the literature on pre-service and post-service teacher education. It is a fact that technology has a critical importance in our lives. Therefore, it is of great importance to determine the computer literacy of teachers. Based on the stated features, the problem statement of this study was determined as "Do the computer literacy levels of classroom teachers differ according to some variables and what is their use of Web 2.0 tools?". In order to find a solution to this problem, solutions to the following sub-problems were sought:

1. Is there a significant difference in computer literacy levels of classroom teachers according to their gender?

2. Is there a significant difference in computer literacy levels of classroom teachers according to their level of education?

3. Is there a significant difference in computer literacy levels of classroom teachers according to their computer course taking status?

4. Is there a significant difference in computer literacy levels of classroom teachers according to their professional seniority?

5. What are the Web 2.0 tools that classroom teachers are aware of?

6. How often do classroom teachers use Web 2.0 tools?

7. For what purposes do classroom teachers use Web 2.0 tools?

Computer Literacy

In our age, computers are actively used in various fields such as health, education, banking, research, software, architecture and engineering. Therefore, it has become one of the indispensable tools in our lives. In order to use this technological tool, it is necessary to acquire some skills and become computer literate (Arslan, 2019). Knowing and using basic information about computers is called computer literacy (Caspo, 2002). The concepts of computer literacy or computer literacy started to be used in the 1980s with the introduction of personal computers into our lives (Kolburan, Geçer & Dağ, 2010). The term "computer literate" includes two basic concepts and their sub-topics. These are:

The reader; a brief history of the computer, concepts and definitions of the computer, the most commonly expressed computer terms, the classification of the computer, the working principles of the computer, the capacity of the computer, the technical hardware and peripherals of the computer, networks.

The author; as grouped active use of the internet, programming, grouping of software, purpose of use of software, programming (Yazıcı, 2006).

Individuals who are computer literate are expected to have some computer-related competencies. A good computer literate person should have the following characteristics:

-Can operate a computer,

-Knows the working logic of the computer,

-Knows what the components of a computer are,

-Can use a portable device,

-Windows can open, move, close,

-Can access the internet,

-Can access social networking sites,

-Know which paths to follow to reach the information they want,

-Knows which computer programs to use to access information,

-Finally, they use the computer effectively (Korkmaz & Mahiroğlu, 2009:985; Akkoyunlu, 1996:128; Walsch, 2007:80).

Web 2.0 Tools

Web 2.0 applications can be categorized as wiki (Wikipedia etc.), social networks (Facebook, MSN etc.), blog (Diary), podcast (Audio Recording), video sharing sites (Youtube etc.).

Wiki (Wiki) is used in Hawaiian to mean to be fast, to be in a hurry (Wiki, 2009). Wikis are websites that facilitate bridging between pages, allowing users to create content, edit content and delete content. Wiki users can update existing information, add new topics and titles from anywhere in the world. At the same time, users do not need any membership to perform these operations. The realization of these activities is ensured by the participation of many authors. The first of the wiki sites, which provides a highly effective and useful platform especially for authorship applications, is the Internet site called Wikiwiki Web, which was founded by Cunnigham in 1994 for information sharing (Alazcıoğlu, 2016). Today, the first one that comes to mind from wiki sites, which also means internet encyclopedias, is Wikipedia, which was established in 2001 and grew rapidly (Karaman, Yıldırım, & Kaban, 2008). It is translated into Turkish as Wikipedia.

One of the most important applications of Web 2.0 technologies is Diaries (Blogs). The word blog is translated into our language as "diary". Blogs are web applications that contain pictures, links, audio files and text created by individuals or groups. Diaries appear as sites that people use to introduce themselves and express their thoughts. In diaries, features such as adding content, editing-deleting content or expressing opinions are used within the framework of the authorizations given to users. As with other Web 2.0 technologies, there is no need for high-level technical equipment to use or manage blogs. Users can write and publish the content they want to write in a very simple way by using ready-made templates. The usage areas of diaries in educational environments vary from electronic product files to online newspapers-magazines. Diaries can be created by individuals as learning materials and used in educational environments as well as used to present course content (Karaca & Aktaş, 2019).

Horzum (2010) gave the example of diaries designed as "online personal newspapers" about the use of diaries in educational environment. These diaries are the joint works of students in an interactive sharing. While students create their works, they can be shared with other students, schools and parents on the web without worrying about time, space and budget. Thanks to these diaries, which are prepared as electronic personal product files (portfolios), students have the opportunity to present their works to everyone by adding them to their electronic diaries. In this way, teachers and parents can easily follow the personal development of students. Teachers and academics also make great use of diaries in today's technological age. These studies, called teacher diaries, are platforms where educators exchange ideas in their fields, discuss various issues, and establish dialogue with each other (Weller, Pegler, & Mason, 2005). Such technological applications provide great convenience to educators, students and parents in educational environments.

Today's most widely used websites are Social Networks. These sites, also called social media, contribute individuals to recognize themselves, express themselves, and communicate and interact with their close environment. Individuals use social media to come together for a common purpose or to become a member of a group (Karaca, 2015). The most well-known social networks are sites such as Instagram, Facebook, Google Plus, Linkedin, Twitter, Flicker, Yahoo, Foursquare, Skype. These social networks are capable of carrying the communication between people to the virtual world. They are very suitable environments especially for the development of communication skills of people who have difficulty in expressing themselves. In the digital age we are in, people can communicate with all over the world in written, audio and video thanks to these tools. In addition, it provides environments where individuals who do not know each other at all and reside in different cities can establish social communication with each other. The most popular social media site among these is

Facebook. Facebook contains multiple advanced Web 2.0 technologies such as tagging, video chat, instant messaging, and media sharing, content scoring.

Video sharing sites are sites that offer participants the opportunity to share their videos with each other on various topics. The content of video sharing consists of sharing and publishing subjects in all kinds of video formats (Horzum, 2010). Users can watch these shared videos using technological tools such as tablets, phones and computers. Thanks to video sharing sites, which are one of the most widely used applications of Web 2.0 tools, users can access videos more quickly and easily. Videos provide a permanent record for the events that take place, allowing for detailed analysis and unlimited repetition (Tan & Towndrowb, 2009: 63). Video sharing sites also vary according to the purpose of use. The most widely used ones are YouTube and Google Video. These video sharing sites include the publication of videos prepared for educational or different purposes on web pages. It offers learning environments to users visually and aurally. At the same time, they are also sites that educators who want to diversify learning in the classroom environment can effectively benefit from. Teachers benefit from video sharing sites as a virtual library in supporting traditional education, visualizing difficult-to-understand subjects, repeating subjects abundantly, compensating for missing learning, and following students' lessons one-to-one by providing access to video clips (Duffy, 2009: 126).

Podcasts are generally audio recording files that can be listened to on a computer or portable devices (tablet, phone, usb, hard disc) through a website and shared over the web. Although podcasts are similar to radio, which is one of the traditional media tools, they show great differences in terms of technique and format. Some of these differences can be listed as follows (Kaynar, 2021):

- Providing mobile listening feature,

- It can be downloaded to devices and listened to without internet,

- Being under the control of the user,

- Not being affiliated with a specific media group,

- No subject, place and time limit,

- Free from institutional limitations,

- Configuring the content suitable for interventions such as deleting, editing, adding,

- The podcaster can update the content at any time,

- Podcasts differ from radio in terms of many features such as the fact that podcasts can be controlled by listeners and listeners can re-listen to the broadcast at the desired speed. These differences also make podcasts more advantageous.

Podcasts offer users the opportunity to make podcasts with non-professional technical equipment, without the limitations of subject, format, space and time. Podcasts are more economical than oral presentations by providing a content presentation that is preferable for learners who learn with audio materials. Podcasts have many benefits such as being automatic, easy to control, always accessible, portable, concise and concise (Geoghegan & Klas, 2007). Therefore, it has become one of the most utilized technologies in education. According to Beldarrain (2006), some teachers recommend topics suitable for the content and scope of the course to their students and allow them to share these products by going through active participation processes such as researching the topic in teams, sifting and analysing information, writing scenarios, recording their performances. In addition to all these, postcasts support and facilitate the transfer of the prepared content to every medium of education through portable devices.

Technology which use as tools in education can be used at every stage of education and training in order for people to reach a better level of learning experiences (Huang, Spector, & Yang, 2019). In the current digital age, it is necessary to create educational environments equipped with technology in order for individuals to acquire various skills and competencies. Technology integration contributes greatly to education by improving pedagogical practices as well as providing students with high-level analytical learning skills (Keengwe & Onchwari, 2011). The active and efficient use of technology in the educational environment once again reveals the importance of technology integration (Samancıoğlu, 2011).

It is recognized that teachers' own subject knowledge is no longer sufficient to transfer knowledge to students of today's digital age. Therefore, different methods and strategies need to be developed and implemented. Technology provides great convenience in the process of accessing, transferring and sharing information. More effective and permanent learning will be provided when teachers use these technological opportunities in the education environment (Burmabıyık, 2014). Technology, which has become the most basic element of our daily lives, has an important effect on the training of well-equipped individuals. Web 2.0 applications, which are most preferred by individuals in the field of technology, are also used in educational environments. In this way, the skills targeted in students are tried to be gained faster and in a fun way. Through these applications, users can share information and collaborate with each other more frequently without time and space limitations.

Web 2.0 is an idea first proposed by Tim O'Reilly in 2004 as a brainstorming session at a conference (O'Reilly, 2007). Web 2.0 tools have emerged with ideas such as being able to use personally created products and content, open source coding, participation structure, and reaching more masses (Anderson, 2007). According to O'Reilly (2007), the concept of Web 2.0 encompasses brand new applications and services that allow many participants to create an environment and structure simultaneously. The most important target of Web 2.0 applications and services is to enable users to share content without being exposed to technical problems and to benefit from the social sharing and collaboration potentials of the Internet. Web 2.0 applications, which are called social software, bring about a transition from technology literacy to technology literacy. The Internet moves away from being an environment where existing information is created and consumed, and turns into a platform where content is created, integrated, shared and transferred with the participants (Horzum, 2010). O'Reilly (2007) argues that people who use Web 2.0 tools can access information, use information, share information, and produce their own thoughts without being dependent on existing information, and that they do not need to be computer literate for this. The use of Web 2.0 tools in the educational environment is a very important step that enables the establishment of an effective communication network between users, the production of active knowledge and the sharing of the produced knowledge with various groups (Wright & Akgüngüz, 2018). Web 2.0 tools refer to technologies that bring users from a passive position to the position of both using and producing content.

With Web 2.0 applications, online tests, presentations, animations, diaries, games, boards, word clouds, concept maps, banners and logos can be prepared. Web 2.0 tools are divided into various sections according to their tasks; word clouds, content management systems, drawing tools, concept maps, file storage and sharing, animation, presentation tools and video, survey and online meeting tools (Elmas & Geban, 2012). We can group these technologies as wikis, blogs, RSS (Rich Site Summary), social networks, podcasts and instant messaging. The features of these applications and the purposes and examples of their use in education are as follows: Students and teachers can easily incorporate these applications into the process in the educational environment; thus, they have the opportunity to integrate many achievements into the educational environment at the same time. With the use of these applications in education; blogs and weblogs enable the sharing of announcements and the transfer of new information to the social environment in the safest and fastest way. Concept maps, concept cartoons and word clouds help students internalize new schemas, while presentation tools make knowledge transfer efficient, effective and fun. Podcasts allow students to listen to and repeat the lessons at any time. Wikis, on the other hand, means "hurry" in Hawaiian and their use by academics, students and teachers in the field of education is rapidly becoming widespread worldwide (Genç, 2010). As guides, teachers develop students' writing skills. Web 2.0 applications are also called read-write Web. The most used instant messaging applications by users are Google Talk, Whatsapp, Messenger, Yahoo Messenger, Facebook, Sype. With these applications, students have high-level thinking skills. With the projects, students have the opportunity to meet, discover, share and collaborate with their peers around the world.

METHOD

In this study, the general survey model was used. Yıldırım and Şimşek (2008) explained the general survey model as a survey conducted on the whole universe or a group, sample or sample to be taken from it in order to reach a general conclusion about the universe in a universe consisting of many members.

Working Group

The participants of this study consisted of 300 primary school teachers working in the central district of Tokat province in the 2021-2022 academic year. While 140 of the participants were female primary school teachers, 160 were male primary school teachers. The number of primary school teachers with bachelor's degree

or less consists of 221 individuals, while 79 of them have postgraduate education. Participants were determined by simple random sampling method.

Data Collection Tools

In this study, data were collected to determine the computer literacy levels of classroom teachers and their use of web 2.0 tools. The data of the study were obtained through the sociodemographic information form, the computer literacy scale developed by Kolburan, Geçer and Dağ (2010) and the questionnaire on the use of Web 2.0 tools developed by Karaca and Aktaş (2019). The sociodemographic information form was developed by the researcher based on the independent variables of the study. In this section, there are questions about the gender, education level, computer course enrollment status and professional seniority of the classroom teachers.

Computer Literacy Scale, in which data were collected to determine the computer literacy levels of classroom teachers, consists of 40 five-point Likert-type items. The items in the scale have the options of not at all (1), very limited (2), a little (3), quite (4) and very good (5). The arithmetic mean ranges used in the evaluation of the research findings are as follows: "1,00-1,80=None", "1,81-2,60=Very Limited", "2,61-3,40=Somewhat", "3,41- 4,20=Quite" and "4,21-5,00=Very Good". Since the scores in the scale are between 1.00 and 5.00, it is accepted that the participants' level of agreement with the statement is high as the scores approach 5.00 and low as the scores approach 1.00. The score that a participant can get from the scale is between 40 and 200.

Web 2.0 Tools Usage Status Scale, in which data were collected to determine the use of Web 2.0 tools by classroom teachers, included questions about Web 2.0 applications such as Wiki, Blog, Social Networks (Facebook, MSN), VPS (Video Sharing Sites), Podcast and RSS. Some outdated Web2.0 tools (MSN) were not excluded from the scale in order to preserve the originality of the scale. The questionnaire, which consists of four sub-sections, aims to determine the participants' Awareness of Web 2.0 Applications, Frequency of Use of Web 2.0 Applications, Ways of Using Web 2.0 Applications for Educational Purposes and Level of Proficiency for Web 2.0 Applications. The frequency of classroom teachers' use of Web 2.0 tools was analyzed as "never used, once a month, once a week, every day" and the purposes of using Web 2.0 tools were analyzed as "Information, Professional, Communication".

The measurement tools used to determine classroom teachers' computer literacy levels and their use of web 2.0 tools were prepared online through Google Forms. In order to implement these measurement tools, permission was obtained in accordance with the circular of the Ministry of National Education General Directorate of Innovation and Educational Technologies No. 2020/2 on Research Application Permissions. The instructions for completing the measurement tools were shared with the participants through whatsapp groups and social networks and they were asked to fill them in. The participants were informed that participation in the study was voluntary, that no personal data was requested and that the data obtained would not be used for purposes other than the research. A total of 300 classroom teachers completed the scales and sent them to the researcher.

Data Analysis

All statistical procedures within the scope of the research were carried out in SPSS 23 data analysis program. Before analyzing the data, missing and outliers and the assumptions of the independent samples t-test and one-way analysis of variance (ANOVA) were examined. In order to examine the accuracy of the data, the minimum and maximum values of each classroom teacher's responses to the dependent and independent variable items were examined (George & Mallery, 2020; Harrison, Kemp, Brace, & Snelgar, 2021; Kalaycı, 2010). The very limited number of missing values in the data set were assigned the item median value if it is a ranking type variable or the mode value if it is a classification type variable (Parent, 2013). No univariate outlier was found in the data set (Tabachnick & Fidell, 2012).

Descriptive statistics including frequency, percentage, mean and standard deviation were used to classify the classroom teachers' sociodemographic characteristics and their responses to the items of the Technology Literacy Scale and the whole scale. Independent samples t-test was used to determine whether there was a significant difference in the total mean scores of the technology literacy scale according to the gender, education level and whether they had taken a computer course or not. One-way ANOVA was used to determine whether there was a significant difference in the total mean scores of the technology literacy scale according to the professional seniority of the classroom teachers.

In order to examine the normality assumption, the skewness and kurtosis values of the total scores of the Technological Literacy Scale were examined, taking into account the sample size (George & Mallery, 2020;

Tabachnick & Fidell, 2012). As a general rule, skewness and kurtosis values in the range of -2 to +2 indicate that the data show a distribution close to normal. When the skewness and kurtosis values of the total scores of the Technological Literacy Scale were analyzed, it was found that the skewness value was -.84 and the kurtosis value was .45. These findings indicate that the total scores of the Technological Literacy Scale show a distribution close to normal. The assumption of homogeneity of variances, which is the other assumption of t-test for independent samples and one-way ANOVA, was checked with Levine's test (Hinton, McMurray, & Brownlow, 2014). Since the assumption of homogeneity of variances was not met in one-way ANOVA analyses as a result of the Levine tests, the Welch F test, which is recommended to be used when the assumption of homogeneity of variances is not met, and the post-processing Games Howell test were used (Hinton et al., 2014). A significance level of .05 was used in all inferential analyses.

Research Ethics

Tokat Gaziosmanpaşa University Social and Human Sciences Research Ethics Committee approved this study. Ethics committee approval was obtained with number E-91742949-044-167638 and date 30.05.2022.

FINDINGS

In this section, the mean and standard deviation values of the computer literacy scale of the classroom teachers and the findings related to the sub-problems of the research are given respectively.

1. Mean and Standard Deviation Values of Computer Literacy Scale of Classroom Teachers

Table 1 shows the mean and standard deviation values of classroom teachers' responses to the computer literacy items and the entire scale.

Table 1. Mean and Standard Deviation Values of Computer Literacy Scale of Classroom Teachers

	Mean	Std.	Comment
1. I can load data from a USB flash drive or CD into a computer.	4.65	.67	Very High
2. I can apply operations such as cut, copy, paste to files or folders on the computer.	4.66	.70	Very High
3. I can create a personal file on a computer.	4.61	.80	Very High
4. I can use Windows operating system with its features.	4.11	.85	High
5. I can connect the printer to the computer, identify and operate it.	4.20	1.00	High
6. I can set up an internet connection and make its settings.	3.99	1.01	High
7. I can use a presentation program on the computer effectively (such as PowerPoint).	3.94	1.05	High
8. I can make bank transactions online.	4.36	.88	Very High
9. I can effectively use writing and calculating programs on the computer (such as Word, Excel).	3.90	.96	High
10. I can subscribe to blogs, file sharing sites or forums and transfer files.	3.72	1.14	High
11. I can create and manage a personal Web page.	2.64	1.29	Middle
12. I can format the computer and install programs.	2.62	1.40	Middle
13. I can use technological tools related to my profession.	4.15	.74	High
14. I can scan a printed material on a scanner and transfer it to a computer.	3.79	1.24	High
15. I can use Bluetooth technology.	4.01	1.08	High
16. I can use social media programs (Facebook, Twitter, LinkedIn, etc.) effectively.	3.97	1.04	High
17. I can use the smart board effectively.	4.13	.96	High
18. I can use internet search engines effectively.	4.45	.70	Very High
19. I can shop online.	4.27	1.04	High
20. I can connect the projection device to the computer and use it.	4.13	1.08	High
Computer Literacy General	4.02	.72	High

Note N = 300. Values between 1.00-1.80 are categorized as Very Low, values between 1.81-2.60 as Low, values between 2.61-3.40 as Medium, values between 3.2-4.20 as High, and values 4.21 and above as Very High.

As seen in Table 1, the three computer literacy skills that the classroom teachers had at the highest level were being able to perform operations such as cut, copy, and paste to files or folders on the computer (Mean. = 4.66), being able to run a USB flash drive or CD on the computer and upload data to the computer (Mean. = 4. 65) and creating a personal file on the computer (Mean = 4.61), while the three computer literacy skills they had the lowest level were formatting and installing programs on the computer (Mean = 2.62), creating and managing a personal web page (Mean = 2.64), and becoming a member of blogs, file sharing sites or forums and transferring files (Mean = 3.72). When the computer literacy skills of classroom teachers are evaluated as a whole, it is seen that these skills are at a high level.

2. Computer Literacy Levels of Classroom Teachers by Gender

The results of the independent samples t-test conducted to determine if there is a significant difference between the total mean scores of the computer literacy scale according to the gender of the classroom teachers are shown in Table 2.

Table 2. Computer Literacy by Gender Independent Samples t-test Results

	n	Mean.	Std.	sd	t	p	d
Male	160	84.39	13.86	298	5.36	.001***	.62
Female	140	75.65	14.36				

p < .001***.

As seen in Table 2, independent samples t-test, it was found that there was a significant difference in the total mean scores of the computer literacy scale according to gender (t(298) = 5.36, p < .001, d = .62). This difference has a moderate effect size. It is seen in Table 2 that the total mean scores of male classroom teachers on the computer literacy scale are significantly higher than the mean scores of female classroom teachers. Figure 1 shows these differences observed between the groups according to gender graphically.
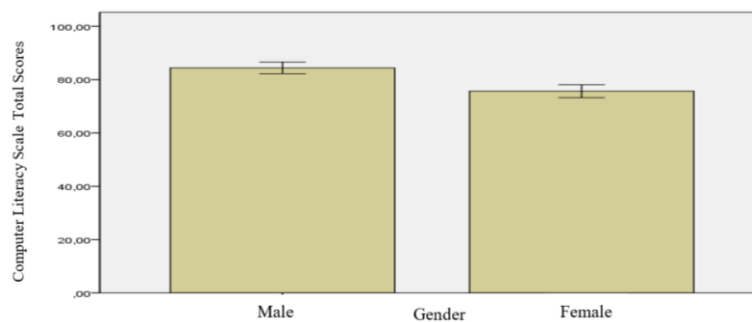

Figure 1. *Computer Literacy Scale Total Score Averages by Gender*

3. Computer Literacy Levels of Classroom Teachers by Education Level

The independent samples t-test results to determine whether there is a significant difference between the total mean scores of the computer literacy scale according to the education levels of the classroom teachers are shown in Table 3.

Table 3. Independent Samples t-test Results of Computer Literacy by Level of Education

	N	Mean.	Std.	sd	t	p	d
Undergraduate and below	221	78.39	15.08	298	-3.86	.001***	-.51
Postgraduate	79	85.68	12.32				

p < .001***.

As seen in Table 3 it was found that there was a significant difference in the total mean scores of the computer literacy scale according to the education level of the classroom teachers (t(298) = -.3.86, p < .001, d = -.51). This difference has a moderate effect size. As seen in Table 3, the total mean scores of the computer literacy scale of classroom teachers with postgraduate education are significantly higher than those of classroom teachers with undergraduate and below education. Figure 2 shows these differences observed between the groups according to the level of education graphically.
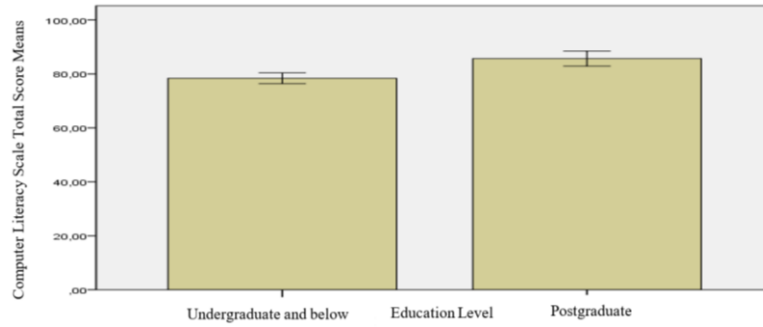
Figure 2. *Computer Literacy Scale Total Score Averages According to Education Level*

4. Computer Literacy Levels of Classroom Teachers According to the Status of Taking Computer Courses

Table 4 shows the results of the independent samples t-test conducted to determine whether there is a significant difference between the total mean scores of the computer literacy scale according to whether the classroom teachers have taken a computer course or not.

Table 4. Independent Samples t-test Results of Computer Literacy According to Computer Course Taking Status

	n	Mean.	Sdt.	sd	t	p	d
Yes	226	81.95	14.55	298	3.42	.001***	.46
No	74	75.31	14.26				

p < .001***.

As seen in Table 4, it was found that there was a significant difference in the total mean scores of the computer literacy scale according to the status of taking computer courses (t(298) = 3.42, p < .001, d = .46). This difference has a low level effect size. As seen in Table 4, the total mean scores of the computer literacy scale of the classroom teachers who took computer courses were significantly higher than the classroom teachers who did not take computer courses. Figure 3 graphically shows these differences observed between the groups according to the status of taking computer courses.
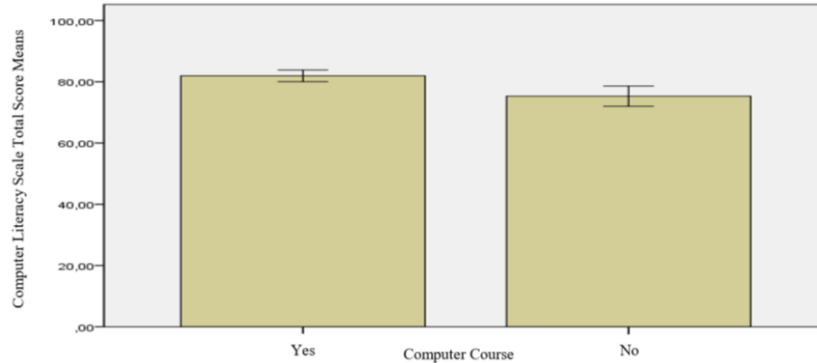

Figure 3. *Total Score Averages of Computer Literacy Scale According to Computer Course Taking Status*

5. Computer Literacy Levels of Classroom Teachers According to Their Professional Seniority

The results of one-way ANOVA conducted to determine whether there is a significant difference in the total mean scores of the computer literacy scale according to the professional seniority of the classroom teachers are shown in Table 5.

Table 5. One-Way ANOVA Results of Computer Literacy According to Professional Seniority

	N	Mean.	Sdt.	sd₁, sd₂	F	p	η²	Post Process
1. 10 years and less	83.45	11.21	11.21	2, 141.34	3.16	.041*	.04	1-3
2. 11-20 years	81.32	13.72	13.72					
3. 21 years and over	77.89	16.77	16.72					

p < .05*.

As seen in Table 5, it was found that there was a significant difference in the total mean scores of the computer literacy scale according to the professional seniority of the classroom teachers (F(2, 141.34) = 3.16, p < .05, η2 = .04). This difference has a low level effect size. As a result of the post-processing Games-Howell tests

performed in order to determine which group or groups this difference observed in the total mean scores of the computer literacy scale according to professional experience was caused by the difference in scores between the groups, it was found that the total mean scores of the computer literacy scale of classroom teachers with 10 years or less professional experience (mean = 83.45) were significantly higher than those of classroom teachers with 21 years or more professional experience (mean = 77.89). There is no significant difference between the other groups. The graphical representation of these differences observed between the groups is shown in Figure 4.
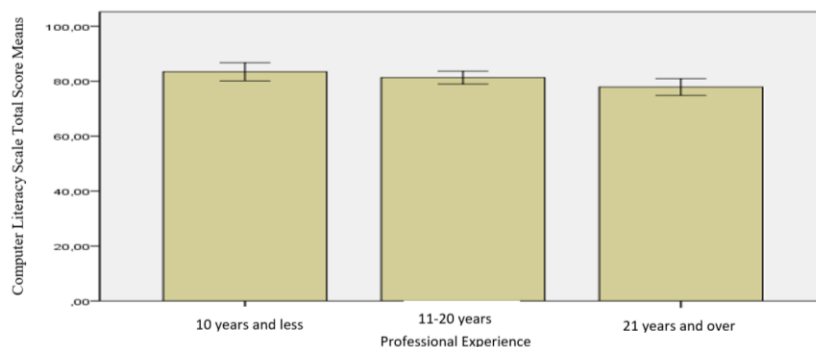

Figure 4. *Computer Literacy Scale Total Score Averages According to Professional Experience*

6. Web 2.0 Tools that Classroom Teachers are Aware of

Table 6 shows the frequency and percentage values of Web 2.0 tools that classroom teachers are aware of.

Table 6. Web 2.0 Tools that Classroom Teachers are Aware of.

	n	*%*
Facebook	285	95.0
Msn	250	83.3
Wiki	62	20.7
Diaries	68	22.7
Video Sharing Sites	221	73.7
Podcast	61	20.3

Note Participants may tick more than one option or may not indicate their preferences if they do not use them. Therefore, the sum of frequency counts may be more or less than the sample size.

As seen in Table 6, the Web 2.0 tool that classroom teachers are most aware of is Facebook (95.0%), followed by MSN (83.3%), video sharing sites (73.7%), diaries (22.7%), Wiki (20.7%) and Podcast (20.3%).

7. Frequency of Classroom Teachers' Use of Web 2.0 Tools

The frequency and percentage values of the frequency of classroom teachers' use of Web 2.0 tools are shown in Table 7.

Table 7. Frequency of Classroom Teachers' Use of Web 2.0 Tools

	n	*%*
Facebook		
Never used	37	11.8
Once a month	50	15.9
Once a week	59	18.8
Every day	168	53.5
MSN		
Never used	33	13.4
Once a month	82	33.2
Once a week	66	26.7
Every day	66	26.7
Wiki		
Never used	129	74.1
Once a month	17	9.8
Once a week	19	10.9
Every day	9	5.2

Diaries		
Never used	70	65.4
Once a month	13	12.1
Once a week	13	12.1
Every day	11	10.3
Video Sharing Sites		
Never used	23	15.6
Once a month	68	46.3
Once a week	18	12.2
Every day	38	25.9
Podcast		
Never used	57	61.7
Once a month	21	22.3
Once a week	9	8.6
Every day	7	7.4

Note Participants may tick more than one option or may not indicate their preferences if they do not use them. Therefore, frequency counts may be more or less than the sample size.

As seen in Table 7, 53.5% of the classroom teachers who expressed their opinions on the frequency of use of Web 2.0 tools use Facebook every day, 33.2% use MSN once a month, 10.9% use Wiki once a week, 12.1% use diaries once a month, 46.3% use video sharing sites once a month and 22.3% use podcasts once a month.

8. Classroom Teachers' Purposes of Using Web 2.0 Tools

Table 8 shows the frequency and percentage values of the answers given by the classroom teachers according to their purposes of using Web 2.0 tools.

Table 8. Classroom Teachers' Purposes of Using Web 2.0 Tools

	n	%
Facebook		
Obtaining information	122	25.5
Vocational	114	27.3
Contact	211	47.2
MSN		
Obtaining information	81	29.0
Vocational	83	29.7
Contact	115	41.3
Wiki		
Obtaining information	36	51.4
Vocational	22	31.4
Contact	12	17.2
Diaries		
Obtaining information	18	36.7
Vocational	21	42.9
Contact	10	20.4
Video Sharing Sites		
Obtaining information	63	30.4
Vocational	65	31.4
Contact	79	38.2
Podcast		
Obtaining information	19	43.2
Vocational	14	31.8
Contact	11	25.0

Note Participants may tick more than one option or may not indicate their preferences if they do not use them. Therefore, frequency counts may be more or less than the sample size.

As can be seen in Table 8, among the Web 2.0 tools, the classroom teachers who expressed their opinions use Facebook (47.2%), MSN (41.3%), video sharing sites (38.2%) mostly for communication purposes, while Wiki (51.4%) and podcast (43.2%) are used for information acquisition and diaries (42.9%) are used for professional purposes.

DISCUSSION AND CONCLUSION

In this study, it was examined whether the computer literacy levels of classroom teachers differed according to gender, educational status, computer course taking status and professional seniority variables and their use of Web 2.0 tools. Classroom teachers' awareness of Web 2.0 tools, frequency of use of these tools and their purposes of use were analyzed.

It was determined that the computer literacy levels of primary school teachers differed significantly according to gender, education level, and taking computer courses. As a result of the research conducted by Akgül, Küpeli and Kır (2015) in which the computer literacy levels of primary school teachers were examined, the computer literacy levels of classroom teachers differed significantly according to gender and educational status. In the study conducted by Safa (2019), it was found that the technology literacy of classroom teachers showed a significant difference according to gender and that the significant difference was in favor of men. As a matter of fact, the same situation was also found in this study. The fact that male teachers are more interested in technological devices and spend more time with these devices may be effective in the emergence of this result.

A low level significant difference was observed in the computer literacy levels of classroom teachers according to professional seniority. There was a significant difference in the computer literacy rate between classroom teachers who worked for the first years of their profession and classroom teachers who worked for 21 years or more. There is no significant difference between the other groups of classroom teachers working between 1-10 years and 11-20 years. In the formation of this situation, the fact that young teachers who are working in the first years of their profession are accustomed to the technological opportunities brought by the age and have a positive attitude towards them has led to higher technological literacy rates of young teachers. They consider themselves competent in terms of computer literacy as a result of being intertwined with technology both in their university education and as a result of their age. In Güneş and Buluç's (2017) study, it was concluded that there was no significant change between primary school teachers' ability to use technology and their professional seniority. This result is in parallel with the findings of this study. Technology is everywhere in life today. Regardless of age and professional seniority, a technology-based education and training environment has become inevitable. Especially during the Covid-19 pandemic, this situation has become a necessity. For this reason, no matter which seniority teachers have and which settlement they work in, they are naturally included in this obligation. For this reason, the computer literacy levels of classroom teachers may not have differed significantly according to professional seniority. As a result of the study conducted by Kaya (2017), it was concluded that there was a highly significant difference between the attitudes of classroom teachers towards the use of technology in education according to their professional seniority.

Another variable, education level, is also an important factor in the development of computer literacy. In this study, according to the educational level, the computer literacy of classroom teachers with postgraduate education is significantly higher than that of classroom teachers with undergraduate and below education. As a result of the research conducted by Tatlı and Akbulut (2017), pre-service teachers stated that they mainly had problems with the use of current software and Microsoft Office and that they wanted to take courses on these issues during undergraduate education. In addition, as the technology literacy levels of pre-service teachers increased, they exhibited positive attitudes and behaviours in the use of technology throughout education (Usta & Korkmaz, 2010). Therefore, the education offered at every level will have significant contributions to the computer literacy levels of individuals.

As a result of the research, the computer literacy of classroom teachers who took computer courses was significantly higher than classroom teachers who did not take computer courses. As a result of the research conducted by Akgül, Küpeli and Kır (2015), the computer literacy level of teachers who took computer courses was higher. It will enable classroom teachers who take computer courses to use the computer, which is one of the most important technological tools, more actively and quickly in the classroom environment.

In our world where technological development and change are very fast, there are many studies that web 2.0 applications are the most important digital tools used in the contemporary education paradigms of the 21st century. When the internet usage of students was investigated, it was found that they use web 2.0 applications excessively. Internet use provides important benefits to students' academic lives as well as their social lives (Genç, 2010). It is also important for classroom teachers to take a course about web 2.0 tools which are so important. With the development of technology and especially web technology, it is noteworthy that courses for special purposes are organized instead of general comprehensive courses. One of these is the courses on web 2.0 tools. These courses, which are suitable for the requirements of the age, will contribute to teachers in the teaching process. Therefore, computer literacy of teachers will be shaped in parallel with these courses.

As a result of the research, it was seen that classroom teachers were mostly aware of social networks and video sharing sites among Web 2.0 tools, and they were aware of the existence of Wiki and podcast at a low rate. Similar results were observed in Horzum's study in 2010. Teachers' awareness of Social Networking and Video Sharing Sites was found to be much higher than other Web 2.0 applications. The frequent use of social networks in all areas of daily life may have been effective in the emergence of these results. It is thought-provoking that teachers have a low level of awareness of Web 2.0 tools such as podcasts, which have many benefits such as being automatic, easily controllable, always accessible, portable, concise and concise. As mentioned by Harkness in 2010, podcast recordings are very important in terms of complementing the course content and presenting information, recording and sharing it easily and quickly, listening to it again and again at any time and place, and being an alternative educational tool in environments where face-to-face education is not possible. In addition, this web tool will be an alternative for students who cannot attend the lessons for some reasons or who have learning difficulties.

The most used Web 2.0 tools are Facebook every day, Wikis once a week, MSN once a month, diaries, video sharing sites and podcasts. It was observed that teachers used Facebook, MSN and video sharing sites for communication, Wiki and podcasts for information and diaries for professional purposes. This situation shows that the tools that teachers use and are aware of the most are used for communication and information acquisition. Akkoyunlu, Atav, and Sağlam (2006) also concluded that pre-service teachers use internet tools mostly for communication and accessing information. Web 2.0 tools are of great importance today because they allow individuals to communicate whenever and wherever they want, despite their geographical location (Olaniran, 2009).

Karaca and Aktaş (2019) in their study "Investigation of Secondary Education Institution Teachers' Awareness, Proficiency Levels, Frequency of Use and Educational Purposeful Use of Web 2.0 Applications" concluded that teachers use Web 2.0 tools mostly to communicate. This result is consistent with the findings of this study. The use of such technological tools by teachers in the educational environment increases the quality of education and motivates the students positively. In this way, the teacher saves time and energy by addressing students who learn in different styles.

As a result of the research, it was determined that the computer literacy levels of classroom teachers were at a high level. Accordingly, it can be said that the computer literacy levels of classroom teachers are at a sufficient level. These findings are in line with the findings of Öztürk (2019) that digital content is appropriate and actively used. We can conclude that the good level of classroom teachers' ability to use digital content and technology is of great benefit to their professional competences. It is concluded that they have the competences of active use in teaching activities. Having these competences was found to be very important in terms of providing benefits to educational studies and activities. As a result of the research conducted by Özbek (2020) on 304 classroom teachers, it was concluded that classroom teachers generally considered themselves sufficient in terms of their ability to use technology in terms of digital content and scope. As a result of the research conducted by Atalay and Anagün (2014), almost all primary school teachers considered themselves sufficient in the use of technology.

Implication

In order for classroom teachers to use technology effectively in the educational environment, the following can be done:

- In-service training courses can be given to classroom teachers.
- Physical facilities of educational environments can be organized in a way to allow the use of technology. Technology equipment classes can be created in schools. In this way, environments where teachers can learn and apply the use of technology more easily can be prepared.

- Technology groups can be established in virtual environments for teachers to develop positive thoughts towards technology. Thanks to these environments, teachers will increase their interactions with each other and improve themselves in the subjects they lack.
- The technological literacy of teachers who have been working in the profession for 10 years and over and classroom teachers who are 30 years old and over can be monitored and training can be given to teachers at certain intervals.
- Teachers can be given courses to use Web 2.0 tools more effectively in educational environment. Teachers can be informed about which Web 2.0 applications they can use in the educational environment on the basis of branch.
- In particular, areas where students studying in the Faculty of Education can use the computer at an advanced stage should be created. Educators who understand technology very well and use it in all areas of their lives will cause an incomplete learning process.
- This study was conducted to investigate the technological literacy levels of primary school classroom teachers. Studies can also be conducted to investigate the technological literacy levels of teachers at different levels of education. Since this study is limited to the central district of Tokat province, studies with different sample groups can be conducted and the results obtained can be compared.

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Turkey-Singapore Comparison in terms of Variables Affecting PIAAC 2015 Quantitative Skills

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Abstract

This study aims to determine the variables predicting the numerical scores of Turkey and Singapore participating in the PIAAC 2015. The application was conducted on 5199 adults in Turkey and 5394 adults in Singapore between the ages of 16-65. According to the multiple linear regression analysis, gender, age, education level, employment status, and participation in any educational activity in the last 12 months significantly predict the numeracy skills of adults in Turkey and Singapore. These variables explain approximately 33% of the variance in Turkey's PIAAC numerical scores and 55% of the variance in Singapore's PIAAC numerical scores. In both countries, the variable that predicts the quantitative scores of adults the most is that the participants have a bachelor's degree. After education level, the next most predictive variable is age. A high level of education (bachelor's degree and above) and a low level of age (16-24 years old) are strong predictors of quantitative scores. Employment status is the least predictive variable of numerical scores in both countries.

Keywords: large-scale assessments, multiple linear regression analysis, international comparison

PIAAC 2015 Sayısal Becerilerini Etkileyen Değişkenler Açısından Türkiye-Singapur Karşılaştırması
Öz

Bu araştırmanın amacı PIAAC 2015 uygulamasına katılan Türkiye'nin ve Singapur'un sayısal puanlarını yordayan değişkenleri belirlemektir. Uygulama, 16-65 yaş aralığındaki Türkiye'de 5199, Singapur'da 5394 yetişkin üzerinden gerçekleştirilmiştir. Yapılan çoklu doğrusal regresyon çözümlemesine göre cinsiyet, yaş, eğitim düzeyi, çalışma durumu ve son 12 ayda herhangi bir eğitim-öğretim faaliyetine katılma durumu değişkenleri Türkiye'deki ve Singapur'daki yetişkinlerin sayısal becerilerini manidar bir biçimde yordamaktadır. Bu değişkenler Türkiye PIAAC sayısal puanları varyansının yaklaşık %33'ünü, Singapur PIAAC sayısal puanları varyansının ise yaklaşık %55'ini açıklamaktadır. Her iki ülkede de yetişkinlerin sayısal puanlarını en fazla yordayan değişken, katılımcıların lisans mezunu olmasıdır. Eğitim düzeyinden sonra en fazla yordayıcı güce sahip değişken yaş değişkenidir. Eğitim düzeyinin yüksek olması (lisans ve üzeri) ve yaş düzeyinin düşük olması (16-24 yaş arası) sayısal puanlarının güçlü birer yordayıcısıdır. Her iki ülkede de çalışma durumu sayısal puanlarını en az yordayan değişkendir.

Anahtar Sözcükler: geniş ölçekli durum belirleme, çoklu doğrusal regresyon çözümlemesi, uluslararası karşılaştırma.

INTRODUCTION

People may learn from birth to death. This process is called "lifelong learning" in the literature, which includes learning from early childhood to the end of adulthood and is seen as a universal right to education (Benasso et al., 2022). According to Miser (2013), lifelong learning includes all learning activities in and out of school. Individuals need to fulfill their learning needs in adulthood following their years of formal education.

Adult learners' continuation of lifelong learning is ensured by adult education. Adult education is defined as education that covers formal and non-formal learning activities that have a significant impact on encouraging adults to develop their potential, adult literacy, community awareness, and participation in civil society (Okojie & Sun, 2020). It contributes to the completion of incomplete education of adults or the provision of new educational opportunities to individuals who have completed their education (Faure, 1972).

Many countries attach importance to the participation of adults in lifelong learning activities, aiming to ensure that every individual in society benefits from equal educational opportunities and acquires various skills (State Planning Organization-Devlet Planlama Teşkilatı [DPT], 2001; United Nations, 2015). Skills include cognitive, intrapersonal, and interpersonal competencies that enable individuals to use the multiple knowledge they have acquired in real-life situations (Haladyna, 1997; Kutlu, et al., 2017; Kutlu and Altıntaş, 2021). Rapid economic, scientific, and social changes and developments in countries require adults to have more and more skills.

General skills, which are defined as a means of developing a workforce that can cope with changing conditions, consist of skills such as numeracy, communication, self-learning and performance improvement, information technology, management, work organization, problem-solving, and group work (Pumphrey & Slater, 2002). In the lifelong learning declaration published by the European Union, it is stated that all individuals in society should develop skills such as literacy, numeracy, information technologies, foreign languages, and entrepreneurship by providing learning opportunities to individuals everywhere (Commission of the European Communitie, 2000). Within the framework of Education and Training 2020, it aims to increase adults' participation in lifelong learning activities and reduce the proportion of adults with low literacy, numeracy, and science skills (Eurostat, 2019). The United Nations Sustainable Development Plan aims to ensure that a significant portion of all youth and adults acquire literacy and numeracy skills by 2030 (United Nations, 2015).

Numeracy, which is included in countries' educational policies and development goals, is a comprehensive skill that requires mathematical skills and other skills such as problem-solving, reasoning, and communication (O'Donoghue, 2018). It relates to contexts involving mathematical knowledge in daily life (O'Sullivan, 2023) through thinking, reasoning, and acting (Tout, 2020). Numeracy is seen as a fundamental skill for young people and adults beyond formal education to perform an expanding range of mathematical and statistical operations and the requirements of these operations (Gal et al., 2020). Increasing technology and data use causes the world's quantitative aspect to become more prosperous and complex, requiring numerical skills in all applications in daily life, online platforms, and all kinds of communication (Hoogland & Diez-Palomar, 2022). Numeracy, which is effective in participating fully in society today and having opportunities and options to shape its future, is also accepted as critical employability skill in the global economy (Alcantara, 2022).

It is also becoming increasingly important to determine at what level adults have various skills (Organisation for Economic Co-Operation and Development [OECD], 2021). With the findings obtained from large-scale evaluations at the national and international levels, a path can be followed in education policies and planning (Simon et al., 2013). Since the 1990s, the International Adult Literacy Survey (IALS) and Adult Literacy and Life Skills (ALL) applications have been developed to evaluate adult skills between the ages of 16-65 (Kirsch & Braun, 2020). Prose literacy, document literacy, and quantitative literacy skills of adults were measured in the IALS application, launched in 1994 (OECD, 2000). In this application, skills that require numerical operations are considered numeracy literacy. In the ALL application implemented in 2003, literacy and numeracy were separated, and the problem-solving skill area was added. In each application, studies were carried out to develop skill areas.

In 2012, the IALS and ALL applications were further developed, and the Programme for the International Assessment of Adult Competencies (PIAAC) was launched. PIAAC is conducted by the OECD and consists of achievement tests of adults aged 16-65 in various countries in the areas of literacy, numeracy, and problem-solving

in a technology-intensive environment and a background survey that collects information about adults (OECD, 2013). In the achievement tests in the application, proficiency levels consisting of specific tasks were defined. Individuals were scored according to their responses to the items at these levels, and their proficiency level was determined (OECD, 2016; OECD, 2019).

The first cycle of PIAAC implementation was carried out between 2012-2018 and the second cycle is planned to be completed between 2018-2024. Turkey participated in this implementation in 2014-2015 and the implementation was carried out in 30 provinces (The Ministry of Labor and Social Security-Çalışma ve Sosyal Güvenlik Bakanlığı [ÇSGB], 2020). As a result of the implementation, adults in Turkey ranked 32nd among 34 countries with an average score of 219 points in numeracy skills, below the OECD average of 263 points. Considering the success of the countries participating in the second round of the application together with Turkey, Singapore stands out. Adults in Singapore scored 257 points in numeracy skills, below the OECD average, like in Turkey (OECD, 2016). The country ranking ranks 17th among 34 countries and is close to the OECD average. The reason why Singapore stands out here is that Singapore generally ranks high in the results of the Programme for International Student Assessment (PISA), Trends in International Mathematics and Science Study (TIMSS), and Progress in International Reading Literacy Study (PIRLS), which are international applications that measure the skills of the young population (Deng & Gopinathan, 2016; Kaur et al., 2019).

PISA, which is applied to individuals before adulthood (age 15), measures skills in reading, mathematical literacy, and science literacy (OECD, 2024). In the years when PIAAC was implemented, the mathematics achievement of students in Turkey was below the OECD average, while Singapore was above the OECD average (OECD, 2024). Considering both PISA and PIAAC results, Turkey has low numeracy skills in the youth and adult populations. In Singapore, on the other hand, the numeracy skills of the youth population in PISA are high, while the numeracy skills of the adult population in PIAAC are low. Singapore's success in the young population can be explained by consistent education policies, teacher training systems, quality school leaders, information and communication technologies, and the importance given to equal opportunities in education and mathematics, science, and technical skills (Levent & Yazıcı, 2014). It is thought that Singapore's failure to achieve the same success in the adult population and Turkey's failure in the youth and adult population may be due to various reasons.

In both countries, the adult population aged 15 and above constitutes a large proportion of the general population (Department of Statistics Singapore, 2020; Turkish Statistical Institute-Türkiye İstatistik Kurumu [TÜİK], 2021). For this reason, studies are carried out in both countries to improve the education and skills of adults, who constitute a large part of the population. In Singapore, many institutions and organizations for lifelong learning and adult education aim to improve the skills of adults and increase their employability (SkillsFuture, 2020a). With the SkilssFuture movement launched in 2014 in the country, lifelong learning is turned into a culture, and various education programs are provided to students, employers, employees, education experts, and other individuals in the country (SkillsFuture, 2020b). In Turkey, many studies have been carried out in the name of adult education since the ancient Turks. The Ministry of National Education and other public institutions, organizations, and non-governmental organizations carry out studies on adult education The Ministry of National Education has set priorities for creating a culture of lifelong learning in society, increasing access to opportunities, and expanding it: Creating lifelong learning culture and awareness in the society, increasing lifelong learning opportunities and provision, increasing access to lifelong learning opportunities, developing lifelong guidance and counseling system, developing recognition of prior learning system, developing lifelong learning monitoring and evaluation system (Ministry of National Education Lifelong Learning Strategy Document 2014-2018, 2021). Adult education activities provided through the non-formal education system are carried out through Public Education Centers, Maturation Institutes, and Open Education Schools (Ministry of National Education Regulation on Lifelong Learning Institutions, 2018). In these institutions, various programs are organized for individuals of different ages and education levels to complete their incomplete education, improve their skills and acquire a profession.

In Singapore, adult education includes courses on workplace numeracy skills for employees, numeracy skills for parents, basic numeracy skills for machine learning and software development, and differentiated learning methods for numeracy for educators, with the government paying for the courses (SkilssFuture, 2022). In Turkey, literacy courses on mathematical competence for adults, game-based mathematics education for educators, and numeracy skills used daily. Citizens can benefit from free of charge at public education centers (MoNE, 2022). In open education school programs, mathematics courses are taught in parallel with formal education programs (MoNE, 2001).

Although there are many studies on lifelong learning and adult education activities in Turkey and Singapore courses and programs are organized for numeracy skills (SkillsFuture,2022; MoNE, 2018), it is seen that PIAAC numeracy skills are low. Although there are many studies in the literature on international applications such as PISA and TIMMS (Anıl, 2009; Jeffries et al., 2020; Karali et al., 2022; Nilsen, et al., 2022; Radišić et al., 2023; Østbø & Zachrisson, 2022; Quintano et al., 2012), studies on the assessment of adult skills are more limited. The studies on PIAAC in Turkey (Karabacak and Kaygın, 2018; Köker et al., 2016; Özdemir 2019; Yıldız et al., 2018) generally focus on the level of Turkey's success in PIAAC implementation and the examination of this situation in the context of the education system. In the application in which many countries participate, there is no study comparing the achievement levels and factors affecting the achievement of other countries and Turkey. With international practices, the skills of different countries can be compared (Kirsch et al., 2013), and new policies can be produced based on similarities and differences in education systems (Erdoğan, 2003; Bakioğlu, 2017; Fischman et al., 2019).

For this reason, this study aims to compare the variables affecting Turkey's numeracy skills with Singapore, a country below the OECD average. Within the scope of the study, a literature review was conducted to determine the variables that may affect numerical scores. In the literature, it is seen that gender, age, education level, participation in any educational activity in the last 12 months, and employment status are effective on individuals' skills (Green & Riddell, 2015; Jovicic, 2016; Paccagnella, 2016; Schneeweis et al., 2014; Solheim & Lundetræ, 2018). This study aims to determine the variables that predict the numerical scores of Turkey and Singapore participating in PIAAC 2015. It is expected that the findings of the research will shed light on educators and policy makers to determine the variables predicting numeracy skills of adults and to overcome skill deficiencies. For this purpose, the following questions were sought to be answered:

1. What is the distribution of Turkey's and Singapore's numerical scores according to proficiency levels?

2. Do gender, age, education level, employment status and participation in any educational activity in the last 12 months significantly predicts the numerical scores of participants from Turkey?

3. Do gender, age, education level, employment status and participation in any educational activity in the last 12 months significantly predicts the numerical scores of participants from Singapore?

4. Do the variables predicting Turkey's and Singapore's numerical scores show similarities and differences.

METHOD

Research Model

In this study, correlational research method, one of the quantitative research methods, was used. The correlational model aims to determine the existence or degree of change between two or more variables (Karasar, 2020; Fraenkel, Wallen and Hyun, 2012). The correlational model was used in the study since the prediction levels of the variables of gender, age, education level, employment status, and participation in any educational activity in the last 12 months were examined.

Population and Sample

The study population is adults between 16-65 in Turkey and Singapore. Stratified sampling method, one of the probability sampling methods, was used in the PIAAC implementation (OECD, 2016). Stratified random sampling is the selection of subgroups classified according to various characteristics according to their proportion in the population (Fraenkel, Wallen and Hyun, 2012). The application sample is 5199 adults in Turkey and 5394 adults in Singapore who participated in PIAAC in 2016. This research was conducted on 5184 adults in Turkey and 5381 adults in Singapore after missing data and extreme value analysis. The distribution of the adults who participated in the study in Turkey and Singapore according to their demographic characteristics is given in Table 1 below.

Table 1. Distribution of Adults from Turkey and Singapore who participated in the PIAAC Application according to Demographic Characteristics

Country	Variable	Level	Number	Percentage
Turkey	Gender	Male	2627	50.5
		Female	2572	49.5
	Age	16-24	860	16.6
		25-34	1423	27.4
		35-44	1322	25.4
		45-54	907	17.4
		55 and above	687	13.2
	Education Level	Primary education or below	2989	57.5
		High School	1243	23.9
		Vocational School, Open Education Faculty(2 years)	297	5.7
		License	591	11.4
		Master's Degree	76	1.5
	Employment Status	Working	2318	44.7
		Not working	240	4.6
		Out of Labor Force	2626	50.7
	Education Participation Status (Last 12 Months)	Yes	1468	28.2
		No	3728	71.7
Singapore	Gender	Male	2675	49.6
		Female	2719	50.4
	Age	16-24	1074	19.9
		25-34	1097	20.3
		35-44	1168	21.7
		45-54	1113	20.6
		55 and above	942	17.5
	Education Level	Primary education or below	933	17.3
		High School	1234	22.9
		Post-secondary non-higher education	732	13.6
		Short-term higher education	1027	19.0
		License	1131	21.0
		Master's Degree/PhD	336	6.2
	Employment Status	Working	3989	74.0
		Not working	210	3.9
		Out of Labor Force	1194	22.1
	Education Participation Status (Last 12 Months)	Yes	3324	61.6
		No	2070	38.4

When Table 1 is analyzed, the gender distribution of adults in Turkey and Singapore is very close to each other. While the majority of participants in Turkey are between the ages of 25-34, the distribution of age groups in Singapore is close to each other. Most adults in Turkey have primary education or below, while in Singapore, they have above primary education. This shows that adults in Turkey are mostly at a lower educational level than adults in Singapore. In Turkey, there is a high proportion of working adults as well as those outside the labor force, whereas, in Singapore, most adults are working. While most adults in Turkey have not participated in any educational activity in the last 12 months, more than half of adults in Singapore have.

Data Collection

In the PIAAC application, data collection was carried out through visits to certain addresses by officials. First of all, a background questionnaire was applied in which demographic information about adults was collected. Then a paper-pencil or a computer-based assessment was made according to the computer use status of adults.

Data Collection Tools

In this research, Turkey and Singapore data were downloaded in SPSS format from the PIAAC data available on the OECD's official website. PIAAC Quantitative Skills Test and Background Questionnaire were used as data collection tools in the research.

Numeracy Skills Test: It consists of various dimensions that involve managing a situation or solving a problem (OECD, 2016). The numeracy skill test has items of different difficulty levels, which are evaluated for over 500 full points. There are 52 items in the computer-based assessment and 24 in the paper-pencil assessment. According to the success of the adults in answering the items, 6 proficiency levels were defined: Below Level 1, Level 1, Level 2, Level 3, Level 4, and Level 5. As you go from Level 1 to Level 5, the difficulty levels and score levels of the items also increase.

For the validity analysis of cognitive tests in PIAAC, a population model consisting of responses to the background questionnaire and item responses in the cognitive tests was used. The findings showed that the variance explained by Item Response Theory and the latent regression model was comparable across countries (OECD, 2019). For the estimation of the proficiency scores of the skills tests, 80 replications were performed on the weighted data in the scores of the two countries, and 10 possible values (PV1-PV-10) of each adult in the sample were used together. In the PIAAC report published by the OECD, the reliability coefficient of the numeracy skills test was reported to be 0.85 in Turkey and 0.93 in Singapore (OECD, 2016).

Background Questionnaire: The background questionnaire developed by the OECD as part of a consortium of countries was designed to be in line with the conceptual and theoretical framework, valid and reliable, comparable across groups and countries, and comparable with other international practices (OECD, 2019). The questionnaire consists of 258 items that collect demographic information about adults, education and training, employment status, literacy at work and in daily life, use of problem-solving skills in a numerical and technology-intensive environment, learning strategies, health, and parental characteristics (OECD, 2016).

Analyzing the Data

Percentage and frequency calculations were used to determine the distribution of the Turkish and Singaporean samples according to demographic characteristics. The distribution of numerical scores according to proficiency levels was determined using the International Database Analyzer (IDB) program of the International Association for the Assessment of Educational Achievement (IEA).

Multiple regression analysis was conducted with the SPSS 25 Package Program to determine which variables significantly predicted the numerical scores of Turkey and Singapore, such as gender, age, education level, employment status, and participation in any educational activity in the last 12 months. Then, the results of the multiple linear regression analysis of the two countries were compared.

In the first question of the research, IEA's IDB program was used to determine the distribution of PIAAC 2015 Turkey's and Singapore's numerical scores according to their proficiency levels. This program determines the distribution of Turkey's and Singapore's numerical scores according to their proficiency levels. Multiple regression analysis was used to determine which of the variables of gender, age, education level, employment status, and participation in any educational activity in the last 12 months significantly predicted the numerical scores of Turkey and Singapore in the 2nd and 3rd questions of the study. In the fourth question of the study, multiple linear regression analysis findings of the two countries were compared to determine whether the variables predicting the numerical scores of Turkey and Singapore show similarities and differences.

Multiple linear regression analysis is a statistical analysis method based on the prediction of a dependent variable by more than one independent variable (Büyüköztürk, 2019; Pallant, 2017). The independent (predictive) variables of the study are gender, age, education level, employment status, and participation in any educational activity in the last 12 months. The dependent (predicted) variable is numerical scores consisting of 10 possible values (PV1-10). In this study, using the standard multiple linear regression model, all independent variables were analyzed, and the effect on the dependent variable was examined. In multiple linear regression analysis, all variables must be continuous. If the variables are not continuous, a dummy variable is formed as 1 less the number of categories of the categorical variables (Keith, 2014). Since the variables of gender, age, education level, employment status, and participation in any educational activity in the last 12 months were categorical, a dummy variable was created for each. Codings of dummy variables are shown in Appendix 1.

Before the analysis, the data set was arranged, and 5 missing data from Turkey and 2 missing data from Singapore were removed. Tabachnick and Fidell (2013) stated that the methods to be applied would yield similar results if the missing data rate is less than 5% in data sets with a large sample size. To determine the extreme

values, univariate and multivariate extreme values were examined. Data outside the standard Z values of -4, +4 (Harrington, 2008) and above the critical chi-square value according to Mahalanobis distances were excluded from the analysis. After these examinations, analyses were made on 5184 data in Turkey and 5381 in Singapore.

Multiple linear regression analysis assumptions (normality, linearity, multicollinearity, and autocorrelation) were tested (Tabachnick & Fidell, 2013). It was seen that these assumptions were met from the normality and linearity graphs of Turkey and Singapore data. To determine whether there is a multicollinearity problem, it was checked whether there was a value above 0.80 in the correlation coefficients between the variables (Büyüköztürk, 2019). Since no value above this value was found in both countries, it was observed that there was no multicollinearity problem. In addition, tolerance and VIF (Variance Inflation Factors) values were also examined. The highest tolerance value for Turkey is .951, the lowest tolerance value is .409, and the VIF value is between 1 and 3. The highest tolerance value for Singapore is .965, and the lowest tolerance value is .441, with VIF values between 1 and 3. The fact that tolerance values between 0 and 1 and VIF values below 10 in Turkey and Singapore data show no multicollinearity problem (Keith, 2014). When the Durbin-Watson value for the autocorrelation assumption is examined, it is seen that it is 1.81 in Turkey and 1.90 in Singapore. The fact that this value is between 1.5 and 2.5 indicates no correlation between the variables (Kalaycı, 2016). After testing all these assumptions, multiple linear regression analysis was performed.

Research Ethics

The research was conducted taking into account all ethical procedures. In addition, Ethics Committee approval was obtained with the decision of Ankara University Social Sciences Sub-Ethics Committee dated 31/05/2021 and numbered 192.

FINDINGS

Findings Related to the First Purpose of the Study

The first aim of the study is to determine the distribution of Turkey's and Singapore's numerical scores according to proficiency levels in the PIAAC applicationThe results are shown in Table 2.

Table 2. Distribution of PIAAC 2015 Numerical Scores according to Proficiency Levels

Levels	Scores for the Levels	TURKEY Percentage	SINGAPORE Percentage	OECD Percentage
Below Level 1	0-175	20.7	13.0	6.7
Level 1	176-225	30.6	15.2	16.0
Level 2	226-275	34.0	26.8	33.0
Level 3	276-325	13.2	31.7	31.8
Level 4	326-375	1.5	12.0	10.2
Level 5	376 -500	-	1.3	1.0
Missing				1.4
Turkey $\overline{X}$= 219, Singapore $\overline{X}$= 257, OECD $\overline{X}$= 263				

Table 2 shows that the average of Turkey's numerical scores ($\overline{X}$= 219) corresponds to Level 1, and 50.6% of adults are at Level 1 and below. The proportion of adults at Level 4 and above is very low. This shows that adults in Turkey can generally answer items that require simple and one-step processes but cannot answer items that require more complex high-level skills.

Singapore's numerical score average ($\overline{X}$= 257) corresponds to Level 2 and is lower than the OECD average ($\overline{X}$= 263). The distribution of adults in Singapore by qualifications is more proportional than that of adults in Turkey and is similar to the distribution of the OECD average. While there are fewer adults at Level 1 and below in Singapore than in Turkey, there are more adults at Level 3 and above. Accordingly, the skill levels of adults in Singapore are higher than adults in Turkey.

Findings Related to the Second Objective of the Research

The second aim of the study was to determine which of the following variables significantly predicted Turkey's PIAAC 2015 numerical scores: gender, age, education level, employment status, and participation in any educational activity in the last 12 months. The results are shown in Table 3.

Table 3. Multiple Linear Regression Analysis Results for Turkey

Variable	B	Standard Error (B)	ß	t	p	Bilateral r	Partial r	R	R^2	F	p
Constant	169.123	.018		9445.829	0.000			.572	.327	2024520.13	.000
Genderdd2	19.031	.014	.182	1377.800	0.000	.256	.191				
Agedd2	31.386	.023	.252	1389.772	0.000	.150	.193				
Agedd3	24.329	.022	.199	1113.976	0.000	.101	.156				
Agedd4	22.254	.022	.179	1020.081	0.000	-.009	.143				
Agedd5	20.399	.022	.148	907.420	0.000	-.058	.127				
Edudd2	35.726	.015	.283	2307.365	0.000	.267	.310				
Edudd3	37.257	.030	.147	1237.140	0.000	.114	.172				
Edudd4	60.604	.024	.311	2529.781	0.000	.289	.337				
Edudd5	70.872	.058	.144	1218.455	0.000	.132	.170				
Empdd1	2.030	.015	.019	137.612	0.000	.217	.019				
Empdd2	-5.528	.033	-.020	-168.184	0.000	.010	-.024				
Patedudd1	11.068	.015	.096	734.697	0.000	.287	.103				
F (12.49954617=2024520.13)											

When Table 3 is examined, the variables of gender, age, education level, employment status, and participation in any educational activity in the last 12 months show a moderate and significant relationship with the numerical scores of adults in Turkey, and together they explain approximately 33% of the variance in numerical scores. (R=.572, R^2=.327, p<.01). According to the bilateral and partial correlations, there are positive and low-level, negative and low-level relationships between the predictive variables and the predicted variable. When the standardized regression coefficients (β) are examined, it is seen that the most important variable predicting the numerical scores of adults in Turkey is having a bachelor's degree. According to the t value results regarding the significance of the regression coefficient, variables such as gender, age, education level, employment status, and participation in any educational activity in the last 12 months are significant predictors of numerical scores.

Findings Related to the Third Objective of the Research

The third aim of the study is to determine which of the variables gender, age, education level, employment status, and participation in any educational activity in the last 12 months significantly predict Singapore's PIAAC 2015 numerical scores. The results are shown in Table 4.

Table 4. Multiple Linear Regression Analysis Results for Singapore

Variable	B	Standart Error (B)	ß	t	p	Bileteral r	Partial r	R	R^2	F	p
Constant	161.760	0.087		1856.927	0.000			.744	.553	265447.743	.000
Genderdd2	10.283	0.053	0.079	193.723	0.000	0.111	0.115				
Agedd2	47.017	0.098	0.273	478.797	0.000	0.210	0.276				
Agedd3	20.385	0.093	0.124	219.950	0.000	0.210	0.131				
Agedd4	11.823	0.087	0.075	135.644	0.000	0.067	0.081				
Agedd5	11.032	0.083	0.071	132.954	0.000	-0.135	0.079				
Edudd2	52.696	0.084	0.337	626.456	0.000	-0.105	0.351				
Edudd3	64.594	0.100	0.334	648.795	0.000	0.041	0.362				
Edudd4	83.859	0.092	0.497	908.861	0.000	0.146	0.478				
Edudd5	112.830	0.094	0.707	1205.748	0.000	0.368	0.585				
Empdd1	123.619	0.125	0.473	991.230	0.000	0.225	0.510				
Empdd2	-5.226	0.071	-0.035	-74.108	0.000	0.073	-0.044				
Constant	-2.451	0.146	-0.007	-16.754	0.000	0.004	-0.010				
Genderdd2	16.377	0.061	0.123	268.762	0.000	0.413	0.159				
F(13.2790354=265447.743)											

According to Table 4, the variables of gender, age, education level, employment status, and participation in any educational activity in the last 12 months give a moderate and significant relationship with the numerical scores of adults in Singapore, and together their numerical scores are approximately 55% of the variance. (R=.744, R^2=.553 and p<.01). According to the bilateral and partial correlations, there are positive and low level, positive and medium level, and negative and low-level relationships between the predictor variables the predicted variable. According to the standardized regression coefficients (β), having a bachelor's degree is the most important variable predicting the numerical scores of adults in Singapore. variables such as gender, age, education level, employment status, and participation in any educational activity in the last 12 months are significant predictors of numerical scores.

Findings Regarding the Fourth Objective of the Study

The fourth aim of the study is to determine whether the variables predicting Turkey's and Singapore's PIAAC 2015 numerical scores are similar and different. According to the findings, variables such as gender, age, education level, employment status, and participation in any educational activity in the last 12 months are significant predictors of numerical scores in Turkey and Singapore. These variables explain approximately 33% of the variance of numerical scores in Turkey, while this ratio is 55% in Singapore.

According to the bilateral and partial correlations, although there are differences between the two countries in terms of the direction and strength of the relationship between the predictor variables and the predicted variable, there are generally positive and low, negative and low-level relationships. According to the order of importance of the predictor variables on the predicted variables, having a bachelor's degree is the most important variable in both countries. According to the B coefficients, a one-unit increase in the variable of a bachelor's degree causes a change of 112,830 units in the numerical scores of adults in Singapore, while this rate is 60,604 in Turkey

DISCUSSION & CONCLUSION

In this study, which aims to determine the variables predicting Turkey's and Singapore's PIAAC 2015 numerical scores, firstly, the distribution of the numerical scores of the two countries according to proficiency levels was examined. Accordingly, Turkey's numerical score average is below Singapore and OECD averages and corresponds to Level 1. Singapore's numerical score average is below the OECD average and corresponds to Level 2. The number of adults with low proficiency levels is higher in Turkey than in Singapore. Therefore, multiple linear regression analysis was used to determine the variables affecting the numerical scores of both countries.

According to the findings, gender, age, education level, employment status, and participation in any educational activity in the last 12 months were significant predictors of numerical scores. According to the studies on PIAAC in the literature, these variables effectively affect individuals' achievement, which supports this study finding (Calero et al., 2016; Cegolon, 2015; Hinz, 2018; Provasnik, 2018; Støren et al., 2018). Predictive variables explain approximately 33% of the variance in Turkey's numerical scores, and the most important predictor of numerical scores is a bachelor's degree. In Singapore, however, predictive variables explain approximately 55% of the variance of numerical scores. Like in Turkey, a bachelor's degree is the most important predictor of numerical scores. This shows that the predictive variables predict Singapore's numerical scores more, and at the same time, the high level of education significantly affects the numerical scores in both countries. According to the B coefficients, the variable of being a bachelor's degree causes more changes in Singapore's numerical scores. It is thought that the reason for this situation may be that the number of adults at the undergraduate level in Singapore is higher than the number of adults in Turkey in the sample distributions. According to the order of importance of the variables, having high education level and a low age level are important predictors of numerical scores in both countries. In contrast, the employment status variable has the least importance.

Research findings show that numerical scores in PIAAC 2015 application are low in both countries, and variables explain this situation. The development of adults' numeracy skills is critical for the development of active citizenship, employment, individual learning and social inclusion in social, economic and societal spheres (Goos et al., 2023). Therefore, policy makers should revisit and improve their strategic initiatives to avoid exclusion due

to numeracy deficits in the public and private spheres by placing more emphasis on numeracy as a transition to a common interaction between different contexts in everyday life (Díez-Palomar et al., 2023).

Since it is seen that a high level of education has a significant effect on these scores, it is thought that it is important for adults to continue their education during formal education and to develop a culture of lifelong learning in society. The age variable also significantly affects numerical skills, and the fact that low-age individuals (16-24 years old) have more skills than older adults shows that more work is required to develop the skills of the elderly group. Although the numerical skills of the young population in Turkey are low, this situation continues in their adulthood. Although Singapore is a successful country in terms of skills among the young population, it is seen that the skills of the adult population are weak. The most important variable affecting skills in both countries is the high level of education. These findings coincide with the findings of other studies in the literature that skills decrease as age increases in the PIAAC application, while skills increase as education level increases (Calero et al., 2016; Huertas, et al., 2017; Liu, 2018; Paccagnella, 2016 and Villar, 2014). PIAAC states that education is the most important determinant of literacy and numeracy skills (Scandurra, 2012). Huertas, et al. (2017) argue that the decline in skills with aging can be compensated by increasing and qualitatively improving schooling. Cegolon (2015), on the other hand, concluded that skills can be increased through participation in formal and non-formal education activities.

Formal and non-formal education activities are discussed in the literature. According to the research, in our age of rapid change, non-formal and informal learning approaches based on individual interests and needs and formal education should be considered together to meet educational needs such as the use of technology, development of digital competencies, integration into social life (Grajcevci and Shala, 2016; Vartolomei, 2016). Today, non-formal education is not only a complementary education but also an education industry that affects formal education (Romi and Schmida, 2009). Emphasizing that the balance between formal and non-formal learning has changed and non-formal learning has become more important, Rogers (2014) suggests that formal and non-formal learning support each other by i) increasing non-formal learning, ii) using formal and non-formal learning together to regulate the non-social consequences of informal learning, iii) providing support for learners' informal learning, and iv) establishing dialogic links between formal and non-formal learning. Research in the literature and the findings of this study show that formal education and adult education activities have an impact on individuals' skills and should be evaluated together. For this reason, it is thought that formal education and adult education activities should be handled together in order to ensure the skill development of the population and educational programs should be arranged.

Since the PIAAC application provides data on adults in every field, it is important to research variables affecting other skills by reviewing the literature and conducting comparative studies between countries to improve the skills of the adult population in society. It is thought that there are fewer studies on PIAAC in Turkey compared to applications such as PISA, TIMMS, and PIRLS because of the application's low awareness. For this reason, different studies can be conducted by the Ministry of National Education and the Ministry of Labor and Social Security to promote the application. It is also recommended that policy makers should increase the awareness of this application by promoting it in the society in order to improve the skills of the adult population, and other researchers should examine the different factors affecting the skills in the PIAAC application.

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APPENDIX

Appendix 1. Defining Categorical Variables as Dummy Variables and Coding

Variable	Level	Dummy Variable	Coding	Reference Group (Group Excluded from Analysis)
Gender	Male=1 Female=0	Genderd	Male=1 Female=0	Female
Age	1=16-24 2=25-34 3=34-45 4=45-54 5=55 and above	aged	16-24= 1 25-34= 0 34-45= 0 45-54= 0 55 and above = 0 16-24= 0 25-34= 1 34-45= 0 45-54= 0 55 and above = 0 16-24= 0 25-34= 0 34-45= 1 45-54= 0 55 and above = 0 16-24= 1 25-34= 0 34-45= 0 45-54= 1 55 and above = 0	55 and above
Education Level (Turkey)	1=Primary education or below 2=High School 3=Associate degree or open education 4=License 5=Master's Degree/PhD	Edud	Primary school or below = 0 High School= 1 Associate degree or open education= 0 License= 0 Master's/PhD= 0 Primary school or below = 0 High School= 0 Associate degree or open education= 1 License= 0 Master's/PhD= 0 Primary school or below = 0 High School= 0 Associate degree or open education= 0 License= 1 Master's/PhD= 0 **Primary school or below = 0** **High School= 0** **Associate degree or open education= 0** **License= 0** **Master's/PhD= 1**	Primary education or below
Variable	**Level**	**Dummy Variable**	**Coding**	**Reference Group (Group Excluded from Analysis)**

Education Level (Singapore)	1=Primary education or below 2=High School 3=Post-Secondary Non-Higher Education 4=Short Term Higher Education 5=License 6=Master's Degree/PhD	Edud	Primary education or below= 0 High School= 1 Post-Secondary Non-Higher Education= 0 Short Term Higher Education= 0 License= 0 Master's/PhD= 0	Primary education or below
			Primary education or below= 0 High School= 0 Post-Secondary Non-Higher Education= 1 Short Term Higher Education= 0 License= 0 Master's/PhD= 0	
			Primary education or below= 0 High School= 0 Post-Secondary Non-Higher Education= 0 Short Term Higher Education= 1 License= 0 Master's/PhD= 0	
			Primary education or below= 0 High School= 0 Post-Secondary Non-Higher Education= 0 Short Term Higher Education= 0 License= 1 Master's/PhD= 0	
			Primary education or below= 0 High School= 0 Post-Secondary Non-Higher Education= 0 Short Term Higher Education= 0 License= 0 Master's/PhD= 1	
Employment Status	Working=1 Not working=2 Out of labor force=3	Empd	Working=1 Not working=0 Out of labor force=0 Working=0 Not working=1 Out of labor force=0	Out of labor force
Education Participation Status (Last 12 Months)	**Yes=1** **No=0**	**Patedud**	**Yes= 1** **No= 0**	**No**

Experiences of Mathematics Teachers of a Test Preparation Center during Professional Development for Incorporating Critical Thinking Skills into Their Practice

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Abstract

Higher-order thinking skills are important in conceptual understanding of mathematics, and their development is often emphasized in mathematics curricula. In Turkey, with the new emphasis on higher-order mathematical thinking skills in national high-stakes university entrance exams as well as the curricula, teachers needed to change their instruction to address critical thinking, problem solving, and reasoning both in schools and test-preparation centers. In the Turkish context, teachers in test preparation centers do not usually receive professional development. This study aimed to examine the experiences of 7 mathematics teachers working in a test preparation center during a professional development program for assessment, critical thinking, and higher-order mathematical thinking skills, to understand their perceptions of critical thinking and incorporation of it into instruction. Meetings with teachers were held two days a week, for 12 weeks to work on the assessment and integration of these skills into instruction. Data was collected at the beginning, middle, and end of the implementation, via individual semi-structured interviews and open-ended reflection questions. The findings reflect how participants internalized the relationship between critical thinking and higher-order thinking skills. Results suggest that integrating critical thinking and higher-order thinking skills into an assessment-focused professional development program allowed teachers to experience the critical thinking process and engage in teaching critical thinking, in the socio-cultural context of test preparation centers

Keywords: critical thinking in mathematics education, higher-order thinking skills, mathematics teacher education, professional development.

Bir Sınava Hazırlık Merkezindeki Matematik Öğretmenlerinin Eleştirel Düşünme Becerilerini Uygulamalarına Dahil Etme Konusundaki Mesleki Gelişim Deneyimleri

Öz

Üst düzey düşünme becerileri matematiğin kavramsal olarak anlaşılmasında önemli bir role sahiptir ve bu becerilerin geliştirilmesi matematik müfredatlarında sıklıkla vurgulanmaktadır. Türkiye'de, kritik öneme sahip olan üniversiteye giriş sınavlarında ve müfredatta üst düzey matematiksel düşünme becerilerine yapılan yeni vurguyla birlikte, öğretmenlerin hem okullarda hem de sınava hazırlık merkezlerinde eğitimlerini eleştirel düşünme, problem çözme ve muhakeme becerilerine yer verecek şekilde değiştirmeleri gerekmiştir. Türkiye bağlamında, sınava hazırlık merkezlerinde çalışan öğretmenler genellikle mesleki gelişim programlarına dahil olmamaktadırlar. Bu çalışmanın amacı, bir sınava hazırlık merkezinde çalışan 7 matematik öğretmeninin değerlendirme, eleştirel düşünme ve üst düzey matematiksel düşünme becerilerine yönelik bir mesleki gelişim programı sırasındaki deneyimlerini incelemek, onların eleştirel düşünme ve bunu öğretime dahil etme konusundaki algılarını anlamaktır. Öğretmenlerle 12 hafta boyunca haftada iki gün bu becerilerin değerlendirilmesi ve derslere entegre edilmesi üzerine toplantılar yapılmıştır. Veriler, uygulamanın başında, ortasında ve sonunda bireysel yarı yapılandırılmış görüşmeler ve açık uçlu yansıtma soruları aracılığıyla toplanmıştır. Bulgular, katılımcıların eleştirel düşünme ile üst düzey düşünme becerileri arasındaki ilişkiyi nasıl içselleştirebildiklerini yansıtmaktadır. Sonuçlar, eleştirel düşünme ve üst düzey düşünme becerilerinin değerlendirme odaklı bir mesleki gelişim programına entegre edilmesinin, öğretmenlerin sınav hazırlık merkezlerinin sosyo-kültürel bağlamında, eleştirel düşünme sürecini deneyimlemelerine ve öğretimlerinde de eleştirel düşünmeye yer vermelerine olanak sağladığını göstermektedir.

Anahtar Sözcükler: matematik eğitiminde eleştirel düşünme, üst düzey düşünme becerileri, matematik öğretmen eğitimi, mesleki gelişim

INTRODUCTION

Critical thinking (CT) and problem solving are among the skills related to learning and innovation, which are emphasized in the framework for 21st century learning (Partnership for 21st century learning, 2019). CT has always played an important role in mathematics education too and its development is closely related to higher-order mathematical thinking skills. Along with CT, problem solving, mathematical reasoning and interdisciplinary connections of mathematics with real-life applications are emphasized in the mathematics curricula of many countries. In the Turkish context, even though the importance of the development of such skills is also addressed in the mathematics curricula, until recently this emphasis had not been reflected in the nationwide central high-stakes tests for entering high school or university. Since every individual who intends to attend higher education in Turkey must take the university entrance exam, preparation for these exams is taken very seriously by stakeholders. The current university entrance exam consists of two multiple-choice tests called Basic Proficiency Test (TYT) and Content Proficiency Test (AYT). The aim is to measure verbal and quantitative skills and competencies associated with the application of content knowledge. The latest changes made in curricula and these tests have led to the inclusion of questions embedded in real-life contexts that require reasoning and interpretation rather than just remembering and applying information. With the emphasis on higher-order mathematical thinking skills in national high-stakes university entrance exams, teachers in schools and test preparation centers needed to change their instruction to address these skills. There are various after-school test preparation centers in Turkey that play an important role in the enactment of the curriculum. The teachers in these centers influence the development of students' mathematical skills as much as the classroom teachers but oftentimes they do not receive Professional Development (PD) like school teachers.

There is very limited research on how mathematics teachers of test preparation centers perceive and engage in CT skills. In this regard, this study is carried out in a test-preparation center, affiliated with the local municipality, where students attend lessons to increase their academic achievement. The purpose of this research is to examine the experiences of mathematics teachers in the center participating in a PD program to understand their perception of CT and incorporate CT and higher-order mathematical thinking skills into instruction. The PD was designed to improve the teachers' understanding of higher-order mathematical thinking skills and to enhance their instruction in a way to incorporate CT. Working with a group of high school teachers from a test-preparation center, the focus of the PD was assessment, specifically the construction of mathematical test questions to assess higher-order thinking skills. Participants' experiences during the PD were studied for the following research question:

How did teachers' perception of critical thinking and incorporating critical thinking into instruction change during professional development?

LITERATURE REVIEW

Being able to think critically is an important skill for an individual, and many scholars from different fields have worked on identifying this complex construct. Throughout the past decades, CT had been a focus of interest for philosophical, psychological, and educational traditions of thought (Sternberg, 1986). Various approaches and definitions of CT have emerged and its importance in educational settings have been discussed. According to a study where a panel of experts worked on to define and determine the dimensions of CT, its' role in instruction and how it will be assessed (Facione, 1990), critical thinking is a "purposeful, self-regulatory judgment which results in interpretation, analysis, evaluation, and inference, as well as explanation of the evidential, conceptual, methodological, criteriological, or contextual considerations upon which that judgment is based" (p. 2). Here, CT is considered to contain both cognitive skills and affective dispositions. The cognitive skills involved in CT are "(1) interpretation, (2) analysis, (3) evaluation, (4) inference, (5) explanation and (6) self-regulation" (p. 4). Dispositions that are closely related to these cognitive skills include the following (p. 11):

> Clarity in stating the question or concern, orderliness in working with complexity, diligence in seeking relevant information, reasonableness in selecting and applying criteria, care in focusing attention on the concern at hand, persistence though difficulties are encountered, and precision to the degree permitted by the subject and the circumstance.

Ennis (1996) defined critical thinking as "reasonable reflective thinking focused on deciding what to believe or do" (p. 166), emphasizing "reasonableness, reflection, and the process of making decisions". Ennis (1996) also stated that CT involves some dispositions as well as skills. He identified three broad dispositions as

follows (p. 171): Care to "get it right" to the extent possible, represent a position honestly and clearly (theirs as well as others'), and care about the dignity and worth of every person.

Considering the above descriptions and drawing on approaches of CT that were put forward by Glaser (1985) and Halpern (1996), following definition of critical thinking is assumed in this study (Gürkaynak, et.al, 2009, p2):

> Type of thinking that individuals do on purpose and under their own control, where usual approaches and repetition of patterns are prevented; prejudices, assumptions and any information presented is tested, evaluated, judged, and their different aspects, expansions, meanings, and consequences are discussed; ideas are analyzed and evaluated; reasoning, logic and comparison is used; and as a result, certain ideas, theories, or behavior are reached.

CT is closely related to other types of higher-order thinking such as problem solving, decision making and creative thinking (Facione 1990). It differs from these types of thinking, in the sense that it involves judging or assessing the quality of an idea, product or result. Accordingly, critical thinking includes problem solving and it has common processes with creative thinking (Beyer, 1995; Innabi & Sheikh, 2007).

Teaching CT Skills

Halpern (1998) proposed a model for teaching CT which consists of four components: i) dispositional aspect, ii) instruction in CT skills iii) activities designed to facilitate transfer across contexts, and iv) a metacognitive component that is used to direct and assess thinking. For the dispositional aspect, Halpern (1998) suggests keeping in mind that a person may have the ability to think critically but may not have the willingness to use it since it is a process that requires mental effort. Therefore, it is important in instruction to help learners to decide whether a given problem or situation requires using these skills. According to Halpern, the following are among dispositions or attitudes a critical thinker possesses: willingly and persistently engaging in complex tasks, avoiding impulsive activity and acting according to plan, and being flexible and open minded. For the second component, Halpern offered a taxonomy of skills for fostering CT in instruction: verbal reasoning, argument analysis, testing hypothesis, likelihood and uncertainty, and decision making and problem solving. According to her, these five categories of skills are teachable and generalizable so they can be used as a rubric in instruction. For fostering transferring CT across contexts, Halpern suggests using "thoughtful questions" to create meaningful connections between relevant concepts and ads that these questions need to be drawn from the real-world contexts that are frequently encountered. These tasks should include relevant and irrelevant information and require thoughtful analysis and synthesis. In the last component, the importance of meta-cognitive monitoring is emphasized. Some of the questions suggested to be asked are as follows (Halpern 1998, p.454): "How much time and effort are this problem worth?", "How difficult do you think it will be to solve this problem or reach a conclusion?", "What CT skills are likely to be useful in solving this problem or analyzing this argument?", "Are you moving toward a solution?".

Broadbear (2003) distinguishes CT approach to teaching and learning from educational strategies such as group discussion, lecture, experiments etc., stating that CT should be "infused throughout the educational experience and within these strategies". Based on the definitions of CT, he proposes that in order to completely address CT, the following should be included in the lessons: ill structured problems, criteria for assessing thinking, student assessment of thinking, and improvement of thinking. Since ill structured problems do not have a single right answer, they enable students to use reasoning and make interpretations and judgements.

Considering that CT requires people to assess the thinking of others as well as of their own, Broadbear (2003) states that a set of criteria should be established in the classroom which can be used to assess thinking. In order to help students to make this assessment, individual feedback on student responses can be used (Snyder & Snyder 2008). Students can be asked to explain the strengths and weaknesses of their thinking and to provide feedback for improvement (Broadbear, 2003). To improve students' thinking, Broadbear (2003) states that the student work should be revised and resubmitted. After the initial assessment of student work, weak and strong examples can be shared with the students.

Suggestions for teaching CT such as those mentioned above, are general suggestions and not context specific. There has been a debate on whether CT should be taught within a specific subject matter, or separately as a set of general skills. As a result, different approaches to CT instruction have emerged. Ennis (1989) categorized these approaches as follows: general, infusion, immersion, and mixed. In the general instruction approach, CT principles are taught separately from content. The infusion approach also includes explicit CT instruction, but in this case, it is integrated in the content being taught. On the other hand, in the immersed

approach, while CT is integrated in the context, it is taught indirectly without explicit explanation to the learners. Finally, in the mixed approach, a separate general instruction for CT skills is given, accompanied with content specific instruction using infusion or immersed approach.

CT in Mathematics Education

As mentioned earlier, CT is closely related to higher-order mathematical skills. The importance of fostering students' higher-order thinking skills is emphasized both in national and international mathematics curricula. Mathematical proficiency is defined as having five interrelated strands: conceptual understanding which requires comprehension of mathematical concepts, operations, and relations; procedural fluency, which is a skill in carrying out procedures flexibly, accurately, efficiently, and appropriately; strategic competence which is the ability to formulate, represent, and solve mathematical problems; adaptive reasoning which is capacity for logical thought, reflection, explanation, and justification; and productive disposition which is seeing mathematics as sensible, useful, and worthwhile in addition to believing in diligence and one's own efficacy (National Research Council, 2001). The following mathematical practices are instrumental in achieving mathematical proficiency: i) Make sense of problems and persevere in solving them ii) reason abstractly and quantitatively, iii) construct viable arguments and critique the reasoning of others iv) model with mathematics v) use appropriate tools strategically vi) attend to precision, vii) look for and make use of structure and viii) look for and express regularity in repeated reasoning (NCTM, 2014). The Common Core Toolkit published by Partnership for 21st century learning (2011) maps out the way mathematical practices emphasized in common core standards are related to skills identified in the framework for 21st century learning. The practices related to CT and problems skills are identified as: making sense of problems and persevering in solving them, reasoning abstractly and quantitatively, modelling with mathematics, and looking for and making use of structure.

As can be seen from these definitions, important practices to attain mathematical proficiency and higher-order mathematical thinking are closely related to CT and problem solving. Since these skills are emphasized in school curricula (e.g. MoNE, 2018), they need to be properly assessed. In a study conducted with prospective mathematics teachers in Turkey (Çelik & Özdemir, 2020), results revealed reasoning, mathematical thinking skills and problem-solving as significant predictors of critical thinking dispositions.

For this study, CT and higher-order mathematical thinking skills were considered while examining the content of the Turkish national high-stake exams. As a result, the most relevant mathematical skills for the needs of teachers at the test prep center were identified as follows: mathematical information literacy, numerical fluency, spatial thinking and mathematical reasoning. These identified skills are considered as the indicators of higher-order mathematical thinking skills. Teachers in the test-preparation centers are expected to both prepare students for the national tests where these skills are measured, and to generate test questions that measure these skills.

Teacher Practices for CT

To be able to teach higher-order thinking skills such as CT, one would expect the teachers to have these skills themselves and consciously aim for incorporating these skills in their practice. In their longitudinal study with teachers, Miri et al. (2007) concluded that persistently teaching for promoting higher-order thinking in a conscious manner is necessary for success. They suggested that PD programs need to be planned so that the teachers have a better understanding of higher-order thinking and can conceptualize CT in a coherent way.

Similarly, Innabi & Sheikh (2007) state that in addition to having a good knowledge of CT, teachers need to know how to teach it and believe that it is possible to teach it to all students. The authors point out the need for programs to train mathematics teachers on how to teach CT to all students, in addition to developing their understanding of critical thinking. Innabi & Sheikh (2007) interviewed mathematics teachers to assess their perception of critical thinking and found that many of them lacked a coherent and comprehensive understanding of critical thinking. Some of the issues they suggest for PD programs are as follows: CT does not necessarily involve "attacking", i.e., dealing with opposite opinions and ideas. People should CT to assess their own acts, thoughts, and feelings. Considering the equity principle, CT in mathematics classes should be the target for all students. Hence the PD programs should consider dealing with diverse students. Using instructional practices that are known to be useful, such as discussion, cooperative learning, self-learning and questioning, usually fall short for teaching CT. Therefore, these practices should be modified to foster CT.

There are few studies conducted in Turkey, focusing on CT skills of mathematics teachers. In one such study, Tunçer and Sapancı (2021) examined the critical thinking dispositions and critical thinking teaching practices of middle-school mathematics teachers. The results showed that there was a significant difference in favor of the group that received in-service training in critical thinking disposition and perceptions of practice.

Another result showed significant positive relationship between mathematics teachers' critical thinking disposition and perceptions of practice, and the metacognition, perseverance and patience and open-mindedness were found to be significant predictors of critical thinking teaching practices.

METHOD

Research Model

The design of this study is based on a qualitative phenomenological approach. According to Ary et al. (2007), this approach is used to "describe and interpret an experience by determining the meaning of the experience as perceived by the people who have participated in it" (p.461). With the phenomenological approach, it is aimed to understand the individual situations and personal experiences of the participating teachers in detail regarding the teaching and learning practice and to best investigate the common points in the behavior of the group (Giorgi & Giorgi, 2003; van Manen, 2023). In this case, teachers' perceptions of CT and incorporation of CT into instruction during the PD program is the phenomenon being investigated.

Setting and Participants

Increasing demands for higher education have fueled the competition for university entrance, as well as changes in the examination system. The fact that a large part of the exam takers cannot be placed in a program causes students to take the exam a second or third time by having an additional preparation period when they are not enrolled at any high school. Test preparation centers are used to meet the expectations of students who want to improve themselves in this regard. This study is conducted in a test preparation center financed and managed by a local municipality. This educational institution is approved by the Turkish Ministry of National Education and provides free education to students. To provide equal opportunities in education, the institution aims to support the knowledge and skills of students in different disciplines who attend or graduate from school and prepare them for higher education institutions. 21 teachers work in the institution where approximately 700 students participate the educational programs. The test-preparation center offers online and face-to-face courses to students in Science (Physics, Chemistry, Biology), Mathematics, Turkish Literature, Social Sciences (History, Geography). In mathematics lessons, topics in the curricula are reviewed and types of mathematics problems which would prepare students for the national exams are solved. The institution uses textbooks from various publishers as well as the booklets prepared by the teachers. There were eight mathematics teachers working full-time at the institution. The administration of the institution asked all mathematics teachers to attend the PD of this study. This was the first long-term PD for teachers at this institution. One of the teachers could not fully participate in the program activities, so participants of this study were seven.

Demographics information about these seven teachers can be summarized as follows in Table 1. (to ensure anonymity, pseudonyms were used):

Table 1. Demographics of participants

Participant	Age	Teaching Experience (years)	Experience in the institution (years)	Undergraduate Program
Ahmet	29	3	1	Mathematics
Can	29	6	2	Mathematics
Cemre	37	6	1	Mathematics
Defne	34	1	1	Physics
Erdem	30	5	2	Mathematics
Mustafa	26	1	1	Secondary School Mathematics Teaching
Zeki	35	5	5	Mathematical Engineering

As can be seen from Table 1, only one teacher had an undergraduate degree in teaching mathematics. In addition, there is no teacher who has a master's degree in an education-related discipline. This portray can be considered typical for a Turkish test preparation center because undergraduates of mathematics programs cannot

be a teacher at a public or private high school without an additional certification. Also there has been a surplus of mathematics teachers. So many young, new graduates of mathematics programs work at different test preparation centers as well as tutoring.

PD Program

A 12-week PD program was implemented, focusing on the development of higher-order thinking skills and teaching skills of teachers. During the program, meetings were held with participating teachers as three-hour sessions, two days a week. The meetings aimed to develop strategies for teachers to integrate CT and higher-order mathematical thinking skills (mathematical information literacy, numerical fluency, spatial thinking and mathematical reasoning) into their lessons and transfer them to students.

The program had three main phases. The first phase started with discussions on higher-order mathematical skills related to the central exams. Then CT was introduced in Phase 2. The last phase focused on discussing mathematics topics, mainly algebra and possible classroom implementations that would develop CT of students. Table 2 depicts these phases with the topic of each and related main activities.

Table 2. Three phases the implementation

Time Period	Content	Activities
Phase 1 (Weeks1-4)	-Introduction of main concepts -Basic principles of Measurement and Evaluation; validity and reliability, item writing, constructing tests -Introduction of higher-order mathematical skills -Writing contextual questions	-Pre-test -Creating a rubric for skills used in question analysis throughout PD. -Analysis of TYT test items (skills) -Item writing exercises (context and skills)
Phase 2 (Weeks 5-7)	-Defining CT -Discussion of CT with higher-order mathematics skills	-Mid-program data collection -Analysis of TYT test items (skills) -Concept mapping on defining CT - Item writing exercises (context and skills)
Phase 3 (Weeks 7-11)	-Discussing mathematical topics (real numbers, function families) with higher-order mathematics skills -Discussing classroom implementations for incorporating CT and higher-order mathematics skills for the topic of discussion	For the math topic of the week: -Analysis of AYT test items - Item writing exercises for each topic (focusing on content)
Week 12	Wrapping up	Post test

As can be seen from Table 2, this PD was designed for participants to first experience CT in their own practice, critically examining math problems, where CT was implicitly addressed. In other words, the immersed approach of teaching CT (Ennis, 1989) was used in the first phase. Since the purpose of this program is not only to develop CT skills of teachers but also to improve their teaching practice, the CT aspect of the program started to be addressed explicitly with Phase 2. So overall, it can be said that the mixed approach (Ennis, 1989) was used in CT instruction during PD. In Phase 2, definition of CT was discussed with teachers along with methods of teaching it. Three main ideas CT were identified: attitude to use problems based on thinking, knowledge of logical questioning, and application skills. Since the main reason for this discussion was to make connection between CT and higher-order mathematical skills, participants were challenged to incorporate "doing mathematics" with the definition of CT. This discussion led the group to consider the relationship between CT and higher-order mathematical skills that had been examined in Phase 1. After this discussion, participants discussed incorporating these skills while working on important algebra topics. For example, the topic of functions was covered in the following manner: first definition of function and big ideas related to the concept were addressed and then the participants discussed how CT can be incorporated in teaching functions. Then they considered ways to assess students' higher-order mathematical skills with questions related to functions.

The worked-sample mathematics problems used in in-service training consist of non-routine problems that require critical and analytical thinking skills. At this stage, problems matching these qualities from university entrance exams (TYT and AYT) and other standardized tests have been selected for study. Subsequently,

collaborative work with teachers has been conducted to develop CT skills necessary to give answers to these questions asked in the university entrance exams of the last 5 years. In the second stage, teachers examined all the questions in the university entrance exams of the last five years, and then the analyses made by the teachers were discussed with the researchers. In the final stage, teachers were asked to create non-routine problems that require CT skills, and the problems teachers constructed were examined together with the researchers.

Data Collection and Analysis

In the study, data collection process was carried out in three stages: at the beginning of PD program, at the beginning of Phase 2 (with mid-program questionnaire and interviews), and at the end of PD program. To establish trustworthiness and provide triangulation, different data collection methods were used at each stage (Elo, et al., 2014). In all three stages, participants' written answers were gathered through open ended questions. While focus group interview was carried out in the first stage, individual semi-structured interviews were conducted in the second and last stages. Moreover, one of the researchers kept detailed observation notes during the workshops which were then used as supporting data for analysis. Also, several background variables were collected for each teacher. These included the age of the participants, teaching experience, experience in the institution and the department they graduated from (Creswell & Poth, 2016; Stahl & King, 2020).

Participants' written and interview statements were transcribed and then reviewed by four researchers (first individually and then together) and judged collaboratively with the help of low-inference notes taken. The descriptive codes were applied to the data and categorized to look for patterns. To provide an in-depth description of participants' experiences, the findings were presented by combining both the PD phases and the background variables of the participants. The findings were supported by the quotes captured.

Researchers' role

The research team consists of 4 researchers. Three researchers are academicians with background in mathematics education. The fourth researcher is a graduate student in mathematics education. The three academicians took turns as leaders in different weeks of the implementation, while the other three researchers were sitting among participants, contributing to group discussions and/or taking filed notes. It can be said that during implementation, there was a casual and friendly atmosphere, and the researchers did their best to establish a good rapport with the participants. The three academicians conducted the interviews with the participants in parallel sessions (in different rooms in the institution). Before the interviews, the researchers came together to decide how to approach the participants and who will talk to which participant, in order to make sure that the participants feel as comfortable as possible and share their sincere opinions. At the beginning of the interviews, participants were informed that the contents of the interview will not be shared by anyone, including the administration of the institution.

Research Ethics

Participants were informed about the purposes of the study, and they filled out and signed consent forms to give permission for the data from interviews and open-ended questions, collected as a part of PD, to be used for this study. To ensure anonymity, pseudonyms were used throughout the report. Necessary precautions were taken for data security during all phases of the research.

FINDINGS

To examine participating mathematics teachers' experiences of the PD, the focus group interview, mid-program individual interviews, and end of the program individual interviews were analyzed in addition to participants written answers to pre and post open-ended questions. Since the focus of this research is participants' experiences, the findings section is organized around the following central issues addressed by the participants:

i) Definition of CT in the context of mathematics teaching, ii) implementation of CT in test preparation center mathematics classrooms and iii) experiences on the PD program.

Definition of CT in Mathematics Teaching

The skill of problem solving is one of the basic skills that is considered important in mathematics education, like any educational setting. Mathematics teachers always pay special attention to problem solving, and participants of this study were no exception. At the beginning of the PD program, all the participating teachers stated that they make intentional instructional decisions to develop students' problem-solving skills. During the whole group discussion at the beginning of the program, teachers defined problem solving as a skill to handle issues in life. When specifically asked about mathematical problem solving, they pointed out excelling in problem

solving by practicing. Considering that they are working at a test preparation center, the teachers' view of problem solving being limited with solving practice questions/problems in test-books was expected. Instructional practices to improve students' problem-solving skills were also discussed, and one of the teachers, Can, said "I provide why's of the topic, give proofs. For example, proof of square root of 2 [being irrational]". They also acknowledged the complexity of developing problem-solving skills, stating that lots of practice is required and it is connected to other skills such as analytical thinking.

After having teachers' views on problem solving, we asked to define CT. Participants seemed to have very limited understanding of CT at this stage. For example, Erdem defined it as "not to except something as it is but question it". This comment from the participant demonstrates some understanding of CT yet it is very limited. Some participants also stressed questioning. But it's interesting to note that most of the participants defined CT in relation to mathematical problem solving. For example, Can's definition was "A skill to answer different types of questions, eliminating the memorization attitude". So, it can be said that participants had superficial understanding of CT and their discussions were limited to solving math questions/problems.

As stated earlier, in Phase 1 CT was not explicitly addressed. The teachers spent several weeks discussing higher-order mathematical thinking skills and analyzing test items which were intended to measure these skills. It can be said that analyzing the test items this way required them to use their CT skills. So, the teachers had the chance to experience CT, before they were formally introduced to CT. The analysis of the interview data collected at the end of Phase1 revealed that all the participants' answers were still related to solving math problems. While Ahmet provided an unrelated response, answers of other participants were grouped in two perspectives: different aspects, solutions or approaches to the problem (Cemre, Mustafa, Defne) and using reasoning to solve problems (Can, Erdem, Zeki). For example, Cemre explained CT as "being able to use different perspectives, developing interpretation skills, what does the student understand when he/she looks at the problem" while Can defined CT as follows: "It is a type of thinking consisting of cognitive process such as reasoning analysis and evaluation. Thinking differently using basic facts."

After explicitly discussing CT and its relationship with higher-order mathematical thinking skills in Phase 2 and discussing high school algebra concepts with examining how higher-order thinking skills can be developed and assessed in Phase 3, the teachers were asked to define CT again at the end of PD. All the participants' answers were based on solving math problems again, and analyzing test questions, but this time how they approached CT in the context of problem solving differed notably from their initial responses. Six of the participants (Can, Cemre, Defne, Mustafa, Erdem, Zeki) made clear connections between CT and higher-order mathematical skills, especially reasoning. For example, Erdem stated that CT is based on problem solving that brings along abstract and analytical thinking skills while being "automatically loaded" with well-developed mathematical reasoning, procedural fluency, mathematical literacy and spatial reasoning. Some of these participants (Can, Mustafa, Zeki) still described CT as being able to approach solving problems in different ways, but this time they emphasized reasoning supporting CT while talking about exploring different solutions of a problem. Only one participant, Ahmet, limited his definition of CT to solving a problem with different perspectives or aspects.

Findings reported so far portray participants' understanding of CT while they experienced different phases of the PD. First, they experienced CT in their teaching context (analyzing math problems and test questions) without explicit emphasis of CT. As they moved to the second phase, they experienced making sense of CT for mathematics teaching. After the last phase where they examined several algebra concepts with how CT can play a role in teaching those topics, participants' transformed definitions included a web of skills with comprehension of the complex nature of CT. To examine whether this transformation of teachers' CT understanding also transcended into their practice, we asked them about how they would implement CT into their classrooms.

Implementation of CT in Test Preparation Center Mathematics Classroom

To examine participants' understanding of CT from different aspects, we also asked them how they would teach CT in a classroom setting. It should not be forgotten that they have always been test preparation center teachers and even when defining CT, they referred to solving math problems or test questions. During the mid-program interviews, three of the participants (Ahmet, Cemre, Zeki) failed to provide meaningful suggestions for teaching CT. Zeki openly stated that he does not know how while Ahmet mentioned using similar questions to solve in class. Cemre also mentioned using direct instruction to tell students what to do to teach CT. Having given an unrelated response when asked to define CT, Ahmet did not provide a meaningful response to CT instruction that can be expected. While Zeki's definition of CT was based on reasoning, failed to properly discuss teaching CT. This may show that his understanding of CT was not necessarily stemming from CT experiences but from his understanding of the nature of mathematics. Similarly, Cemre defined CT as using different solution methods, but

she explained the instruction method directing students. The remaining four participants either stressed using different strategies or approaches to solve math problems (Can, Defne, Erdem) or using sense-making aspect of problem solving to foster CT in a classroom (Can, Erdem, Mustafa). These two types of answers about teaching CT may be expected from participants at this stage because their teaching experience was limited with ration centers and tutoring for the exam.

Participants' responses related to implementation of CT in class at the end of PD were also examined. Ahmet, Cemre, Defne and Zeki addressed using different approaches to teaching mathematics that supports development of students' CT skills. But they emphasized different aspects of teaching CT in a math classroom. Zeki emphasized analyzing learning objectives deeply and examining not just content but also skills, while Ahmet simply suggested using different solutions, saying "I discuss different solutions with students. Even if one person finds the answer, I ask if there is another way for solution". Zeki seems to be transformed notably in incorporating CT with higher-order mathematical skills, when his response for defining CT in the previous part is considered. Yet, his perspective on teaching CT indicates that he relies mostly on mathematical aspects rather than having a rigorous understanding of CT.

Cemre, suggested using the immersed approach like the researchers used in the first phase of the program. It's not clear whether Cemre used such teaching strategy, but she suggested being a model to her students for CT skills. Similarly, Defne, who had suggested using different approaches while solving problems, did not provide details of how it would be possible in the classroom. When we examine answers of these four teachers related to definition and implementation of CT at the end of first Phase 1, it can be said that Ahmet and Zeki transformed from limited understanding of CT to using different perspectives in mathematical problem solving. Even though Cemre and Defne started the PD with some partial understanding of CT with emphasis on using different approaches while solving problems, at the end of the program their perception of CT was still related to using different aspects or solutions. It can be said that their definition and explanation of implementation was more elaborated at the end of program. This is consistent with Zeki's comment, indicating a change in their "point of view and language". In addition to this limited development of four participants in terms of understanding of CT, the other three teachers (Mustafa, Erdem, Can) transformed their understanding to a certain degree.

Mustafa suggested discussing both correct and incorrect answers in the classroom to ensure variability. He also mentioned helping students to "see the big picture". This indicates that he was considering CT as connected to other higher-order thinking skills but without some elaboration of practice. He is a novice teacher so he might not be able to provide examples from his classroom experiences. Whereas more experienced participants Erdem and Can were able to support their ideas with classroom practices. Erdem thinks that it must be conveyed to the student that mathematics develops the way a brain works, and it is not a subject that can be learned by memorization. Can proposed solving a few math problems in class with discussion on main ideas of mathematics rather than solving many problems with superficial understanding.

Overall, when the whole group of participants are considered, it can be said that there were some improvements in their understanding of CT as teachers. While Zeki and Ahmet started with a very limited understanding of CT, they finished the program by considering CT as addressing different problems, solutions and terminology. Cemre and Defne stressed using different problem-solving tasks or strategies at the beginning and at the end of PD, yet their CT understanding improved in a subtle way. This improvement was evident in their answers related to CT implementation in the classroom. These two teachers' responses differed from both Zeki and Ahmet since they mentioned allowing students to experience CT in classroom. The last three participants (Mustafa, Erdem, Can) might have given different answers to definition of CT and implementing CT in classroom but the common element in their answers was approaching CT together with other mathematical thinking skills. All three of them discussed using the connection between CT and higher-order mathematical thinking skills to teach mathematics to students. Having three profiles of participants in terms of change in their understanding of CT, made us examine how participants experienced PD, what the strengths and weaknesses of the program were from their point of view.

Experiences on PD

To examine how participants experienced the PD about assessment with a focus on critical thinking, individual interviews were carried out after Phase 1 (mid-program interviews) and at the end of Phase 3. Participants were asked how the PD program contributed to their teaching as well as strengths and weaknesses of it. Participants' experiences may shed light on the differences in their CT understanding as discussed in the previous section. Participants, Zeki and Ahmet, who considered CT only as having different solutions or different

approaches to mathematical problem solving, discussed their PD experiences in a limited manner. Zeki stated that he was not expecting much at the beginning because he did not feel the need for any PD. Yet, he stated at the end of the PD that he realized there were more things for him to learn as a teacher. However, he mostly talked about the limitations of the application that had been discussed during the PD. He mentioned they used predetermined textbooks and materials at the preparation center, which limited them in terms of integrating CT into their classroom practices. Another participant, Ahmet, reported four aspects of his experiences: analyzing questions, identifying student mistakes, revamping his teaching strategies, and improvement in mathematical communication between teachers. He said, "As my awareness of skills increased, the questions I asked myself about my teaching method changed, and accordingly, the strategies I applied for teaching changed". Even though he mentioned many aspects, when he was asked to elaborate on his experiences, he provided limited answers. For example, he did not provide any examples of classroom practices. So, based on their answers, it can be deduced that these two teachers' experiences were superficial, which might be the explanation for the limited change in their understanding of CT and not being able to implement CT in their classrooms.

Participants Cemre and Defne, on the other hand, were able to transfer CT discussions of PD into their practice. Both stated that they were uncomfortable at the beginning because of not being given of formal definition of CT and higher-order mathematical thinking skills at the beginning of the PD. Cemre stated that "later, all the pieces came together, actually, we all found out what the skills were because we discussed them for weeks". Defne made a very similar comment and she also stressed realizing how she should have followed a similar approach with her students, guiding them to figure out mathematics. She stated that she felt inexperienced when compared to the other participants and the PD helped her pedagogical skills such as choosing right math problems to promote critical thinking, guiding students step by step:

> Even if a student can't solve the question all the way, I get the student to do it by asking questions on the board. They say, 'I did it, it wasn't that hard, it's nice'. I don't give the answer, I just lead them using prompting questions, just like you did with us.

It can be deduced that, these two teachers were still not incorporating CT with higher-order mathematical thinking skills and reflecting this incorporation into their practices.

The last three participants, Can, Erdem, Mustafa, differed from other teachers in terms of how they defined CT and how they experienced the PD. Being another novice teacher, Mustafa emphasized the benefit of working on constructing test questions. Even though he was the only participant who is a graduate of a mathematics teaching program, having more preparation of teaching practice, he was new to the settings of a test preparation center. So, the tailor-made PD addressing the purpose and needs of a test preparation center in terms of analyzing and constructing test questions really helped Mustafa. He also stressed not being given the definitions and the facts directly, he was able to internalize these skills. Furthermore, he emphasized reasoning skill: "the most important skill that teachers help students to develop is mathematical reasoning". Similarly, a little bit more experienced Erdem stated that he was able to understand higher-order thinking skills for constructing test questions. He had never attended a PD before this one and his purpose of attending this PD was only to be able to develop better test questions. He discussed one limitation of the program; spending too much time on some questions when other teachers were discussing in length. He stated that he would prefer to solve more math problems as a whole group. Can had similar motivations as Erdem at the beginning of PD. Can aimed to learn how to construct test questions in addition to some practices to implement in the classroom. He stated that when the group was reflecting on the test questions written by group members, he was learning a great deal about higher-order mathematical skills. According to his observations, the group changed in a way to use the language of the higher-order thinking skills. He gave an example of discourse from the group as "What am I increasing here, procedural fluency or reasoning?" Furthermore, he gave an example of addressing CT in instruction for teaching trigonometric functions. He concluded that it went well but only because the students were high achievers of the test preparation center. He was convinced that the same instruction might not be effective with low achievers as much as with the high achievers

DISCUSSION & CONCLUSION

The PD examined in this study was designed to address a group of teachers who were often neglected. Test-preparation centers are very common in Turkish context and teacher education is not an option for these teachers. Yet these teachers need PD on development of mathematical skills of students. The motivation of participants to

attend the PD was to improve themselves in terms of constructing better quality math questions to assess students' higher-order mathematics skills. These skills cannot be considered isolated from other aspects of teaching and their development should be considered together with CT.

Thus, the authors designed a unique 12-week PD program on assessment for test-preparation center teachers. In addition to addressing this neglected group of teachers, there are also two aspects of the program in terms of handling skills: utilizing mixed design of teaching CT and merging higher-order mathematics thinking skills with CT in order to improve teachers' practice. First accepting immersed approach to teach CT then switching to general approach (explicitly introducing CT) (Ennis 1989) for participant teachers was an effective strategy. In a meta-analysis on strategies for teaching CT, Abrami et.al. (2015) concluded that four methods proposed Ennis (1989) for teaching CT "produced significantly positive average effect sizes, but the categories did not differ from one another". Since the target group of this study was teachers, and the aim is to discuss teaching CT as well as focusing on their own CT skills, this using multiple strategies seems appropriate. Similar approach can be used while working with prospective teachers. Another finding of Abrami et.al.'s (2015) meta-analysis is that whole-class and group discussions led by the teacher (dialogue), and exposure of students to authentic or situated problems and examples (authentic instruction) are effective instructional methods for teaching CT. They also report that these two strategies are effective when used together, especially when combined with mentorship. These two methods were also used in this study during the PD. In future implementations, mentoring can also be included in the PD activities proving more opportunities for one-to-one interaction with the participants.

Based on participants' answers, it was clear that most of them were convinced to implement CT in their classrooms. However, it should be noted that the program mostly focused on assessing students' higher-order thinking skills based on what has been emphasized in university entrance tests. As researchers intentionally aimed for developing participants' CT skill, the discussions merged CT with higher-order mathematics skills. The findings of this study reflect how participants were able to internalize the relationship between these two. This program provided a change in language and discussions of the mathematics teachers in the test preparation center. The change in perception and practice for two teachers did not go further than that but all the other teachers further improved their perceptions. Most teachers' initial definitions of CT were limited and some included explanations such as criticizing an opinion and opposing a view. A similar issue was also addressed by Innabi and Sheikh (2007). However, as PD progressed their definitions started to include more aspects of CT. In addition, evidence of CT was observed when they were sharing their experiences about PD in classroom discussions. For example, they were talking about how their 'language' changed and how they started to do things differently while writing questions or talking to their students in the classroom. In addition, in the post test, few teachers implied that CT cannot be attained by every student, and they cannot carry out certain conversations with low level students like they do with high level students. However, as Innabi and Sheikh, (2007) suggested, expectations of CT development should be high for all students.

Based on all the participants' views, it can be said that this PD program met their expectations. According to Matherson and Windle (2017), teachers demand PD learning opportunities that i) are interactive, engaging, and relevant for their students ii) show them a more practical way to deliver content iii) are sustained over time and iv) are teacher driven. Teachers in this study also expected us to show them practical ways that they can immediately use, such as giving the definitions of the terms from the start or providing more concrete examples of classroom practice for teaching higher-order skills. The way PD was structured enabled the teachers to be highly interactive. Most teachers seemed to be engaged in the program activities, however some of the teachers reported that they lost focus in some instances, like when discussion about a test question or a content topic went on too long. In general, it can be said that PD was addressing all five of teacher expectations.

This study focused on experiences and perceptions of participating teachers. Further studies can be conducted that focus on the effectiveness of such a program by evaluating teachers' progress in terms of skills and examining their practices. In addition, similar PD programs can be developed for test preparation centers to accommodate teachers from different disciplines.

Statements of Publication Ethics

Ethics board approval was taken on 13.05.2022 from Boğaziçi University Social and Human Sciences Human Research Ethics Committee (meeting number: 2022/05, approval number: 2022-31).

Researchers' Contribution Rate

Authors	Literature review	Method	Data Collection	Data Analysis	Results	Conclusion
Yeşim İmamoğlu	☒	☒	☒	☒	☒	☒
Fatma Aslan-Tutak	☒	☒	☒	☒	☒	☒
Gürsu Aşık	☒	☒	☒	☒	☒	☒
Beyza Oncar-Ekiz	☒	☒	☒	☒	☐	☐

Conflict of Interest

The authors report there are no competing interests to declare.

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Cognitive Abilities in Early Childhood: An Exploration Across Gender, Age Group, School Type, and Parental Educational Status

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Abstract

In this investigation that scrutinized the cognitive abilities of children aged 60-84 months, a causal-comparative design was adopted. The cohort under examination was composed of 120 children attending state-operated independent preschool educational facilities and primary schools. The data collection process employed a personal information form and the Cognitive Abilities Test (CogAT) Form -6, developed by Lohman and Hagen (2000). The internal consistency coefficient (KR-20) in this study for the overall test, subtest, and battery scores ranged between .69 and .93. The findings of this investigation indicated that gender did not significantly influence the total CogAT scores of participants. However, in subtests and batteries, boys demonstrated a significant advantage over girls in the *matrices* subtest and non-verbal aptitude battary. In general, an increase was observed in both the battery and total test scores with advancing age group and grade level. Regarding the influence of maternal education, children whose mothers held a bachelor's degree showed significantly higher verbal battery scores compared to those whose mothers had primary or secondary schooling. While there were some exceptions, there was a significant increase in cognitive abilities corresponding with the rise in the father's education level.

Keywords: cognitive abilities, early childhood, CogAT-6

Erken Çocukluk Döneminde Bilişsel Yetenekler: Cinsiyet, Yaş Grubu, Okul Türü ve Anne-Baba Öğrenim Düzeyi Açısından Bir Karşılaştırma

Öz

60-84 aylık çocuklarının bilişsel yeteneklerinin incelendiği bu araştırmada, nedensel karşılaştırma modeli kullanılmıştır. Araştırmanın çalışma grubu devlete ait bağımsız okul öncesi eğitim kurumları ve ilkokullardaki 120 çocuktan oluşmaktadır. Veri toplama sürecinde kişisel bilgi formu ve Lohman ve Hagen'ın (2000) Bilişsel Yetenekler Testi Form-6 kullanılmıştır. Testin bütün, alt test ve batarya puanlarına ilişkin KR-20 içtutarlılık katsayısı .69 ile .93 arasındadır. Araştırma sonucunda katılımcıların CogAT test puanları cinsiyete göre toplam puan açısından anlamlı farklılık göstermediği ancak alt testler ve bataryalarda erkek öğrencilerin matrisler alt testi ve sözel olmayan bataryada kız öğrencilerden anlamlı şekilde yüksek puan aldığı bulunmuştur. Genel olarak yaş grubu ve sınıf düzeyi arttıkça hem batarya hem de toplam test puanının da arttığı gözlenmiştir. Anne öğrenim düzeyi lisans olan çocukların sözel batarya puanları, anne öğrenim düzeyi ilkokul veya ortaokul olan gruptan anlamlı derecede yüksek olduğu görülmüştür. Bazı istisnalar dışında baba eğitimi düzeyi yükseldikçe bilişsel yeteneklerin de anlamlı olarak arttığı tespit edilmiştir.

Anahtar Sözcükler: bilişsel yetenekler, erken çocukluk, Bilişsel Yetenekler Testi Form-6

INTRODUCTION

Cognitive competencies, which are pivotal predictors of academic prowess and school performance in early childhood (0-8 years), encompass a suite of fundamental abilities that ought to be identified and cultivated from an early stage (Gustafsson, 2008; Kaufman et al., 2012). These abilities embody a diverse range of cognitive activities including reasoning, forecasting, discerning cause-effect relationships, evaluation, elicitation of new meanings, generalization, conclusion drawing, transposition of derived results to varying scenarios, problem-solving, and application of acquired knowledge and experiences in novel situations (İnal & Ömeroğlu, 2011; Lohman & Hagen, 2003).

In the context of early childhood, cognitive capacities can be appraised through verbal, quantitative, and non-verbal (visuospatial) reasoning proficiencies. Verbal reasoning refers to the capacity to derive conclusions based on the understanding and evaluation of conceptually expressed words. Quantitative reasoning, on the other hand, implies the capacity to reach conclusions contingent upon mathematical relationships (Lohman & Hagen, 2003), whereas spatial reasoning denotes the ability to formulate conclusions grounded in the relationships among visually presented symbols or figures (Aiello, 2002).

Reasoning skills underpin the development of fundamental cognitive capabilities such as problem-solving, creativity, and critical thinking, which are indispensable for contemporary individuals. It is through these reasoning skills that an individual adapts to the rapidly changing, dynamic environment in which they find themselves, thereby equipping them with the necessary toolkit to contribute to both personal and societal betterment. Consequently, the imperative for scientific research devoted to the identification and enhancement of reasoning skills, both in terms of volume and quality, cannot be overstated, particularly with an emphasis on early childhood (Mercan, 2021; Zimmerman, 2000).

Theoretical Framework

Cognitive abilities, which encompass the effective deployment of fundamental cognitive processes such as reasoning, problem-solving, and critical and creative thinking, are often associated with the construct of intelligence within the scholarly literature (Alp & Diri, 2003; İnal, 2011; Tillman, Bohlin, Sørensen, & Lundervold, 2009). The concept of intelligence has been a subject of various interpretations across centuries and scholars have propounded multiple definitions. In certain contexts, intelligence is linked with the capability to adapt to the environment, in others, it is connected with the effective use of thinking skills, and yet in others, it is related to the ability to solve problems and to ensure survival (Arslan, 2018; Fry & Hale, 2000; Korkman, 2020; Oktay, 2019). The Cognitive Ability Test (CogAT) was developed utilizing the concept of intelligence, drawing inspiration from Vernon's hierarchical intelligence model and Cattell's fluid-crystallized abilities models (Alp & Diri, 2003; Patterson, 2012). Thus, the theoretical foundations for this study were deemed to be Philip E. Vernon's hierarchical intelligence model and Raymond B. Cattell's fluid-crystallized abilities models.

According to Spearman, intelligence can be bifurcated. Consequently, intelligence is classified into two categories: general intelligence (g) and specific intelligence (s). While general intelligence encapsulates the foundational elements of intelligence measured in intelligence tests, specific intelligence is defined as intelligence that comprises particular capabilities. Thus, while general intelligence encompasses all forms of an individual's mental activity, specific intelligence is a mental power required beyond the general ability to demonstrate a specific capability (Horn & McArdle, 2007; Korkman, 2020). Although Spearman's theory of intelligence occasionally faces criticism from various scholars (e.g., Thurstone) (Korkman, 2020), it is recognized as a seminal theory that forms the bedrock of intelligence theories, considering intelligence in multiple domains (Cocodia, 2014; Daniel, 1997; Dündar, 2019).

Thurstone proposed that intelligence is too multifaceted to be determined by a singular factor alone (Dündar, 2019; Erinç, 2022; Kubinger, Litzenberger, & Mrakotsky, 2006). Consequently, intelligence can manifest into a certain number of primary abilities. These abilities are categorized under seven primary headings: numerical problem-solving/numerical skills, verbal comprehension, memory, general reasoning, verbal fluency, spatial skills, and perceptual speed (Ardila & Bernal, 2007; Arslan, 2018; Korkman, 2020). The congruity between Thurstone's and Spearman's models of intelligence resides in their perception that these abilities are autonomous of each other. Vernon's hierarchical model of intelligence bridges the gap between Spearman's and Thurstone's models of intelligence (Patterson, 2012; Yılmazçetin, 2021). Vernon characterized intelligence as "the ability to think in multiple ways" (Kavcar, 2011). In Vernon's view, intelligence is structured in hierarchical layers. Thus, the apex layer of the model comprises general intelligence. This type of intelligence aligns with the "g" factor as

defined by Spearman. The middle layer houses minor and major group factors, with major group factors including educational or verbal, mechanical, or practical. The minor group factors encompass verbal, numerical, educational, practical, mechanical, spatial, and physical abilities. The bottom layer consists of specific abilities (Guilford, 1967; İnci, 2021; Sözel, 2017; Vernon, 1961; Yılmazçetin, 2021). Vernon's hierarchical intelligence model is illustrated in Figure 1:
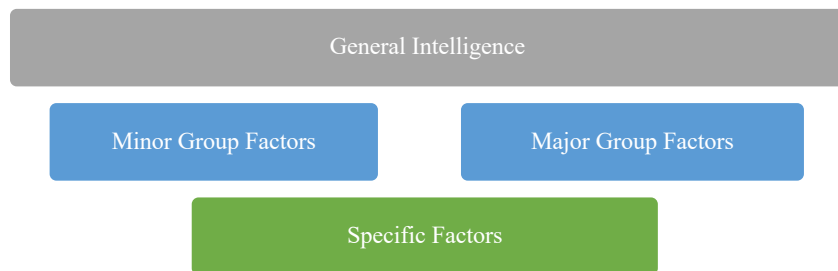
Figure 1. *Vernon's Hierarchical Model of Intelligence*

Cattell, in contrast, introduced two distinctive types of intelligence in his theory of fluid and crystallized intelligence. These are fluid intelligence (Gf) and crystallized intelligence (Gc). According to Cattell, fluid intelligence is the capacity to discern and formulate relationships in relation to the maturation of the brain and is linked to hereditary factors. While fluid intelligence is regarded as the inherited ability to think flexibly and abstractly, crystallized intelligence is defined as intelligence that is influenced by experience and education (Arslan, 2018; Cattell, 1967; Horn, 1985; Oktay, 2019). Fluid intelligence (Gf) pertains to the mental processes that are not performed automatically but are voluntarily and consciously used by the individual. Some of these mental processes include the ability to infer and transfer insights to other situations, problem-solving, concept formation, categorization, generating, testing, and understanding hypotheses. Inductive and deductive reasoning, speed of reasoning, and quantitative reasoning are sub-dimensions of fluid intelligence (Avcı Doğan, 2022; Heit & Rotello, 2010). Crystallized intelligence (Gc) encompasses skills acquired through the utilization of cultural knowledge, language, and concepts. Sub-dimensions of crystallized intelligence include verbal knowledge, language development, language ability, general knowledge, cultural knowledge, sensitivity to grammar, and predisposition to foreign languages (Schipolowski, Wilhelm, & Schroeders, 2014; Tamul, 2017).

The Present Study

A review of the literature on cognitive abilities reveals numerous scientific studies conducted both nationally and internationally over many years (Bickley, Keith, & Wolfle, 1995; Broberg et al., 1997; Halpern, 2004; Lakin & Gambrell, 2014). While national studies have primarily focused on scale adaptation (Akşin Yavuz, 2016; Bildiren, Kargın, & Korkmaz, 2017; İnal & Ömeroğlu, 2011), international studies have connected intelligence with academic achievement, gender, age, cognition, and thinking skills (Daseking, Petermann, & Waldmann, 2017; Kaur, Awasthy, & Syed, 2019; Otero, Salgado, & Moscoso, 2022; Palejwala & Fine, 2015; Weiss et al, 2021). However, it is evident that existing studies are limited in national contexts and include broad age ranges in international contexts. Thus, it is clear that there is a need for more studies predicting cognitive abilities in early childhood. Moreover, the fact that general cognitive ability is one of the most significant predictors of academic achievement underscores the importance of this research (e.g., Neisser et al., 1996; Rohde & Thompson, 2007; Spinath et al., 2006). In light of this need, the primary objective of this study was to examine the cognitive abilities of 60-84-month-old children in terms of gender, school type, age group, and parental education level. In this vein, the study sought answers to the following research questions:

• RQ(1). What are the Cognitive Ability Test (*CogAT*) scores of the participating children in terms of total, subtest, and battery?

• RQ(2). Do the Cognitive Ability Test (CogAT) scores of the participating children significantly differ according to the type of school?

• RQ(3). Do the Cognitive Ability Test (CogAT) scores of the participating children significantly differ according to gender?

• RQ(4). Do the the Cognitive Ability Test (CogAT) battery scores (verbal aptitude, quantitative aptitude, non-verbal aptitude) of the participating children significantly differ according to age groups?

• RQ(5). Do the Cognitive Ability Test (CogAT) battery scores (verbal aptitude, quantitative aptitude, non-verbal aptitude) of the participating children significantly differ according to the level of parental education?

METHOD

Research Design

This research was conducted according to the causal-comparative model within the framework of a quantitative research approach. Causal-comparative research is a type of investigation designed to determine the causes of certain conditions, situations, or phenomena, the variables that are presumed to influence these causes, or the outcomes of a particular effect (Büyüköztürk et al., 2022; Fraenkel, Wallen, & Hyun, 2012). In this context, the aim was to discern whether the categorical independent variables of gender, school type, age group, and parental education level led to differences in the cognitive abilities of the participating children.

Participants

Table 1. Demographic Information About the Participants

Variable	*N*	%
Gender		
Girl	63	52.5
Boy	57	47.5
Total	120	100
Age Groups		
60-66 months		
67-72 months	39	32.5
73-84 months	25	20.8
Total	56	46.7
	120	100
School Type		
Preschool		
Primary School	63	52.5
Total	57	47.5
	120	100
Mother's Level of Education		
Primary/Secondary School	18	15.0
High School	23	19.2
Associate Degree	14	11.7
Bachelor's	43	35.8
Postgraduate	10	8.3
Total	108*	90
Father's Level of Education	9	7.5
Primary/Secondary School	23	19.2
High School	12	10.0
Associate Degree	52	43.3
Bachelor's	12	10.0
Postgraduate	108*	90.0
Total		

Note. * Some participants' parental education information could not be reached.

Table 1 presents the demographic information about the 120 participants of the study. Gender distribution was almost even, with 52.5% of participants being girls (63 participants) and 47.5% being boys (57 participants). Participants were further grouped into three age categories: 60-66 months (32.5%, 39 participants), 67-72 months (20.8%, 25 participants), and 73-84 months (46.7%, 56 participants). Regarding the type of school attended by the participants, 52.5% were from preschools and 47.5% were from primary schools, reflecting the same distribution as gender. The level of education of the children's parents was also collected, though some participants' parental education information could not be reached (totaling to 90% data coverage). For mothers, 15% had primary or secondary education, 19.2% had high school education, 11.7% had an associate degree, 35.8% had a bachelor's degree, and 8.3% had postgraduate education. For fathers, the distribution was slightly different: 7.5% had primary or secondary education, 19.2% had high school education, 10% had an associate degree, 43.3% had a bachelor's degree, and 10% had postgraduate education.

Data Collection Tools

This research utilized a personal information form and the "Cognitive Abilities Test" (CogAT) as the primary tools for data collection. The personal information form captured details about the children and their parents, such as the child's gender, age, school type, and the education level of the parents. The CogAT, developed

by Lohman and Hagen (2000) and validated by İnal and Ömeroğlu (2011), is rooted in theories of intelligence— particularly Vernon's hierarchical intelligence model and Cattell's theory of fluid and crystallized intelligence. The version of the test used in this study was CogAT Form-6, designed specifically for early childhood children. It consists of three subtests focusing on verbal, numerical, and non-verbal reasoning. Each subtest contains 40 items, totaling 120 items for the full test. During the test, children are presented with a directive, under which are visuals with four options. They are asked to select the appropriate option, scoring 1 point for a correct answer and 0 for an incorrect answer. The total score is the sum of correct answers from all subtests. The internal consistency of the CogAT for this research, calculated using KR-20, is provided separately for subtests, batteries, and the whole test in Table 2.

Table 2. Internal Consistency Coefficients of the CogAT for the Whole Sample

Variable	KR-20	N
Subtests		
Oral Vocabulary	.75	120
Verbal Reasoning	.72	120
Relational Concepts	.74	120
Quantitative Concepts	.84	120
Figure Classification	.79	119
Matrices	.69	119
Batteries		
Verbal Aptitude[a]	.84	120
Quantitative Aptitude[b]	.86	120
Non-Verbal Aptitude[c]	.85	119
Whole Test (CogAT-Total)	.93	119

Note.　[a]= Oral Vocabulary + Verbal Reasoning;
　　　　[b]= Associated Concepts + Quantitative Concepts;
　　　　[c] = Figure Classification+ Matrices

Table 2 reveals the internal consistency coefficients of the CogAT, calculated using the KR-20 method. The internal consistency coefficient was .93 for the entire test, .84 for Verbal Aptitude, .86 for Quantitative Aptitude, and .85 for Non-Verbal Aptitude. Regarding subtests, the internal consistency coefficients ranged from .69 to .84. The quantitative concepts subtest had the highest internal consistency, while the matrices subtest had the lowest. These values suggest that the test exhibits good internal consistency for both the overall test and the sub-competencies (Büyüköztürk, 2021). This indicates that the test is reliably measuring the constructs it is intended to measure.

Data Collection Process

The data gathering phase commenced with obtaining requisite permissions from the pertinent institutions and organizations. Subsequent to this, the researchers engaged with the management personnel of the respective institutions, elucidating the objectives of the research. Over an 8-week period, the researchers conducted the data collection 3 times per week at the selected schools. The researchers interacted with the children in a serene environment, introducing themselves and delineating the purpose of the test. Willingness to participate was ascertained from each child on a voluntary basis. The children were assembled in small groups of 4-5 individuals, arranged so that their responses remained private, preventing the potential influence of their peers' answers. Concurrently, adherence to the researchers' instructions was closely monitored.

In an effort to clarify the test process, the researchers commenced by explaining and responding to the sample questions in tandem with the children. Once this was completed, the children were encouraged to concentrate on the test, with every effort being made to ensure that they independently recorded their responses. The children's responses were noted on the test form by the researchers. Bearing in mind the developmental stages of the children, the subtests were administered over different time periods, thereby tailoring the procedure to the children's readiness level. The testing was therefore completed over one, two, or three sessions, as appropriate.

Data Analysis

IBM SPSS 25 software was utilized for data analysis. To validate the normality of the data, the measures of central tendency, skewness, and kurtosis values of the CogAT for the entire test, subtests, and ability levels were scrutinized separately. Literature review indicates that when the mean, median, and mode are closely similar and the skewness and kurtosis values fall between -2 and +2, the data can be deemed to follow a normal distribution (George & Mallery, 2003; Green & Salkind, 2005). Upon reviewing Table 3, it is evident that the measures of central tendency for the total CogAT score, the subtests and battery scores align closely with each other; the skewness and kurtosis coefficients fall between -1 and 1. This suggests that the data adhere to a normal distribution. For the reliability assessment of the test, the KR-20 internal consistency coefficient was computed for the total score, subtest scores, and battery scores. Additional statistical methods such as descriptive statistics, Independent Sample T-test, and One-way Analysis of Variance (One-way ANOVA) were employed to scrutinize the research questions. Cohen's d was utilized to determine the effect size in the Independent Sample t-tests with .2 indicating a small effect size, .5 a medium effect size, and .8 a large effect size. For the One-Way Analysis of Variance, the effect size was computed with Eta-square ($\eta2$), where an $\eta2$ value of .01 signifies a small effect, .06 a medium effect, and .14 a large effect (Cohen, 1988; Green & Salkind, 2004). Statistical significance was established at a 0.05 significance level. The statistical values demonstrating the normality of the data are presented in Table 3, and the normal distribution curve for the overall CogAT test score is depicted in Figure 2.

Table 3. Statistical Values Related to Normality of Data

Variables	M	Med.	Mod.	Skewness	Kurtosis	N
Subtests						
Oral Vocabulary	15.22	16.00	18.00	-.81	-.06	120
Verbal Reasoning	12.70	13.00	17.00	-.10	-.90	120
Relational Concepts	11.09	11.00	13.00	-.12	-.11	120
Quantitative Concepts	14.00	14.00	14.00	-.48	-.47	120
Figure Classification	12.24	12.00	10.00	-.07	-.45	119
Matrices	12.10	12.00	12.00	.07	.22	119
Batteries						
Verbal Aptitude[a]	27.92	29.00	34.00	-.42	-.81	120
Quantitative Aptitude[b]	25.09	25.00	25.00	-.26	-.54	120
Non-Verbal Aptitude[c]	24.34	24.00	23.00	.07	-.29	119
Whole Test	77.48	79.00	67.00	-.21	-.79	119

Note. [a]= Oral Vocabulary + Verbal Reasoning;
[b]= Relational Concepts + Quantitative Concepts;
[c]= Figure Classification+ Matrices
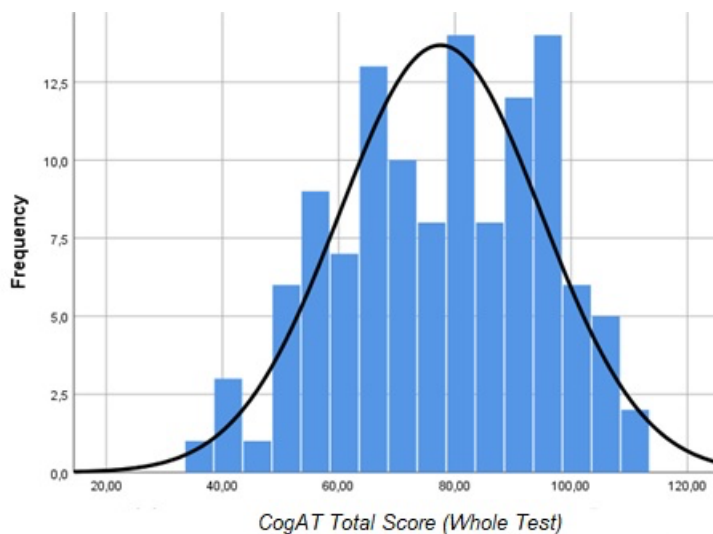
Figure 2. *Normal Distribution Curve for CogAT Total Test Score*

Research Ethics

Social and Human Sciences Ethics Committee Approval Certificate was given by Bartın University on 10.11.2022 with the Protocol Number 2022-SBB-0493.

FINDINGS

Descriptive Statistics for Total, Subtest and Battery Scores of the CogAT

The descriptive statistics of the subtests, ability levels and the whole of the CogAT of the children participating in the study are presented in Table 4.

Table 4. Descriptive Statistics for the Whole Sample

CogAT	*M*	*SD*	*Min.*	*Max.*	*Range*	*N*
Subtests						
Oral Vocabulary	15.22	3.48	6.00	20.00	14.00	120
Verbal Reasoning	12.70	3.62	5.00	20.00	15.00	120
Relational Concepts	11.09	3.53	1.00	19.00	18.00	120
Quantitative Concepts	14.00	4.01	2.00	20.00	18.00	120
Figure Classification	12.24	4.21	1.00	20.00	19.00	119
Matrices	12.10	3.22	3.00	20.00	17.00	119
Batteries						
Verbal Aptitude[a]	27.92	6.52	13.00	39.00	26.00	120
Quantitative Aptitude[b]	25.09	6.90	6.00	39.00	33.00	120
Non-Verbal Aptitude[c]	24.34	6.81	6.00	39.00	33.00	119
Whole Test	77.48	17.35	36.00	111.00	75.00	119

Notes. Possible score ranges (min-max): All subtest scores (0-20); Batteries (0-40) and CogAT Whole test score (0-120).

Upon scrutinizing Table 4, it can be discerned that, among the subtests of the CogAT, the subtest of Oral Vocabulary boasts the highest mean (M=15.22), whilst the subtest of Relational Concepts registers the lowest mean (M=11.09). With regard to the test batteries, the descending order of averages is as follows: Verbal Aptitude (M=27.92), Quantitative Aptitude (M=25.09), and Non-Verbal Aptitude (M=24.34). The Quantitative Concepts stands as the sole subtest where not a single student managed to answer all the questions, as evidenced by a maximum score of 19.00.

Overall, despite the absence of a universally accepted norm, the recorded averages for the subtests, ability levels, and overall scores of the CogAT appear to exceed the median level considering the maximum score that can be obtained from the test. Additionally, an inspection of the standard deviation values suggests a limited degree of deviation from the mean across all scores, thereby indicating a relative consistency in the performance of the participants.

Comparison of Children's CogAT Scores by Gender and School Type

In an effort to ascertain whether the Cognitive Abilities Test (CogAT) scores of the student participants, concerning the subtests, aptitude levels, and overall performance, significantly varied based on their gender and type of school, the Independent Groups t-Test was employed. The results derived from this statistical analysis are encapsulated within Tables 5 and 6, respectively.

Table 5. Comparison of S Children's CogAT scores according to gender

CogAT	Girls (N=63)		Boys (N=57)		*t*(117-118)	*p*	Cohen's *d*
	M	*SS*	*Ort.*	*SS*			
Subtests							
Oral Vocabulary	15.15	3.40	15.29	3.60	-2.180	.828	0.03
Verbal Reasoning	12.76	3.66	12.63	3.61	.196	.845	0.03
Relational Concepts	10.79	3.33	11.42	3.75	-.970	.334	0.17
Quantitative Concepts	13.93	4.03	14.07	4.03	-.181	.856	0.03
Figure Classification	11.77	3.80	12.75	4.60	-1.270	.207	0.23
Matrices	11.38	3.09	12.87	3.21	-2.576	.011**	0.47
Batteries							

Verbal Aptitude	27.92	6.47	27.92	6.62	-0.008	.994	0.00
Quantitative Aptitude	24.73	6.67	25.49	7.19	-.601	.549	0.10
Non-Verbal Aptitude	23.16	6.14	25.63	7.31	-2.000	.048*	0.36
Whole Test	76.04	16.69	79.05	18.05	-.943	.348	0.17

Notes. Figure Classification and Matrices subtests were administered to 119 children.

*p < .05. **p < .01.

Table 5 delineates the comparative analysis of children's CogAT scores based on gender. For each subtest and battery of the CogAT, the table outlines the mean scores, standard deviations, t-values, p-values, and effect sizes (Cohen's d) for girls (N=63) and boys (N=57). In examining the subtests, no significant differences were observed in the Oral Vocabulary, Verbal Reasoning, Relational Concepts, Quantitative Concepts, and Figure Classification subtests, as denoted by the non-significant p-values (>0.05) and negligible effect sizes (Cohen's d <0.2). However, in the Matrices subtest, boys scored significantly higher than girls, as reflected by the t-value of -2.576 and a significant p-value of 0.011, with a moderate effect size (Cohen's d = 0.47). Regarding the CogAT batteries, the Verbal and Quantitative Aptitudes demonstrated no significant differences between genders, with minimal effect sizes. On the other hand, in the Non-Verbal Aptitude, boys significantly outperformed girls, as indicated by the t-value of -2.000, a p-value of 0.048, and a small-to-moderate effect size (Cohen's d = 0.36). In terms of overall performance on the CogAT, the difference between boys and girls was not statistically significant, with a t-value of -0.943 and a p-value of 0.348. The effect size was small, indicating a limited practical significance (Cohen's d = 0.17).

Table 6. Comparison of Children's CogAT scores according to school type

CogAT	Preschool (N=63)		Primary School (N=57)		$t(118)$	p	Cohen's d
	Mean	*SD*	*Mean*	*SD*			
Subtests							
Oral Vocabulary	13.79	3.67	16.80	2.45	-5.223	.000*	0.96
Verbal Reasoning	11.12	3.25	14.43	3.21	-5.595	.000*	1.02
Relational Concepts	9.79	3.49	12.52	3.00	-4.566	.000*	0.83
Quantitative Concepts	12.60	4.15	15.54	3.25	-4.287	.000*	0.78
Figure Classification	10.58	4.01	14.05	3.68	-4.906	.000*	0.90
Matrices	11.19	3.24	13.08	2.92	-3.333	.001**	0.61
Batteries							
Verbal Aptitude	24.92	6.19	31.24	5.15	-6.047	.000*	1.10
Quantitative Aptitude	22.39	6.75	28.07	5.79	-4.911	.000*	0.90
Non-Verbal Aptitude	21.77	6.61	27.14	5.90	4.651	.000*	0.85
Whole Test	69.24	15.82	86.45	14.30	6.207	.000*	1.43

Notes. *Figure Classification and Matrices subtests were administered to 119 children.*

*p=.000, ***p = .001.

Upon examination of Table 6, the CogAT scores—across subtests, ability levels (batteries), and the overall test—of the participating children were observed to be significantly higher for the first graders compared to the preschoolers. The most significant effect size was observed in the CogAT's total test score, as indicated by the t-value of 6.207, the p-value of .000, and a substantial effect size (Cohen's d =1.43). This implies that the total test scores have the greatest influence on the divergence between the mean scores of first grade and preschool children.

In terms of subtests, the most pronounced effect size between first grade and preschool children was seen in the Verbal Reasoning subtest, denoted by the t-value of 5.595, p-value of .000, and a large effect size (Cohen's d =1.02). Similarly, among the ability levels (batteries), the Verbal Aptitude battery displayed the largest effect size between the two student groups, as signified by the t-value of -6.047, the p-value of .000, and a considerable effect size (Cohen's d =1.10). In general, it can be concluded that as grade level increases, so too do the CogAT scores, thereby indicating the validity of the test with respect to this variable.

Comparison of Children's CogAT Scores According to Age Groups

The results of a One-way Analysis of Variance (ANOVA), conducted to determine whether there is a significant disparity in the CogAT scores—both at the battery level and in totality—based on different age groups of the participating children, are delineated in Table 7.

Table 7. One-way ANOVA Results According to Age Groups

CogAT	Age Group	M	SD	N	F	p	η^2	Difference
Verbal Aptitude	1. 60-66 months	24.97	6.63	39				
	2. 67-72 months	25.72	5.96	25	14.02	.000*	.19	1<2<3
	3. 77-84 months	30.96	5.31	56				
Quantitative Aptitude	1. 60-66 months	22.12	7.09	39				
	2. 67-72 months	23.16	6.38	25	11.24	.000*	.16	1<2<3
	3. 77-84 months	28.01	5.82	56				
Non-Verbal Aptitude	1. 60-66 months	22.28	7.31	38				
	2. 67-72 months	21.12	5.34	25	10.94	.000*	.15	2<1<3
	3. 77-84 months	27.17	5.94	56				
Whole Test	1. 60-66 months	69.63	17.03	38				
	2. 67-72 months	70.00	14.52	25	16.74	.000*	.22	1<2<3
	3. 77-84 months	86.16	14.62	56				

Note. Tukey post-hoc tests (α = 0.05) were performed to identify differences.
∗ indicates *p* = .000.

Upon scrutiny of Table 7, the One-way Analysis of Variance (ANOVA) demonstrates a statistically significant variance among the groups with regards to Verbal Aptitude scores (F=14.02, p<.001, partial $\eta2$ =.19). Post-hoc comparisons using the Tukey HSD test revealed that the group aged 77-84 months (M=30.96, SD=5.31) significantly outperformed both the 67-72 months group (M=25.72, SD=5.96) and the 60-66 months group (M=24.97, SD=6.63) in terms of Verbal Aptitude scores. Moreover, the 67-72 months group showed higher scores than the 60-66 months group. A large effect size was indicated by the partial eta squared ($\eta2$) analysis.

Quantitative Aptitude scores also presented a statistically significant difference among the groups, as revealed by the One-way ANOVA (F=10.94, p<.001, partial $\eta2$ =.15). Subsequent post-hoc analysis using the Tukey HSD test indicated that the 77-84 months group (M=28.01, SD=5.82) had significantly higher scores compared to both the 67-72 months group (M=23.16, SD=6.38) and the 60-66 months group (M=22.12, SD=7.09). In addition, the 67-72 months group exhibited higher scores than the 60-66 months group. The actual difference between the groups, as indicated by the partial eta squared ($\eta2$), is large.

When evaluated in terms of Non-Verbal Aptitude scores, the One-way ANOVA displayed a statistically significant discrepancy among the groups (F=11.24, p<.001, partial $\eta2$ =.16). The Tukey HSD test determined that the 77-84 months group (M=27.17, SD=5.94) scored significantly higher than both the 67-72 months group (M=21.12, SD=5.34) and the 60-66 months group (M=22.28, SD=7.31). Interestingly, the 60-66 months group demonstrated higher scores than the 67-72 months group, contradicting the general pattern observed. A large effect size is identified by the partial eta squared (η^2) analysis.

Lastly, in terms of the total CogAT score, the One-way ANOVA revealed a statistically significant divergence among the groups (F=16.74, p<.001, partial $\eta2$ =.22). The post-hoc comparisons indicated that the 77-84 months group (M=86.16, SD=14.62) significantly exceeded both the 67-72 months group (M=70.00, SD=14.52) and the 60-66 months group (M=69.63, SD=17.03) in total CogAT score. Furthermore, the 67-72 months group had a higher total CogAT score than the 60-66 months group. The partial eta squared ($\eta2$) analysis suggests a quite large actual difference among the groups.

Comparison of Children's CogAT Scores According to Parents' Level of Education

The results of the One-way Analysis of Variance (ANOVA), conducted to ascertain if a significant difference exists among the scores of children participating in the study with respect to the batteries and overall CogAT in accordance with the parental education level, are delineated in Tables 8 and 9, respectively.

Table 8. One-way ANOVA Results According to Mother's Level of Education

CogAT	Mother's Level of Education	M	SD	N	F	p	η^2	Difference
Verbal Aptitude	1. Below high school	24.22	6.19	18				
	2. High School	26.34	6.80	23				
	3. Associate degree	27.35	6.44	14	2.686	.035*	.09	1<4
	4. Bachelor's	29.60	5.88	43				
	5. Postgraduate	28.70	6.89	10				
Quantitative Aptitude	1. Below high school	22.33	5.13	18				
	2. High school	23.34	7.67	23				
	3. Associate degree	24.28	7.81	14	2.133	.082		
	4. Bachelor's	26.95	5.54	43				
	5. Postgraduate	24.00	8.21	10				
Non-Verbal Aptitude	1. Below high school	21.77	6.75	18				
	2. High School	23.63	7.20	22				
	3. Associate degree	24.00	7.20	14	1.020	.401		
	4. Bachelor's	25.37	6.68	43				
	5. Postgraduate	22.70	6.03	10				
The Whole Test	1. Below high school	68.33	15.89	18				
	2. High school	73.86	18.87	22	2.333	.061		
	3. Associate degree	75.64	19.42	14				
	4. Bachelor's	81.93	14.96	43				
	5. Postgraduate	75.40	17.65	10				

Note. Tukey post-hoc tests ($\alpha = 0.05$) were performed to identify differences. * indicates $p < .05$

Upon scrutinizing Table 8, the results of the one-way Analysis of Variance (ANOVA) disclosed a statistically significant discrepancy solely in the Verbal Aptitude scores amongst groups, contingent upon the education level of the mother, F=2.686, p<.05; partial η^2 =.09. The post-hoc Tukey HSD test, carried out to ascertain the origin of this divergence, highlighted that the Verbal Aptitude scores of children with mothers possessing a bachelor's degree (M=29.90, SD=5.88) were significantly elevated compared to those whose mothers' education terminated before high school (primary or secondary school) (M=14.22, SD=6.19). The assessment of the partial eta squared (η^2) value suggests that the actual difference between these groups manifests at a moderate level. No significant variances were discerned among the remaining groups.

Table 9. One-way ANOVA Results According to Father's Education Level

CogAT	Father's Level of Education	M	SD	N	F	p	η^2	Difference
Verbal Aptitude	1. Below high school	22.77	7.39	9				
	2. High School	26.60	6.82	23				
	3. Associate degree	26.50	4.16	12	2.868	.027*	.10	1<4, 1<5
	4. Bachelor's	28.96	6.12	52				
	5. Postgraduate	30.66	6.45	12				
Quantitative Aptitude	1. Below high school	20.44	6.18	9				
	2. High school	23.82	5.89	23				
	3. Associate degree	20.75	4.00	12	3.807	.006**	.12	3<4
	4. Bachelor's	26.75	7.16	52				
	5. Postgraduate	26.83	6.19	12				
Non-Verbal Aptitude	1. Below high school	21.77	7.74	9				
	2. High School	22.30	7.15	23				
	3. Associate degree	19.81	3.76	11	3.020	.021*	.10	3<4
	4. Bachelor's	26.09	6.77	52				
	5. Postgraduate	24.08	5.99	12				
The Whole Test	1. Below high school	65.00	19.94	9				
	2. High school	72.73	17.09	23				
	3. Associate degree	67.90	9.19	11	3.718	.007**	.12	1<4
	4. Bachelor's	81.80	17.17	52				
	5. Postgraduate	81.58	14.95	12				

Note. Tukey post-hoc tests ($\alpha = 0.05$) were performed to identify differences.   * indicates $p < .05$, ** indicates p < .01,

Upon examining Table 9, the outcomes of the one-way ANOVA revealed a statistically significant distinction solely in the Verbal Aptitude scores among children, concerning the educational attainment of their fathers, F=2.868, p<.05; partial $\eta2$ =.10. Subsequent post hoc comparisons using the Tukey HSD test indicated that the Verbal Aptitude scores of children with fathers holding an undergraduate degree (M=28.96, SD=6.18) and a graduate degree (M=30.66, SD=6.45) were significantly higher than those of children whose fathers' education terminated before high school (primary or secondary school) (M=22.77, SD=77.39). The partial eta squared ($\eta2$) value suggests that the actual difference between these groups is at a moderate level. No significant variances were discerned among the other groups.

Moreover, the findings of the one-way ANOVA indicated a statistically significant discrepancy in the Quantitative Aptitude scores of children based on their father's education level, F=3.807, p<.01; partial $\eta2$ =.12. The post hoc Tukey HSD test further revealed that children whose fathers possessed an undergraduate degree (M=26.75, SD=7.16) exhibited significantly higher Quantitative Aptitude scores compared to those whose fathers held an associate degree (M=20.75, SD=4.00). The analysis of partial eta squared ($\eta2$) suggests that the actual difference between these groups is at a moderate level. No significant variances were observed among the remaining groups.

Similarly, the outcomes of the one-way ANOVA indicated a statistically significant distinction in the Non-Verbal Aptitude scores among children, dependent on their father's education level, F=3.020, p<.05; partial $\eta2$ =.12. The post hoc Tukey HSD test demonstrated that children with fathers possessing a bachelor's degree (M=26.09, SD=6.77) achieved significantly higher Non-Verbal Aptitude scores compared to those with fathers holding an associate degree (M=19.81, SD=3.76). The analysis of partial eta squared ($\eta2$) indicates that the actual difference between these groups is at a moderate level. No significant variances were observed among the other groups.

Lastly, upon examining Table 9, the one-way ANOVA disclosed a statistically significant distinction in the cognitive abilities total test scores of children in relation to their father's education level, F=3.718, p<.01; partial $\eta2$ =.12. The subsequent post hoc Tukey HSD test revealed that the cognitive abilities total test scores of children whose fathers attained an undergraduate degree (M=81.80, SD=17.17) were significantly higher than those of children whose fathers held an associate degree (M=65.00, SD=19.94). The analysis of partial eta squared ($\eta2$) suggests that the actual difference between these groups is at a moderate level. No significant variances were observed among the other groups.

DISCUSSION AND CONCLUSION

In this study, the investigation of cognitive abilities among 60-72-month-old children in terms of gender, school type, age group, and parental education level yielded interesting findings. While no significant gender difference was observed in the overall test scores, boys exhibited better performance in matrices and Non-Verbal Aptitude scores. The absence of a gender effect in the overall test scores aligns with previous research that has reported mixed findings regarding cognitive gender differences (Lohman & Lakin, 2009; Strand et al., 2006). These inconsistencies suggest that cognitive abilities may be influenced by a complex interplay of biological, social, and environmental factors. Furthermore, the gender-specific advantages observed in matrices and Non-Verbal Aptitude scores are consistent with prior studies highlighting distinct cognitive strengths in different domains for males and females (Maitland et al., 2000; Schaie & Hertzog, 1983;). These results emphasize the importance of considering specific cognitive domains when examining gender differences in cognitive abilities.

The significant difference in cognitive abilities favoring primary school children provides evidence for the sensitivity of the CogAT Form-6 to grade level and school type among Turkish children. This finding supports the notion that cognitive abilities undergo developmental changes and highlights the importance of assessing cognitive abilities at different stages of development (Demetriou et al., 2020). The inclusion of preschool education experiences in this study adds value by acknowledging the potential influence of early education on cognitive skills. The finding that children who attended preschool education exhibited higher cognitive ability test scores further emphasizes the positive impact of early educational interventions on cognitive development (Glick, & Sahn, 2007).

Examining the relationship between cognitive abilities and age groups revealed a significant increase in total test scores with increasing age. These results align with the existing literature on age-related changes in cognitive abilities, highlighting the dynamic nature of cognitive development across different developmental stages (Christoforides et al., 2016; Demetriou et al., 2017, 2018; Makris et al., 2017). The cognitive abilities

exhibited by children in this study are consistent with the expected cognitive milestones at their respective age groups. These findings underscore the importance of understanding the unique cognitive demands and abilities associated with each developmental stage and provide valuable insights into the developmental trajectories of cognitive abilities.

The investigation of parental education level's impact on cognitive abilities revealed significant associations between higher parental education levels and superior cognitive performance in children. Specifically, maternal education level exerted a significant influence on children's Verbal Aptitude scores, while paternal education level impacted children's verbal, numerical, Non-Verbal Aptitude, and overall test scores. These findings align with previous research highlighting the intergenerational transmission of cognitive abilities and the influence of parental education on children's cognitive development (Anger & Heineck, 2010; Villaseñor et al., 2009). The significant impact of maternal education on children's Verbal Aptitude scores may be attributed to the linguistic and cognitive stimulation provided by mothers during early childhood. On the other hand, the influence of paternal education on multiple cognitive domains suggests the importance of paternal involvement in fostering children's cognitive abilities. The increasing involvement of fathers in child-rearing activities, as observed in contemporary society, may contribute to their influence on children's cognitive development (Mercan & Şahin, 2017).

Overall, this study contributes to the existing literature by examining the cognitive abilities of children in relation to various factors. The findings highlight the complexities of cognitive gender differences, the developmental trajectory of cognitive abilities, and the role of parental education in shaping children's cognitive performance. The results underscore the importance of considering multiple factors, including gender, age, school type, and parental education, in understanding the multidimensional nature of cognitive abilities.

Implications, Future Directions, and Limitations

The findings of this study have important implications for both research and practice. Firstly, it highlights the significance of assessing children's cognitive abilities at specific periods and tracking their development from the preschool years onward. This emphasizes the importance of early intervention programs that target children with below-grade level cognitive development. Furthermore, curricula should be designed to enhance children's cognitive abilities, considering the impact of such abilities on overall development.

Additionally, recognizing the influential role of parents in their children's cognitive development, it is recommended to implement more effective family education activities. By raising parental awareness, parents can actively contribute to fostering their children's cognitive abilities.

However, it is crucial to acknowledge the limitations of this study. One notable limitation is the relatively small sample size, which restricts the generalizability of the findings. To overcome this limitation, future research should aim for larger and more diverse samples to ensure more robust conclusions.

Based on the findings, several recommendations can be made for future research and practice:

Regular monitoring of children's cognitive abilities using standardized tests should be implemented from early childhood to detect and address any developmental gaps promptly.

Parental involvement and education should be emphasized, with efforts aimed at increasing awareness of their impact on children's cognitive development. Expanding family education activities can effectively support this objective.

Early intervention programs should be tailored to target cognitive abilities specifically, addressing the needs of children with developmental delays.

Future research can explore the longitudinal and cross-sectional effects of the Verbal, Quantitative, and Non-Verbal dimensions of the *CogAT* Form-6 on the academic achievement of Turkish children.

Large-scale studies should investigate the influence of socio-economic status and cultural differences on children's cognitive abilities, providing valuable insights into the broader context of cognitive development.

Conclusion

The findings of this study revealed that there was no significant disparity in cognitive abilities among participants based on gender, as indicated by the total scores. However, when examining specific subtests and batteries, boys outperformed girls significantly in the matrices subtest and Non-Verbal Aptitude. Furthermore, a noteworthy discrepancy was observed based on the type of school, favoring first graders over children attending pre-school education institutions. Overall, the study observed a positive correlation between age group and both battery and total test scores, indicating that as the age group increased, cognitive performance improved. Another significant factor influencing cognitive abilities was the educational level of the parents. Children whose mothers

held a bachelor's degree achieved significantly higher Verbal Aptitude scores compared to children whose mothers had less than a high school education (primary or secondary school). Similarly, it was noted that cognitive abilities tended to increase as the level of the father's education rose, with a few exceptions.

Statements of Publication Ethics

Publication ethics statements were complied with in the study.

Researchers' Contribution Rate

Authors	Literature review	Method	Data Collection	Data Analysis	Results	Conclusion
Author 1	☒		☒		☒	☒
Author 2	☒		☒		☒	☒
Author 3	☒	☒	☒	☒	☒	☒

Conflict of Interest

There is no conflict of interest in the study.

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An Action Research to Alleviate Speaking Anxiety of Prospective EFL Teachers

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Abstract

This study was driven by the need to help freshman prospective EFL teachers control high foreign language speaking anxiety that was observed during the compulsory course of "Oral Communication Skills-I". A 14-week action plan was designed to alleviate the foreign language anxiety (FLA) they felt while speaking and improve their speaking performance. Multiple sources of data were collected by means of quantitative and qualitative measures in order to evaluate the effect of the action plan on participants. Qualitative results demonstrated that the action plan positively affected their speaking performance, and self-confidence. Additionally, a slight decline in their speaking anxiety was revealed. On the other hand, a decline in their speaking performance was observed. Thus, despite the decline in their speaking performance, the action was useful in supporting socio-psychological factors that are significant determinants of speaking performance The study provides some clues for re-structuring the curriculum used in faculties of education. Despite the ample research on FLA in the EFL setting, existing research has little to report on FLA experienced by non-native prospective EFL teachers and majority of this research aims to find out the sources of FLA they experienced, so the study fills in a crucial gap in the related body of literature.

Keywords: action research, foreign language anxiety, prospective EFL teachers, speaking skill

Yabancı Dil Olarak Türkçe Öğrenenlerin Motivasyon Kaynakları ve Sorunlarının İncelenmesi

Öz

Bu çalışma, birinci sınıf İngilizce öğretmeni adaylarının "Sözlü İletişim Becerileri-I" zorunlu dersi sırasında gözlemlenen yüksek yabancı dil konuşma kaygısını kontrol etmelerine yardım etme ihtiyacından ortaya çıkmıştır. Konuşma sırasında hissettikleri yabancı dil kaygısını hafifletmek ve konuşma performanslarını artırmak için 14 haftalık bir eylem planı tasarlanmıştır. Eylem planının katılımcıların üzerindeki etkisini değerlendirmek için nicel ve nitel ölçümler yoluyla birden fazla kaynaktan veri toplanmıştır. Nitel sonuçlar, eylem planının katılımcıların konuşma performanslarını, kişilerarası becerilerini ve özgüvenlerini olumlu yönde etkilediğini göstermiştir. Ayrıca konuşma kaygılarında hafif bir düşüş olduğu ortaya çıkmıştır. Öte yandan konuşma performanslarında düşüş gözlemlendi. Bu nedenle, katılımcıların konuşma performanslarındaki düşüşe rağmen, eylem planının, konuşma performansının önemli belirleyicileri olan sosyo-psikolojik faktörleri desteklemede faydalı olduğu sonucuna ulaşılmıştır. Çalışma, eğitim fakültelerinde kullanılan eğitim programının yeniden yapılandırılması için önemli ipuçları sunmaktadır. Yabancı dil olarak İngilizce öğrenme konusunda çok sayıda araştırmaya rağmen, mevcut araştırma, İngilizce öğretmeni adaylarının yaşadığı yabancı dil öğrenme kaygısı hakkında çok az bilgi vermektedir ve mevcut araştırmanın büyük çoğunluğu, hedef grubun yaşadığı kaygının nedenlerini bulmaya yöneliktir. Bu nedenle, çalışma alan yazındaki önemli bir boşluğu doldurmaktadır.

Anahtar Sözcükler: eylem araştırması, İngilizce öğretmeni adayları, konuşma becerisi, yabancı dil kaygıs

INTRODUCTION

Foreign language anxiety (FLA) is one of the most frequently experienced affective factors in language classes. In speaking classes where students need to process language input and produce output simultaneously FLA is observed frequently (Çağatay, 2015). Although some learners perform successfully in learning different subjects, they might not display the same performance learning a foreign language because of mental block against it. In this case, anxiety might be the factor that impedes the learning process of these learners (Horwitz et al., 1986). FLA has a harmful effect on the speaking performance of foreign language learners. Ultimately, speaking anxiety might cause students to have difficulty in adapting to their learning environment and succeeding in learning to speak (Hanifa, 2018; Woodrow, 2006).

Regarding the types of anxiety, three of the most prominent researchers of FLA (Horwitz et al., 1986) distinguished the phenomenon from other anxiety types, and they became the first to define FLA. The researchers defined FLA as "a distinct complex construct of self-perceptions, beliefs, feelings, and behaviors related to classroom language learning arising from the uniqueness of language learning process" (p. 128). They suggested that FLA is a situation-specific anxiety and results from mastering a foreign language in formal environments, so it should be viewed as a different case from general classroom anxiety that is being transferred to foreign language learning. Besides, FLA should not be viewed as a state that occurs because of transferring classroom anxiety (that includes test anxiety, communication anxiety, and anxiety resulting from negative evaluation) to foreign language setting. Results of the research by MacIntyre and Gardner (1989) supported the theory that FLA could be distinguished from general anxiety, and FLA was defined as situation-specific anxiety that occurs systematically over time. Besides, it was concluded that foreign language proficiency level and FLA are related (MacIntyre & Gardner, 1991). Later, this result was confirmed by further studies (Sparks & Ganschow, 2007; Thompson & Lee, 2013). Results of the further studies showed that anxiety influences both language learning and communication skills negatively.

Foreign Language Anxiety and Language Learning

Amongst students who experience FLA, anxiety is mostly associated with speaking the language. Learners find speaking publicly in the target language extremely anxiety-provoking (MacIntyre & Gardner, 1991). According to Horwitz (1996, p. 1), "much of this anxiety results from the inherent threat to the learner's self-concept of competence and individuality posed by communicating in an imperfect way". To put it another way, communication requires nonspontaneous and complex mental operations and the performance in the second language might challenge the self-concept of an individual, so it might lead to panic, self-consciousness, or fear. Additionally, the researcher states that FLA in second language learning has already been recognized and teachers and learners are now aware that some students (in particular the ones with high anxiety) feel anxious using a second language.

The research on FLA demonstrates that FLA is experienced in EFL (English as Foreign Language) settings, as well. Related body of literature presents ample evidence about the sources of FLA in EFL settings. According to the results of these studies, reasons of FLA in EFL settings are students' past learning experiences about language learning, visiting foreign countries, academic achievement, overall average expected for the course, self-perceived academic abilities, and perceived self-worth (Onwuegbuzie et al., 1999). Additionally, female gender is disadvantageous in terms of FLA (Demirdaş & Bozdoğan, 2013; Onwuegbuzie et al., 1999; Özalp & Merç, 2022; Öztürk & Gürbüz, 2014) because female students experience higher level of anxiety while speaking a foreign language. Besides, some other reasons are immediate questions teachers asked, fear of making mistakes while speaking English, negative evaluation of others, and concern to have a perfect pronunciation (Öztürk & Gürbüz, 2014). Last, a study conducted in an EFL context gave evidence on the sources of speaking anxiety. The results revealed that the reasons of FLA in EFL setting could be classified into three categories, namely, cognitive, affective, and performance-oriented. Cognitive factors include being familiar with the topic and interlocutors while affective factors constitute self-consciousness, or feelings towards the topic discussed and group members. Finally, performance-oriented reasons are planning and rehearsals for the task, environmental conditions, and discourse control (Hanifa, 2018).

Regarding the effects of FLA on language learning, it is obvious that it has a harmful effect. Anxiety influences both language learning and communication skills negatively because students with high anxiety are unable to show the language input they are processing (MacIntyre & Gardner, 1994). Highly anxious learners learn more slowly and remember less material than their counterparts with lower levels of anxiety (MacIntyre &

Gardner, 1994). Although he did not investigate the effect of FLA on language learning, Öztürk and Gürbüz (2014) stated that EFL speaking anxiety might cause lack of self-confidence and giving up speaking in a classroom atmosphere.

Concerning classroom interventions to overcome foreign language anxiety, an existing study categorized the interventions into two time periods as before and after 2000. Before 2000, the interventions to control anxiety targeted teachers. The techniques suggested were journal keeping, emotive therapies, behavioral contracts, use of pair/group activities in classrooms, relaxation activities, and presenting a non-threatening classroom environment. After 2000, interventions suggested to control anxiety included such strategies as self-encouragement to take risks, positive talk, positive thinking, and short-term project work (Toyama & Yamazaki, 2021).

Likewise, Casado and Dereshiwsky (2001) offered suggestions about how to control high anxiety in foreign language classes. According to the researchers, teachers need to explain grammar structures in the native language of students particularly in beginner and elementary classes. Support groups are beneficial in providing learners with an opportunity to discuss difficulties in language learning, as well. Another interesting finding obtained by Effiong (2016) was that along with their age and tone of voice, the dress code of teachers is significant in terms of evidencing their friendliness and self-presentation. Therefore, teachers having a less formal style may alleviate anxiety in foreign language classrooms.

Foreign Language Anxiety Amongst Non-native Prospective Teachers

Despite the ample research on FLA in the EFL setting, existing research has little to report on "FLA experienced by non-native prospective EFL teachers" (Canessa, 2004; Horwitz, 1996; Horwitz et al., 2010). Non-native English teachers are increasing in number worldwide and although they are supposed to be high-level speakers of their target language, they are still foreign language learners and they might experience FLA, just as any other language learner might. Even non-native instructors of advanced levels of EFL might discover that language learning is never completely finished (Tüm & Kunt, 2013).

As stated by Horwitz (1996), when a teacher completes the required course of study to become a teacher, his language learning process is not complete. In addition to the demands on their linguistic skills posed by classroom teaching, these teachers immediately recognize the need to improve their target language proficiency. Likewise, teacher certification does not guarantee confidence in using the target language, which explains why speaking "in front of the class" and "on the spot" was found to be the most anxiety-provoking situation amongst non-native prospective teachers according to the results of some studies (MacIntyre & Gardner, 1991; Young, 1990; Young, 1992). The anxiety prospective teachers feel might result in some undesirable behaviors. Initially, prospective teachers with FLA might minimize or avoid speaking the target language publicly when they start teaching in case their classes pose over-concern about correctness and native-like pronunciation. However, language teachers and instructional materials are two significant sources of input in language classes, so a teacher that avoids speaking decreases the amount of exposure to the target language. Furthermore, students in the language class might perceive the teacher's uneasiness, so they might experience the same feeling. Last, the teacher might develop negative feelings towards the profession such as dissatisfaction and burnout (Horwitz, 1996).

Türkiye is one of the expanding circle countries where English language is taught as a foreign language (Crystal, 2012), so English language teachers are non-native teachers that teach English in an expanding circle country and they are very likely to experience FLA (Dağtan & Cabaroğlu, 2021; Tüm & Kunt, 2013; Tüm, 2012). There is a scarce body of literature that explored the FLA prospective EFL teachers in Türkiye experienced and most of the related research aimed to investigate reasons for FLA. In one of these studies, causes of FLA experienced by prospective teachers in the ELT department at a Turkish university (Dağtan & Cabaroğlu, 2021) were parallel to the ones in EFL settings. According to the results of this study, fear of being despised, personality traits, and teachers' improper strategies were three factors that provoked anxiety amongst the participants. Likewise, the results of another study demonstrated that non-native prospective teachers at a Turkish university felt anxious when they were not well planned, encountered an unexpected situation, and they thought they were not proficient enough to accomplish a speaking task (Merç, 2015). Last, an existing study by Subaşı (2010) revealed that FLA of prospective EFL teachers stemmed from their personality traits, teachers' manners, teaching procedures, and previous language learning experience.

Additionally, the effect of FLA on Turkish prospective EFL teachers' language learning was investigated by few researchers. In a study, it was found that FLA had an adverse effect on two language areas that were the application of grammar rules and the execution of speaking skills (Tüm & Kunt, 2013). Last, regarding the strategies to cope with FLA, it was suggested by Tüm (2012) to present a non-threatening environment where FLA

was accepted as part of language learning, so it was useful for teacher trainers to familiarize with guidelines that would help prospective teachers that experienced high FLA (set realistic self-expectations for proficiency, deep-breathing, and progressive relaxation exercises and so on.).

This present study attempts to address two gaps on foreign language anxiety experienced by prospective EFL teachers. Initially, the majority of the existing studies aimed to find out sources of FLA the target group experienced. In these studies, quantitative (scale studies) (Tüm & Kunt, 2013; Tüm, 2012) or mix-method research designs (Merç, 2015) were adopted in order to reveal causes and effects of FLA on language learning of prospective EFL teachers. Although some strategies were suggested to cope with FLA (Horwitz, 1996; Tüm, 2012), there is a need for studies that examine the impact of certain strategies or actions on alleviating it. This study reports on the effect of an action plan designed to alleviate speaking anxiety of prospective EFL teachers in addition to revealing sources of FLA, so it addresses a significant gap in the related body of literature.

Second, as stated earlier, despite the ample research on FLA experienced by EFL students, there is a scarce body of literature that reports on "FLA experienced by non-native prospective teachers" (Horwitz, 1996; Horwitz et al., 2010; Canessa, 2004), so there is a need for further research to confirm results of the existing studies. This present study aims to reach conclusions about the FLA amongst prospective EFL teachers. ELT departments in faculties of education in Türkiye are aimed at non-native prospective teachers and include a wide range of courses on language teaching methodology, linguistics, second language acquisition, education, as well as a number of courses to improve language proficiency of students. In particular, the courses offered during the first academic year are mostly aimed at developing language proficiency of students in four main skills, reading, writing, speaking and listening (Tüm, 2012). "Oral communication skills" course is one of the compulsory courses offered during the first and second terms to promote students' verbal and non-verbal oral communication skills in a variety of settings in interpersonal, group and public speaking contexts. Considering the results of the studies that demonstrated that speaking is the most anxiety-provoking situation amongst the non-native prospective teachers (MacIntyre & Gardner, 1991; Young, 1990; Young, 1992), prospective teachers are more likely to experience FLA in "Oral communication skills" course compared to other courses. However, most of the research, especially in the Turkish setting was conducted with senior prospective EFL students (Dağtan & Cabaroğlu, 2021; Merç, 2015; Subaşı, 2010; Tüm & Kunt, 2013). Therefore, this present study is significant in terms of revealing the FLA freshman prospective EFL teachers experience in a communication-based course.

Research Questions

This study was driven by the need to help freshman prospective EFL teachers control high foreign language speaking anxiety that was observed during the compulsory course of "Oral Communication Skills-I". During the course, one of the researchers observed the reluctance of prospective EFL teachers to speak English in the classroom, which led the two researchers to design an action research study in order to alleviate FLA they felt while speaking and improve their speaking performance. The action research sought answers to the four questions presented below:

1. What are the reasons for prospective EFL teachers' reluctance in the oral communication skills course?

2. Does the action alleviate foreign language speaking anxiety of prospective EFL teachers?

3. Does the action have a positive effect on the speaking performance of prospective EFL teachers?

4. What are the opinions of prospective EFL teachers about the action?

METHOD

This study is designed as action research to address the need for reducing FLA prospective EFL teachers feel while speaking and improving their oral proficiency. As Corey (1954) states, action research gives "a priori promise of enabling us to cope more effectively with our professional problems" (p. 376). Furthermore, since it provides professional growth opportunities and facilitates teacher empowerment, action research practices are seen as integral to teacher education programs (Hine, 2013). The research falls into the type of "practical action research" in which educators carry out a small-scale research project focusing on a specific problem to be resolved within a school environment. Practical action research is used in situations in which teacher researchers "seek to enhance the practice of education through the systematic study of a local problem" (Creswell, 2005, p. 611). It usually involves a small-case research project, narrowly directs at a specific problem or issue and is undertaken by individual teachers or teams within a particular education setting (Jonida, 2014).

In this study, action research design was seen as necessary in the context of an English language teacher education program where prospective EFL teachers were observed to be reluctant to speak in front of the classroom during the compulsory course of "Oral Communication Skills-I" offered in fall term, 2021-2022 academic year.

Context and Participants

During the fall term, 2021-2022 academic year, the first researcher was delivering the compulsory course of "Oral Communication Skills-I" in the department of English Language Teaching (ELT) at a Turkish university and she observed that few students were eager enough to express themselves during the lessons. While some students struggled to speak the target language in response to the immediate questions of the trainer, some of them even refused to speak. After the identification of the problem, she cooperated with the second researcher who was teaching at another state university and had a PhD. degree in ELT. The two researchers of the study cooperated in order to find out solutions to the problem observed. They made an action plan and applied it during the compulsory course of "Oral Communication Skills-II" that was offered in the spring semester of 2021-2022 academic year.

Participants of the study are prospective EFL teachers in the department of ELT at a state university in Türkiye. 35 participants filled in the foreign language anxiety scale and 62 participants performed video-recorded tasks. 10 participants answered pre-action questions, 35 participants gave written responses to post-action questions, and post-task questions were answered by 31 participants. Purposive sampling technique was used for selecting the participants of the study. It is mainly used for focusing on characteristics of a population that are of interest, which will best enable the researchers to answer the research questions. The sample being studied is not representative of the population, so it is commonly used in qualitative research. In this type of sampling, researchers may have a specific group in mind (Etikan et al., 2016). In our case, the prospective students that took the preliminary course (Oral Communication Skills-I) were invited to the study. For pre-action questions, the prospective teachers that the instructor observed to have a high anxiety during the preliminary course were invited and 10 students volunteered to answer the questions. Regarding other measurements, all prospective teachers that took the preliminary course were invited, and the data was obtained from the voluntary ones. The age of the students changed between 17-32 and while 36 students were female 26 students were male.

Research Instruments

Multiple sources of data were collected by means of quantitative and qualitative measures in order to evaluate the effect of the action plan on participants. The research instruments are as follows:

Foreign language speaking anxiety scale: Horwitz et al. (1986) developed a scale to measure the FLA levels of language learners and this scale has become the most widely used scale with some adaptations for measuring speaking anxiety by the scholars in the field (Bozok, 2018; Çağatay, 2015; Öztürk & Gürbüz, 2014). In the original form, Horwitz et al. (1986) grouped the items on the scale into three categories:"communication apprehension", "test anxiety" and "fear of negative evaluation". In this study, the version adapted by Saltan (2003) was used for several reasons. First, Saltan (2003) adapted the scale specifically for measuring FLA that arouses while speaking the target language. She designed the questionnaire by selecting 18 items which were decided to be directly related to foreign language speaking anxiety from 33 items of original form. The Cronbach's Alpha for these items was found as .93, suggesting very good internal consistency reliability for the scale. The questionnaire is a 5-graded Likert scale (1 = strongly disagree, 5 = strongly agree) As the researchers aimed to identify and alleviate the FLA prospective EFL teachers felt in a communication-based course, they preferred this version.

Pre-action interview questions: The questions aimed to explore sources of speaking anxiety the participants experienced during the compulsory course of "Oral Communication Skills I". Two questions were asked to explore how the participants felt while speaking English and why they felt so.

Speaking Tasks: Learners in groups of four or six were required to perform and video-record four speaking tasks throughout the semester. The tasks were chosen from an advanced-level course book, Language Leader (Cotton et al., 2010) which was used in the compulsory course of Oral Communication Skills-II in the teacher education program. Video-recorded task performances were evaluated and graded by the researchers based on oral proficiency evaluation criteria. The tasks are illustrated in Table 1.

Table 1. Speaking Tasks

Order	Name of the task	Content
1	Choosing an intern	First participants had to choose an intern for an internship at UNESCO in 10-15 minutes. They were expected to discuss the strong and weak points of three profiles in the course book by using the phrases for "talking about strengths and weaknesses" given on page 13.
2	Choosing and planning a publicity campaign	Three participants represented the government health department while each of the other three participants made a presentation about a publicity campaign for a different health issue. Government representatives had to listen to presentations and reach a decision about which campaign to choose by using the phrases for "inviting someone to speak, responding to argument, and making a choice" on page 45 in 10-15 minutes.
3	Retail revamp	Participants had to decide how to save a company on the verge of bankruptcy by using the phrases for "making a proposal and disagreeing" on page 55 in 10-15 minutes.
4	Auditioning	Groups were divided into two as reality show producers and contestant candidates. Candidates had to create a new character and persuade producers to be chosen by giving impressive answers to the questions in the course book. Participants were expected to use the phrases for "recalling what someone said, explaining choices and making a decision" on page 109 in 10-15 minutes.

Post-task questions: The questions aimed to encourage the participants to assess their own performance and get their reaction to the task. Self-assessment was expected to help them improve their performances while recording the following tasks. Two questions were asked. First, they were asked to explain the strengths of their task. Second, they were asked to explain the weaknesses of the task.

Post-action questions: The questions aimed to gather qualitative data to measure the effect of action on speaking skills of the participants and get suggestions on how to improve the tasks used in the action plan. In the first question, they were asked to comment on the effects of the tasks on their speaking skill. In the second question, they were requested to make suggestions on how to improve the tasks given.

Evaluation Criteria: The video-records were evaluated by the two researchers according to oral proficiency evaluation criteria which were based on task achievement, grammatical competence, language use, and fluency. A participant can get a minimum of 0 and maximum 25 from each criterion. The use of criteria to evaluate oral performance of students is significant in terms of providing consistency while evaluating the speaking performance. Dunbar et al. (2006) suggests that speaking competence consists of some sub-areas that are choosing a topic and organizing the speech appropriately, language use, vocal variety, correct articulation, grammar, pronunciation, using supportive materials, and using appropriate nonverbal behaviors. The evaluation criteria used in this study is in line with these sub areas. First, task achievement includes the criteria about choosing a topic and organizing the speech appropriately, using supportive materials, and using appropriate nonverbal behaviors. Second, grammatical and lexical competence consists of criteria about language use. Last, fluency consists of criteria about vocal variety, correct articulation, and pronunciation. Besides, in the evaluation criteria, an analytic approach is adopted because the instrument works on each criterion separately, providing scales for a list of components and a description for each rating. This type of rubric is used to assess important tasks where each component needs to be evaluated separately (Ülker, 2017).

Data Collection

Basically, action research follows a spiral process which includes problem investigation, taking action and fact-finding about the result of action. It enables a teacher to adopt and craft the most appropriate strategy within its own teaching environment (Jonida, 2014). After identifying the unwillingness of the prospective EFL teachers

towards speaking during the compulsory course of "Oral Communication Skills-I" the two researchers cooperated to find solutions via practical action research. The research was conducted following three phases (Table 2). During the problem investigation phase, the course's instructor, the first researcher of the study, conducted interviews with randomly selected and volunteer participants in order to find out sources of speaking anxiety. 10 participants answered the questions. After that, 35 participants in total completed the Foreign Language Anxiety Scale (Saltan, 2003) as pre-test. While interview questions aimed to explore the sources of FLA the participants felt while speaking, their level of FLA was measured via the scale.

During the second phase that is taking action, the two researchers designed speaking tasks in line with the results of the pre-action interviews and the scale. Results of the interviews led the researchers to design tasks that allow the students to speak outside the classroom and choose their own group members. Accordingly, 4 tasks were assigned to the students during spring semester, 2021-2022 academic year. Before each task, target vocabulary and grammar structures were practiced in the classroom and in the following week the participants were required to video-record their tasks outside the classroom. The video-records were evaluated by the researchers according to oral proficiency evaluation criteria. Researchers' feedback was shared with the students after watching sample videos in the classroom and the participants were allowed to make comments about the tasks they watched in the classroom. Furthermore, they answered post-task questions to reflect on strengths and weaknesses of their task. The same procedure was repeated for the four tasks assigned.

During the post-action phase that is fact finding, "Foreign language speaking anxiety scale" (Saltan, 2003) was applied as the post-test, and the students were requested to answer two post-action questions. The scores of the participants in pre-test and post-test were compared to evaluate the effect of the action on alleviating FLA the participants felt while speaking. Additionally, the effect of the action was evaluated via qualitative data obtained from post-action questions. Last, the results of the action plan were reported and some suggestions on how to improve the tasks for next term were made.

Table 2. Action Plan

Problem investigation Pre-action (Week 1)	Conducting foreign language anxiety scale (pre-test) Pre-action questions
	Week 2: Preparation for task 1 (Target vocabulary and grammatical structures were practiced during the lesson) Week 3: Task 1 (Students video-record task 1 and share it with the researchers). Video-records were evaluated by the researchers. Week 4: Watching sample video-records and the researchers' giving feedback to students. Post-task questions (to let students reflect on their own performance along with their strengths and weaknesses)
	Week 5: Preparation for task 2 (Target vocabulary and grammatical structures were practiced during the lesson) Week 6: Task 2 (Students video-record task 2 and share it with the researchers). Video-records were evaluated by the researchers. Week 7: Watching sample video-records and the researchers' giving feedback to students. Post-task questions (to let students reflect on their own performance along with their strengths and weaknesses)
Taking action During action (Week 2-Week 13)	Week 8: Preparation for task 3 (Target vocabulary and grammatical structures were practiced during the lesson) Week 9: Task 3 (Students video-record task 3 and share it with the researchers). Video-records were evaluated by the researchers. Week 10: Watching sample video-records and the researchers' giving feedback to students. Post-task questions (to let students reflect on their own performance along with their strengths and weaknesses)
	Week 11: Preparation for task 4 (Target vocabulary and grammatical structures were practiced during the lesson) Week 12: Task 4 (Students video-record task 4 and share it with the researchers). Video-records were evaluated by the researchers. Week 13: Watching sample video-records and the researchers' giving feedback to students. Post-task questions (to let students reflect on their own performance along with their strengths and weaknesses)
Finding fact Post-action (Week 14)	Conducting foreign language anxiety scale (post-test) Post-action questions

Data Analysis

Both qualitative and quantitative data analysis techniques were used. While the results of "Foreign language speaking anxiety scale" (Saltan, 2003) and the grades participants received in four tasks were analyzed quantitatively, answers students gave to pre-action questions, post-task questions and post-action questions were analyzed qualitatively.

Regarding the results of "Foreign language speaking anxiety scale" (Saltan, 2003), paired samples t-test was administered to determine if the mean difference between pre-test and post-test were statistically significant. Before conducting the paired samples t-test, normality distribution of the data was measured.

First scale: Skewness is 0.19 and Kurtosis is 1.14.

Second scale: Skewness is 0.05 and Kurtosis is 0.98.

As all values of Skewness and Kurtosis were found between -1.50 and +1.50, the data was understood to display normal distribution (Tabachnick & Fidell, 2013).

Speaking performance of the participants was evaluated according to grades they received in four tasks. Speaking performances were evaluated based on four criteria (task achievement, grammatical competence, lexical competence and fluency). For each criterion, participants could get maximally 25 points. Participants were graded four times and to compare mean grades across four task performances, repeated measures ANOVA was used. Prior to the repeated measures ANOVA, normality distribution of the data was measured. Skewness and Kurtosis values were found as follows:

Task 1= Skewness is -0.26 and Kurtosis is -0.57.

Task 2= Skewness is -0.01 and Kurtosis is -1.24

Task 3= Skewness is 0.57 and Kurtosis is -0.57

Task 4= Skewness is 0.72 and Kurtosis: 0-.56.

As all values of Skewness and Kurtosis were found between -1.50 and +1.50, the data was understood to display normal distribution (Tabachnick & Fidell, 2013).

Answers given to pre-action questions, post-task questions and post-action questions were analyzed inductively (Creswell, 2005). Inductive approach was used to analyze the qualitative data obtained from the interviews and generate the categories. After the collection of data, the audio records were transcribed verbatim. In the coding stage, the researcher followed 5 steps suggested by Creswell (2014):

1. initial reading of the transcribed texts,

2. identifying specific text segments,

3. labeling the text segments to create categories,

4. reducing overlap and redundancy among the categories,

5. creating a model incorporating the most important categories.

Initially, the data was thoroughly read to obtain a general sense. Subsequently, descriptions or sub-themes and categories were determined in the second and third stages. In this stage no pre-set codes were used, and categories and subcategories emerged from the data at hand. After that, the overlap and redundancy among the categories were reduced. Initially, both researchers analyzed the data separately, then they compared the coding. In case of any disagreements, transcriptions were re-visited, and conflicts were resolved.

FINDINGS

Results of the present study were reported in accordance with the research questions. The first research question is: "What are the reasons for prospective EFL teachers' reluctance in the oral communication skills course?". Results of the pre-action questions showed that they experienced negative feelings while speaking English, which could be the reason for their reluctance during the lessons. 8 out of 10 participants who answered pre-action questions expressed negative feelings about speaking English. They felt "anxious", "tense" and "fearful of making mistakes". Participants' negative feelings emerged when they had to speak with or in front of people to whom they were unfamiliar or when they were surrounded with people whom they thought as more proficient. They attributed their negative feelings to lack of speaking practice at high school and perfectionist attitudes of parents. Thus, the students' negative feelings about speaking in class particularly guided the researchers to design tasks that prospective teachers would perform outside the classroom, and they would choose their own group

members. Additionally, they would record the tasks as many times as they desired, and they would find the opportunity of practice.

SÇ: "*I feel nervous while speaking English…….I don't do it so often. It is just like the fear when people feel when they have to do something new or something they have never done before. In fact, I don't have difficulty speaking Turkish in front of the whole class. I can speak, no problem. However, when it is English, maybe because of lack of practice. I don't speak English. I think that I can't speak it. During high school, our main focus was on answering the questions in multiple-choice tests. We never spoke or wrote, so I am having difficulty in speaking and writing*".

ZK: "*I feel nervous, maybe, because of lack of practice. Besides, I am trying to be careful about grammar and vocab. I am aware I should give up monitoring, but it is not possible. For example, sometimes, while speaking I cannot remember a word, so I stay there. I cannot keep speaking. I feel nervous and get irritated when it happens.*"

MD: "*It depends on the people around me. When I am in the classroom, I feel nervous. For example, during the midterm-exam, I was in front of the classroom, and I felt so nervous that I could not speak. I can feel better when I am comfortable with the people around me.*"

TD: "*I feel nervous; I am afraid of making mistakes. Sometimes, I notice the mistakes I make while speaking. It is not that bad to make mistakes, but I am trying to be the best. I think it is because of my parents. My father is a teacher, too. He always assisted me with my homework, and I was always the best starting from primary school. In high school, I was the best, again. I was the best in the language class, as well, so I feel sad when I make mistakes. I know it is okay to make mistakes, but ….*"

The two participants who felt more confident about speaking English expressed their joy of language learning by focusing on the British accent to improve their pronunciation, playing games and watching movies. While one of these participants stated that he got help from his teachers to correct his pronunciation mistakes, the other participant underlined the positive impact of his parents, both of whom were English teachers. These two participants can be said to have benefitted from the good role modeling of nonnative English-speaking adults when they were younger.

AD: "*I feel confident about speaking English because I can express myself better. For a long time, I thought that my English level was low because my pronunciation was bad. For example, the British accent seemed magical to me, and I thought I was bad at English. Now, I think I am good at pronunciation and spelling, and I can get the message across easily.*"

Regarding the second research question, "Does the action alleviate foreign language speaking anxiety of prospective EFL teachers?", "Foreign language speaking anxiety scale (Saltan, 2003)" was carried out twice as pre- and post-tests so as to observe the participants' levels of anxiety before and after the action. T-test results indicated that their anxiety levels before and after the action did not display a statistically significant difference. A slight decrease in their mean scores of anxiety levels can be seen in the table below (Table 3).

Table 3. Change in Anxiety Level of Students

		Mean	Std. Deviation	Std. Error Mean
Pair 1	SCALE1	2.7934	.91491	.15465
	SCALE2	2.6809	.96857	.16372

As illustrated in Table 3, while the mean score of the participants' level of anxiety was 2.79 before the action, it was found to be 2.68 after the action. In other words, speaking tasks might have helped in lowering the participants' level of anxiety to some degree. They had moderate levels of FLA before and after the action, though.

The third research question of the study is "Does the action have a positive effect on the speaking performance of prospective EFL teachers?". In order to answer this question, differences between four task grades and answers to post-task questions were examined. First, differences among grades given for four tasks were examined by means of ANOVA test for repeated measures. ANOVA test results indicated that the differences among task grades were significant because Mauchly's Test of Sphericity value was <.001. Additionally, tests of Within-Subjects Contrasts gave evidence that mean differences across four tasks were significant (Table 4).

Table 4. Tests of Within-Subjects Contrasts

Source	task	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
task	Level 1 - Level 2	3087.000	1	3087.000	5.676	.020	.084
	Level 2 - Level 3	1289.286	1	1289.286	4.400	.040	.066
	Level 3 - Level 4	2655.254	1	2655.254	16.140	<.001	.207
Error (task)	Level 1 - Level 2	33720.000	62	543.871			
	Level 2 - Level 3	18167.714	62	293.028			
	Level 3 - Level 4	10199.746	62	164.512			

As seen in Table 5, performances of participants in four speaking tasks showed a zigzag progress. While the participants received higher grades in the first and third tasks (71 and 68), they got lower grades in second and fourth tasks (64 and 62).

Table 5. Progress in Speaking Tasks
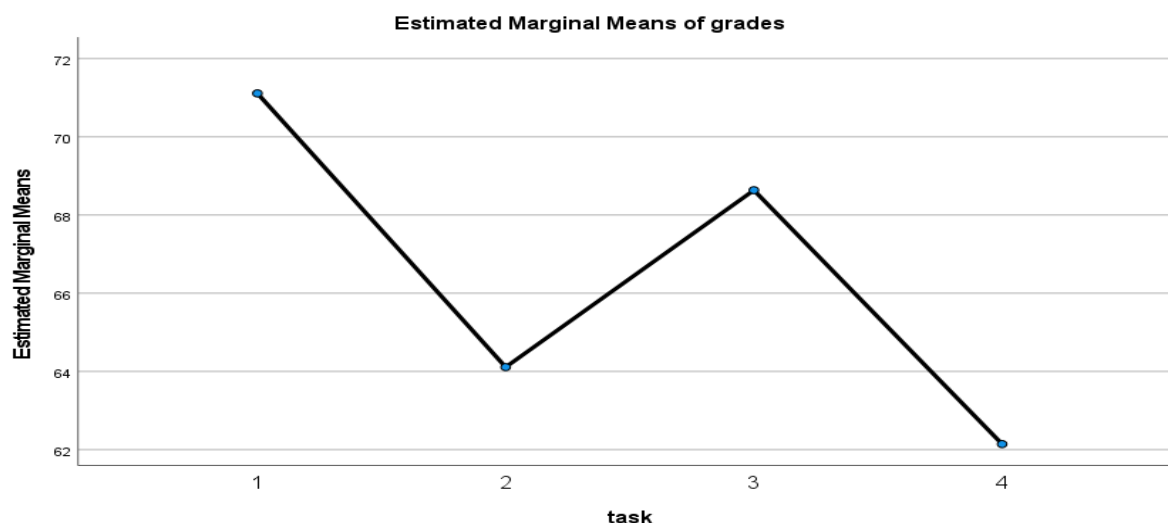
This reverse effect was not expected by both researchers. To examine the reasons for this decline in the participants' performances, their answers to post-task questions were examined. In terms of strengths and weaknesses of tasks, five categories emerged from the participants' responses (Table 6).

Table 6. Results of Post-Task Questions (Strengths & Weaknesses of Performances in View of the Participants)

	Strengths	Weaknesses
Group-related points	- Good coordination - Communication - Work distribution	- Unfair work distribution - Incoordination
Language related points	-Generating complex sentences - Good pronunciation - Fluency - Spontaneous speech when necessary - Being able to debate	- Problems about pronunciation and fluency - Limited lexical range - Limited grammatical range - Reading out lines
Task-related points	- Conforming to task instructions - Sufficient planning and preparation	- Insufficient planning and preparation -speaking spontaneously instead of preparing a script -lack of rehearsal and memorization of lines -video-recording tasks at one go -keeping discussion section short -forgetting to introduce oneself -making short videos - Inattention to task instructions - Lack of creativity

Technical points	High acoustic quality of videos	- Low acoustic quality of videos -Videorecording in a noisy / inappropriate environment -Lack of equipment (i.e.: microphone and internet connection)
Psychological points	-	High anxiety

As illustrated in Table 6, group-related, task-related, language-related as well as psychological and technical problems contributed to the decline in performances of the participants. Participants expressed a higher number of weaknesses compared to strengths. Both weaknesses and strengths consisted of group-related, language-related, task-related and technical points. Some quotes are as follows:

"While preparing the task, we could improvise to assist a group member who had difficulty in expressing something, we corrected deficiencies of one another" (Task 1, strengths, group related, good coordination).

"We should have started to prepare the task earlier, so we could have planned the task better and practiced more" (Task 2, weaknesses, task-related points, insufficient planning and practice).

"We could speak fluently while recording the task. Although we did not spend a long time preparing for the task, our performance looked natural and fluent" (Task 1, strengths, language related points).

"We displayed a good performance during the task. We made a great effort. We spoke fluently in a natural way and we felt like we were in a real meeting and discussed simultaneously. We tried to use complex sentences. We followed the instructions well. Besides, we recorded the video a few times and edited some parts" (Task 4, strengths, task-related points, language related points, generating complex sentences, good pronunciation, fluency, spontaneous speech when necessary, conforming to task, instructions, sufficient planning and preparation).

"I think we did not take the task seriously. If we had taken it more seriously and planned it well, we would have displayed a better performance" (Task 3, weaknesses, task-related points, insufficient planning and practice)

The fourth research question is "What are the opinions of prospective EFL teachers about the action?" and answers to the post-action questions were analyzed in order to answer this question. As for the post-action questions, 35 participants submitted their answers in written form. To the question of "How did the tasks affect your speaking skill?" 34 participants gave positive responses. Almost all the participants thought that the tasks improved their speaking skill. Furthermore, they stated that the tasks increased their confidence, improved their fluency, pronunciation and lexicon, lowered their stress and anxiety and helped them get accustomed to group work.

SH: *"The tasks definitely had a good effect on my speaking English because it increased my courage to speak in a friendly environment. It helped me to notice and correct the mistakes I made while pronouncing a word."*

FD: *"In my opinion, the tasks improved my speaking skills. The fact that we could choose the group members both reduced my stress and created a fun environment while doing the homework. I enjoyed the tasks."*

TD: "*Thanks to the tasks, I got used to group assignments. Since our first year was online, we mostly did homework on our own, and group assignments weren't very helpful. However, thanks to these tasks, I became familiar with group assignments and the homework preparation process, and I can't say that I do not feel as nervous as I used to be."*

BU: *"Tasks affected my speaking skills in a positive way. I realized that I could have difficulty in producing sentences in some situations while I could speak fluently in some other situations. Apart from that, the variety of tasks and the conversations in new situations definitely improved my speaking competence."*

SU: *"The tasks mostly affected our speaking performance positively because we practiced speaking with our classmates on some themes. We got informed about the topic of the task and we learned which words and which patterns are used in speaking English. Even if we sometimes forgot a word because of feeling stressed or nervous, we learned how to keep speaking in such situations. I think that I can express myself more easily now, and I feel like I can overcome the speaking anxiety."*

Contrary to the positive comments, only one student commented negatively about the tasks:

CA: *"I think that the tasks did not have a positive effect on my speaking skill. On the contrary, maybe because it was 'homework' and I was aware my speech would be evaluated, I got excited while recording the video,*

so I couldn't speak well. While I could speak fluently and comfortably with tourists outside of school, I could not speak very well during the tasks."

In conclusion, despite the decline in task performance, the action appears to have a positive effect on the participants' speaking skills, self-confidence and interpersonal skills according to the results driven from the qualitative data.

To the second post-action question of "What are your suggestions about improving the tasks given?", the participants' first and foremost response was about selecting more "current", "daily", "simple", "creative", "interesting" and "enjoyable" topics. Moreover, the participants suggested choosing their own topics, and they expressed their preference for acting out in the classroom environment instead of video-recorded performances. Lastly, they suggested reducing the number of group members and changing/ not changing them in each task.

CG: *"Changing the number of group members for each task caused some problems. We had difficulty in finding a new member for a task or removing a member for the next one"*

SB: *"We could talk about different topics, maybe daily topics or more interesting ones. Maybe we could be more comfortable that way. Or it could be a task (interview, etc.) about people (tourists) from outside the school."*

FR: *"The tasks could have been a little more creative because we always either chose someone or we were chosen."*

GU *"I think that it would be more appropriate and efficient to perform the tasks in a live classroom environment rather than in the form of a video. I think it would be good to improvise instead of paper or memorizing, and rather improve it in a way that our own ideas are prioritized and practiced."*

DISCUSSION

This paper aimed to evaluate the influence of an action plan on speaking performance of prospective EFL teachers. After identifying the high FLA they experienced during the Oral Communication Skills-I, the action plan aimed to alleviate it. The study was conducted during the second semester of 2021-2022 academic year at a state university in Türkiye.

Although prospective EFL teachers are trained to teach English during their pre-service training, they might feel anxious speaking English. A nationwide recent study proved that Turkish prospective EFL teachers are unable to speak English as proficient as expected and they have difficulty maintaining confidence while speaking (Dağtan & Cabaroğlu, 2021). Results of the present study confirmed this finding because while the participants displayed moderate level of FLA both before and after the action, the answers of the pre-action questions demonstrated that they experienced negative feelings such as fear and nervousness while speaking English and these negative feelings prevented them from maintaining confidence while speaking. Furthermore, 8 out of 10 participants expressing that they were not good at speaking support the findings of the prior study by Dağtan and Cabaroğlu (2021).

According to results of the present study, prospective EFL teachers displayed moderate level of FLA while speaking English. In another study done in Indonesian context, similar results were found out about the FLA level of prospective EFL teachers (Daud, et al., 2019). Both India and Türkiye are amongst the expanding circle countries where English is taught as a foreign language and language learners learn the target language in similar learning settings. In these learning settings, language learners do not find enough opportunity to practice the target language outside the classroom (Crystal, 2012). This fact might explain why the FLA level of Turkish and Indian prospective EFL teachers is similar.

On the other hand, some previous studies exploring the speaking anxiety of prospective EFL teachers reached contradictory results. According to some of these studies, prospective EFL teachers were found to have high-level foreign language speaking anxiety. Highly proficient prospective EFL teachers were less likely to experience high anxiety, though (Abrar et al., 2016; Hammad & Ghali, 2015). Horwitz (1996) and Tüm and Kunt (2013) presented some explanation regarding this finding. According to them, although they are supposed to be high-level speakers of their target language, prospective EFL teachers are still foreign language learners and they might experience FLA, just as any other language learner might. The contradictory results between the present study and the two prior studies (Abrar et al., 2016; Hammad & Ghali, 2015) might stem from the difference in year level of the participants. In the present study, the participant group was homogenous, and they were freshmen. However, in the prior studies, the participants were in their second year (Abrar et al., 2016) or the participants'

year level were heterogeneous including students from four different year levels (Hammad & Ghali, 2015), so the prospective teachers might be feeling more anxious as they were required to present lesson plans during the courses like a real teacher. Because results of a number of studies found out that speaking "in front of the class" and "on the spot" was found to be the most anxiety-provoking situation amongst non-native prospective teachers (MacIntyre & Gardner, 1991; Young, 1990; Young, 1992).

Regarding the sources of anxiety, the participants of the present study stated that negative feelings emerged when they had to speak with or in front of people to whom they were unfamiliar or when they were surrounded with people whom they supposed to be more proficient. They attributed their negative feelings to lack of speaking practice at high school and perfectionist attitudes of parents. These results implied the place of social factors in improving speaking performance of the prospective EFL teachers. In a similar way, results of some previous studies (Daud et al., 2019; Hammad & Ghali, 2015; Kenoh , 2021) confirmed the significance of social factors in speaking performance of prospective EFL teachers. For example, findings reached in some studies (Daud et al., 2019; Hammad & Ghali, 2015; Kenoh , 2021) were parallel to the results of the present study. The participants in these studies stated that social factors aroused feelings of anxiety while speaking English. When they were surrounded by people, prospective teachers felt FLA because they were afraid of making mistakes and losing face and they felt nervous and under pressure dealing with people. Thus, the results of the present study imply that in case the social factors are taken into consideration while structuring teacher training programs as well as speaking courses, it is highly possible that the speaking performance of the prospective teachers will be improved. Improving the speaking performance of the prospective EFL teachers is important to avoid some undesirable outcomes. According to Horwitz (1996), the anxiety prospective teachers feel might cause them to minimize or avoid speaking the target language publicly when they start teaching. However, language teachers and instructional materials are two significant sources of input in language classes, so a teacher that avoids speaking decreases the amount of exposure to the target language.

Another significant result of the present study is that the action did not positively influence speaking performances of prospective EFL teachers. Regarding the decline observed in the speaking performances of the student teachers, it might be a result of their overconcentration on grades as products, not on the process of performing well in the tasks. Because according to the qualitative data obtained from post-task questions, although they were aware of their weaknesses they did not spend much effort to compensate for them. Because, the participants stated many weaknesses about their performances. Insufficient planning and preparation for the tasks were frequently expressed. According to the results, their planning was insufficient in terms of rehearsal and memorization of lines, keeping discussion sections long enough, introducing oneself, making videos long enough to discuss, attention to task instructions and creativity. In the post-task comments, the participants expressed a higher number of weaknesses compared to strengths, which means that although they were aware of weaknesses of their performances, they might not have made much effort to improve them. While they needed a long time to solve language-related and psychological problems, they could have solved task-related, group-related and technical problems in the last two or three tasks. The decline in the performance showed that the participants may not have behaved as meticulously as expected while practicing or video-recording the tasks and they cared more about getting grades high enough to pass the course rather than performing well.

Moreover, the zigzagging progress they displayed across the four tasks supported this claim. The participants were assigned two tasks for the midterm exam. It seemed that after they got a high point from the first task, they did not find it necessary to get a high point from the second task, so they did not try to display a good performance while practicing it. Similarly, they completed two tasks (task 3 and task 4) for the final exam. It seemed after they got a high point from the third task, they did not find it necessary to get a high point from the fourth task, so they did not make an effort to display a good performance while practicing it. Additionally, after they made sure that they would not fail the course, they might not have devoted considerable effort to improve their performance in the last task (task 4) because their mean scores indicated that they got the lowest grade in the task 4. The timing of the task could have had a negative effect on the performances of participants because the task was assigned to them later in the spring semester.

As another possibility, the decline in the speaking performance of the participants may be due to the restricted number of the tasks assigned since mastering the speaking skill requires learners to practice a lot. Speaking in a foreign language is challenging for EFL learners because it involves simultaneous activation of several mental processes that are cognitive, physical and socio-cultural. Speaking skill is both dynamic and complex (Lestari, 2019). The participants' answers to the pre-action questions revealed their lack of speaking practice at high school. This finding was supported by some past studies that investigated the washback effect of

University Entrance Exam on English language learning of prospective EFL teachers (Hatipoğlu, 2016; Sevimli, 2007; Yıldırım, 2010). In these studies, it was reported that instead of developing teaching and testing materials and methods that would foster the development of the communicative skills of the students, teachers focused on preparing their students for the exam. Furthermore, instructional language in classes was predominantly Turkish. Lack of interaction or limited use of target language influences speaking skill of EFL learners negatively (Lestari, 2019). Therefore, like the learners in the study by Bohari (2020) Turkish prospective EFL teachers should realize that they need to practice in order to overcome negative feelings such as shyness or anxiety. Considering the statements of the participants in pre-action questions and results of the past studies (Hatipoğlu, 2016; Sevimli, 2007; Yıldırım, 2010), the participants might have been given little chance of practicing the target language and their exposure to the target language might have been limited as the instructional language was predominantly Turkish at high school. This finding provides an important clue for faculties of education. Freshman prospective teachers at faculties of education are expected to be high-level speakers of English; however, most of the students in language classes in high schools are not provided with much opportunity to practice the target language, so they have weak communicative skills when they start to study ELT in faculties of education. Thus, extra courses should be enhanced to the teacher training programs used at faculties of education to allow prospective EFL teachers to use English for communicative purposes. Moreover, they should be encouraged by the instructors to join speaking clubs or international exchange programs.

Despite the decline in speaking performance of the participants across the four tasks, they reported positive effects of the action on their speaking skills, interpersonal skills and self-confidence. Additionally, even though it was found statistically insignificant, a slight decline in their speaking anxiety level was observed. Taken together, the action was useful in supporting social and psychological factors that play a pivotal role in improvement of speaking skill. Action research studies designed to alleviate speaking anxiety in language classes reported similar findings concerning the improvement in social and affective factors. In an action research study (Koçak, 2010) designed to decrease speaking anxiety of primary school students, an increase in self-confidence of the participants was reported. The students expressed that they could speak more fluently as they felt more self-confident about speaking English. Likewise, Li (2016) designed an action research study to investigate the impact of drama technique on English speaking anxiety of Chinese EFL learners and she gave evidence that the technique was useful in supporting social and affective factors which in turn improve speaking skill. Similar to the present study, the study gave evidence on the predictors of anxiety linked to socio-psychological factors interacting with classroom social variables. Additionally, self-confidence was found to greatly influence the anxiety level and the willingness to communicate, which was directly or indirectly connected to fears of negative evaluation, public attention, face-protection and face loss. In the present study, the participants reported the positive influence of the assigned tasks on their self-confidence and interpersonal skills, so the action research was useful in supporting the socio-psychological factors that are the determinants of speaking skills.

On the other hand, it is obvious that prospective teachers are still in need of creative tasks in which they will use the target language for communication purposes inside or outside the classroom. The action could be revised in line with the participants' suggestions for future tasks. They suggested selecting more "current", "daily", "simple", "creative", "interesting" and "enjoyable" topics. Besides, they suggested choosing their own topics. Thus, potential topics could be negotiated with teacher trainees before they are assigned tasks. The second suggestion was about recording videos because the participants expressed their preference for acting out in class over video-recorded performances. In-class performances that could be integrated into the action plan are as follows: "holding street interviews and TV shows", or "performing short excerpts from movies".

Last but not least, while redesigning the tasks, the instructor of the lesson could benefit from the techniques suggested on alleviating high anxiety. Support groups suggested by Casado and Dereshiwsky (2001) allow students to discuss difficulties they face while speaking in target language, so after each task, prospective EFL teachers could discuss the difficulties or challenges they face while practicing the task. In the present study, the participants submitted written comments to the instructor. They could speak instead of write, so they will have much more chance to practice. Furthermore, they could analyze the difficulties of learning a foreign language. Because according to Casado and Dereshiwsky (2001), this technique might be beneficial for prospective EFL teachers experiencing high anxiety while speaking. As they lower the anxiety they experience, they gain self-consciousness about their foreign language learning process, and they might become more empathetic towards the difficulties their future students will encounter. Other techniques teacher trainers could utilize to lower speaking anxiety of prospective EFL teachers are the use of pair/group activities in classrooms, use of project work, and presenting a non-threatening classroom environment (Toyama & Yamazaki, 2021). Such techniques are already

used in the faculty of education where the study was conducted. However, the present study's participants were freshman prospective EFL teachers, so they might become more competent English speakers as they progress through the year levels. However, some relaxation techniques (breathing exercise) suggested by Toyama and Yamazaki (2021) could be enhanced to the Oral Communication Skills Course. Last, as suggested by Tüm (2012) teacher trainers should present a non-threatening environment where FLA was accepted as part of language learning, so it is useful for teacher trainers to familiarize with guidelines that will help prospective teachers that experience high FLA (set realistic self-expectations for proficiency, deep-breathing, and progressive relaxation exercises and so on.).

CONCLUSION

This study was driven by the need to help freshman prospective EFL teachers control high FLA they felt while speaking during the compulsory course of "Oral Communication Skills-I". A 14-week action plan was designed to alleviate the FLA they felt while speaking and improve their speaking performance. Multiple sources of data were collected by means of quantitative and qualitative measures in order to evaluate the effect of the action plan on participants' speaking English. Regarding the qualitative results, the participants reported positive effects of the action on their speaking performance, interpersonal skills and self-confidence. Additionally, a slight decline in their speaking anxiety was revealed. On the other hand, a decline in their speaking performance was observed. Thus, despite the decline in their speaking performance, the action was useful in supporting socio-psychological factors that are significant determinants of speaking performance. Last, the results gave evidence on the need for similar actions that allow prospective teachers to use English for communicative purposes. The study provides significant clues for re-structuring the curriculum used in faculties of education. Conclusions and implications of the study are as follows:

The participants expressed they felt "anxious", "tense" and "fearful of making mistakes". Participants' negative feelings emerged when they had to speak with or in front of people to whom they were unfamiliar or when they were surrounded with people whom they thought as more proficient. They attributed their negative feelings to the perfectionist attitude of their parents. These results demonstrated the place of social factors in speaking performance of the prospective EFL teachers.

Moreover, they attributed their negative feelings to lack of practice during high school, which confirmed the findings of some prior studies (Hatipoğlu, 2016; Sevimli, 2007; Yıldırım, 2010) that investigated the washback effect of University Entrance Exam on English language learning of prospective EFL teachers (Hatipoğlu, 2016; Sevimli, 2007; Yıldırım, 2010). In these studies, it was reported that instead of developing teaching and testing materials and methods that would foster the development of the communicative skills of the students, teachers focused on preparing their students for the exam. Furthermore, instructional language in classes was predominantly Turkish. Lack of interaction or limited use of target language influences speaking skill of EFL learners negatively. Considering the statements of the participants in pre-action questions and results of the past studies (Hatipoğlu, 2016; Sevimli, 2007; Yıldırım, 2010), the participants might have been given little chance of practicing the target language and their exposure to the target language was limited as instructional language was predominantly Turkish.

Therefore, Turkish prospective EFL teachers should realize that they need to practice in order to overcome negative feelings such as shyness or anxiety. This finding gave evidence on that although freshman prospective teachers at faculties of education are expected to be high-level speakers of English, most of the students in language classes in high schools are not provided with much opportunity to practice the target language, so they have weak communicative skills when they start to study ELT in faculties of education. Thus, extra courses should be enhanced to the teacher training programs used at faculties of education to allow them to use English for communicative purposes. Moreover, they should be encouraged by the instructors to join speaking clubs or exchange programs.

Moreover, the techniques suggested on alleviating high anxiety (such as relaxation activities, discussion groups to discuss difficulties they face while speaking in target language) could be enhanced to the Oral Communication Skills Course (Casado & Dereshiwsky, 2001; Toyama & Yamazaki, 2021).

The action did not positively influence speaking performances of prospective EFL teachers, which might have stemmed from two factors. First, the participants might have over-concentrated on grades as products, not on the process of performing well in the tasks. Because according to the qualitative data obtained from post-task questions, although they were aware of their weaknesses they did not spend much effort to compensate for them. They stated many weaknesses about their performances. Insufficient planning and preparation for the tasks were

frequently expressed. As another possibility, the decline in the speaking performance of the participants may be due to the restricted number of tasks assigned since mastering the speaking skill requires learners to practice a lot. Speaking in a foreign language is challenging for EFL learners because it involves simultaneous activation of several mental processes that are cognitive, physical and socio-cultural (Lestari, 2019).

The action was found to be useful in supporting social and psychological factors that play a pivotal role in improvement of speaking skill. Like the present study, another past study (Li, 2016) gave evidence on the predictors of the anxiety linked to socio-psychological factors interacting with classroom social variables. Additionally, self-confidence was found to greatly influence the anxiety level and the willingness to communicate, which was directly or indirectly connected to fears of negative evaluation, public attention, face-protection and face loss. In the present study, the participants reported the positive influence of the assigned tasks on their self-confidence and interpersonal skills, so the action research was useful in supporting the socio-psychological factors that are the determinants of speaking skills.

This present study has two limitations. First, rather than a product-oriented approach, a process-oriented approach could have been adopted while designing the action plan. After it was designed at the outset of the spring term, the action plan was implemented throughout the entire term and the data was analyzed at the end. Instead, the researchers could have re–restructured the tasks in line with the comments of the participants, which might have encouraged the participants to focus on the process of performing well. Second, as the tasks were graded for midterm and final exams, 62 participants performed the tasks. The ones making comments for the post-task and post-action questions were less. The researchers could have taken precautions to obtain qualitative data from more participants.

Statements of Publication Ethics

Before conducting the action plan, ethics committee approval was obtained from Alanya Alaaddin Keykubat University (meeting no: 01, decision no: 17, and decision date: 17.03.2022). Afterwards, target participants were informed about the objectives and procedures of the research. Moreover, they were informed that participation in the research was on a voluntary basis, and they could leave the research at any time. When withdrawing from the study, the participant should let the research team know that he/she/they wish to withdraw. A participant may provide the research team with the reason(s) for leaving the study but is not required to provide their reason. However, none of the participants expressed his/her wish to leave the research.

Researchers' Contribution Rate

Authors	Literature review	Method	Data Collection	Data Analysis	Results	Conclusion
Derya UYSAL	☒	☒	☒	☒	☒	☒
Sevgi GÖKÇE	☐	☒	☐	☒	☒	☒

Conflict of Interest

There is no conflict of interest in this study.

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