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An Examination of Academic Studies Regarding Vocabulary Teaching in Secondary School Turkish Textbooks

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ABSTRACT

Vocabulary teaching aims to transfer the cultural properties and richness of expression of a language to the next generations. Studies conducted on vocabulary teaching become important in the development of the textbooks used as the primary source for teaching vocabulary in schools, the emergence of new approaches to vocabulary teaching, and the way for the relevant experts to gain different perspectives. When the studies in the literature are reviewed, although there are some studies conducted on vocabulary teaching in textbooks, there is no study that handles all these studies together. The aim of the present study, which was conducted based on the lack of studies in the literature, is to examine the academic studies conducted on vocabulary teaching in secondary school Turkish textbooks between 2006-2023. Within the aim of the study, a total of 22 postgraduate theses and 42 articles that were indexed in Google Scholar, YÖK National Thesis Center, Proquest, and TR Index databases and discussed the vocabulary elements in Turkish textbooks have been examined. Document analysis, one of the qualitative research methods, was used in the study and descriptive analysis was performed to analyze the studies included in the scope of the research. As a result of the study, it was concluded that of the studies conducted on the vocabulary elements in secondary school Turkish textbooks, 34,4 % were theses while 65,6 % of them were articles; the qualitative method was mostly used in studies; the 5th, 6th, 7th and 8th-grade Turkish textbooks were examined together throughout the research; studies were conducted to determine the vocabulary elements in the passages of the textbooks, identify the vocabulary elements in the activities of the textbooks, and analyze the textbooks in terms of idioms, proverbs, and word frequency; vocabulary elements such as idioms, proverbs, formulaic expressions, reduplications, proper nouns, and related words were included more; keywords in the studies were grouped under the title of vocabulary, culture, genre, method and technique, book, skill, linguistics, word, and education and training; and keywords included in the studies and aims of the present study overlapped with each other.

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INTRODUCTION

The language learning process varies according to the motivation, learning style, beliefs, attitude, personal background, age, personality, gender, family background, cultural identity, ethnic background, and learning environment of a student (Akkaş Baysal & Ocak, 2020). Good progress in the language learning process, which may vary from person to person, is crucial to enable humans as social creatures to communicate with other people. Language is the most important tool that enables humans as social creatures to communicate with other people. The way to build strong relationships between people and create an effective communication environment depends on the richness of the language in terms of vocabulary. Vocabulary is a whole consisting of meaningful language units covering not only the words of a language but also its proverbs, idioms, stereotyped words, reduplications, terms, and various narrative patterns (Karadağ, 2021; Aksan, 2018).

Vocabulary is an indicator of the richness of a language, and every individual studying a language is supposed to have great command over the vocabulary of the language. The academic performance of individuals with an excellent command of the vocabulary of the language will improve not only in language courses but in other courses as well. Because vocabulary is a unique source that covers all figurative meanings (metaphors) and richness of expression of a language and acquiring this source will increase individuals' ability to comprehend and interpret (Blachowicz et al., 2006: 526). Vocabulary is defined as not just signs, codes, or symbols in linguistics established by a combination of some sounds in the language, but also a section of the conceptual world of the society speaking that language, the reflector of the culture, and a cross-section of the worldview (Aksan, 2018: 15). Based on this scope regarding vocabulary, concepts such as "kelime hazinesi", "kelime serveti", "sözcük varlığı", "sözcük dağarcığı", "söz dağarcığı", "söz varlığı" are used to meet the same concept in various resources on language teaching. Although all these concepts are used to carry the same meaning, there are some minor differences between them (Onan, 2016: 21).

Kelime dağarcığı is defined as "the entire mass of words used by an individual or involved in a sentence (Vardar, 2007: 182)", while kelime hazinesi is defined as "All the words of a language; the sum of words in the vocabulary of an individual or a community (Korkmaz, 2010: 144)". According to another definition, kelime hazinesi represents the words in a text (Baş, 2011). When we look at the definitions regarding 'kelime dağarcığı' and 'kelime hazinesi', it is seen that they are much more different from the concept of 'vocabulary'. Because it is necessary to analyze the vocabulary not as an area that covers all the words of a language, but as a concept that includes meaningful word patterns such as idioms, proverbs, and stereotyped words.

It is sometimes confused with different concepts. However, vocabulary should be more frequently included in language teaching, and it should be ensured that individuals use the vocabulary elements they have learned. Despite the fact that individuals are engaged in vocabulary elements in almost all courses, especially the studies conducted in the Turkish language course can be more effective in achieving the goal. In that sense, one of the objectives of the Turkish course is to disseminate vocabulary teaching at all grade levels.

The most frequently used resources for vocabulary teachers by teachers in Turkish language courses are textbooks. Because researches conducted at various times have shown that teachers' commitment to textbooks is at a high level (Özbay, 2003; Öztürk, 2019; Kara Özkan, 2021; Köroğlu & Balcı, 2022). Textbooks are defined as resources written for teaching a certain course and for students at certain levels, prepared in accordance with the objectives, content, learning-teaching process, assessment and evaluation methods, and significantly affecting what students will learn in the learning-teaching process (Küçükahmet, 2003; Ceyhan & Yiğit, 2005; Demirel & Kıroğlu, 2005).

Textbooks have particular importance in terms of teaching Turkish because of the reason that technology addiction has become increasingly common in secondary schools in recent years (Dere &

Uçar, 2020). Because, textbooks have an important place in teaching Turkish as the Turkish language teaching also plays a significant role in transmitting spiritual values such as cultural elements and values besides being a course covering listening, reading, speaking, and writing skills. The primary source for transmitting these skills and values is textbooks.

Textbooks that are frequently used by Turkish language teachers and described as a reference source in transmitting both skills and values occupy an important place in vocabulary teaching as well. Because students guess the meaning of the vocabulary elements such as idioms, proverbs, and reduplications they encounter in the reading texts in a textbook depending on their context in reading text or learn the meaning of a word by looking up words in a dictionary and they consolidate the words they have learned by using them in various sentences. In this respect, the vocabulary elements included in textbooks need to be both adequate and appropriate to grade level.

The literature review reveals that 64 studies were conducted between 2006-2023 regarding the vocabulary elements in secondary school Turkish language textbooks. These studies evaluated the vocabulary elements in textbooks used at various times in secondary schools, however, there is no study in the literature that handles all these studies together. Therefore, the present study aims to analyze the trends in the studies conducted on the vocabulary elements in secondary school Turkish language textbooks. In line with the main purpose of this study, the sub-objectives are listed as follows:

1. What is the distribution of studies by years conducted on the vocabulary elements in secondary school Turkish language textbooks?

2. What is the distribution of studies conducted on the vocabulary elements in secondary school Turkish language textbooks according to their methods?

3. What is the distribution of studies conducted on the vocabulary elements in secondary school Turkish language textbooks according to the textbooks analyzed?

4. What is the distribution of studies conducted on the vocabulary elements in secondary school Turkish language textbooks according to research purposes?

5. What is the distribution of studies conducted on the vocabulary elements in secondary school Turkish language textbooks according to their frequency of using the vocabulary elements?

6. What is the distribution of studies conducted on the vocabulary elements in secondary school Turkish language textbooks according to their keywords?

METHOD

Research Design

The current study was designed according to the document analysis conducted with a qualitative approach. In qualitative research, large amounts of data obtained through various sources such as observation, interview, and document analysis are first analyzed and encoded; findings are reached considering the coding and synthesizing (Büyüköztürk et al., 2020: 258). Document analysis can be defined as the collection and analysis of visual and written materials. Written materials can be books, magazines, edicts, memories, articles, pleadings, novels, tales, poems, inscriptions, etc, while visual materials can be pictures, slides, films, monuments, clothes, tools and materials, stamps, flags, etc (Sönmez & Alacapınar, 2019: 109).

Data Collection and Analysis

42 articles and 22 postgraduate theses conducted on the vocabulary elements in secondary school Turkish textbooks were analyzed through descriptive analysis according to their publication years, methods, textbooks examined, purposes, frequency of using vocabulary elements, and keywords. According to descriptive analysis, the obtained data are summarized and interpreted considering the

themes that were previously determined based on the research questions and sub-questions. The purpose of this analysis is to present the findings to the reader in a summarized and interpreted manner (Yıldırım & Şimşek, 2021: 244).

Validity and Reliability

Studies evaluated within the context of the research are composed of studies that analyze the vocabulary elements in Turkish textbooks included in Google Scholar, YÖK National Thesis Center, Proquest, and TR index databases between the years 2006-2023. The searches in the above-mentioned databases were performed between April 24, 2023 and June 1, 2023.

As a result of the search on the Google Scholar database, we found 4210 results using the term "vocabulary" and "textbook"; 5312 results for the terms "word" and "textbook", 10958 results just for the term "vocabulary", and 2890 results just for the term "Turkish textbook". 48 of these results were downloaded as they were found to be related to the research subject. However, due to the fact that one of the studies was directly on the vocabulary elements in the social studies textbook, and twelve of them were not directly associated with the vocabulary elements, thirteen of them were not covered under the scope of this study as a result of the analysis.

As a result of the search on YÖK National Thesis Center, we found 3 results using the term "vocabulary", and "textbook", and 7 studies for the terms "word" and "textbook". It was found that just one of them was directly related to the research subject. When we searched for just 'vocabulary' on the same search engine, we found 383 results. 15 of those studies were downloaded, and 7 of the studies downloaded were directly found to be related to the research subject. We found 61 results as a result of the search using just the term "Turkish textbook". 6 of these results were downloaded as they were found to be related to the research subject.

We first searched for the terms "vocabulary" and "textbook" on the Proquest database and found 144 results. Based on the search, it was found that there were 144 results for the terms "word" and "textbook"; 175 results just for the term "vocabulary", and 184 results just for the term "Turkish textbook". 8 of the above-mentioned studies were included in the scope of the research as they were related to the research subject.

As a result of the search on the TR index database, we found 20 results using the term "vocabulary" and "textbook"; 119 results for the terms "word" and "textbook", 570 results just for the term "vocabulary", and 97 results just for the term "Turkish textbook". 7 of the above-mentioned studies were included in the scope of the research as they were related to the research subject.

Table 1. *Distribution of the studies included in the scope of the research by research type*

Research Type	**f**	**%**
Postgraduate Thesis	22	34,4
Article	42	65,6
Total	64	100

As seen in Table 1, it has been found as a result of the conducted analysis that there are no doctoral dissertations directly related to the research subject. However, 22 postgraduate theses (34,4 %) and 42 articles were included in the scope of the research.

The analysis of the studies included in the research was initially conducted by the researchers and then by a researcher who is a specialist in the field of Turkish language education. It was determined that the ratio between the findings of the researchers is 90%, while the ratio between the findings of the researchers and those of the field experts is 95%. The reliability formula developed by Miles and Huberman (1994) was used to calculate the reliability of the obtained data.

Ethic

In the study, human and animals (including material/data) were used for experimental or other scientific purposes, clinical studies were conducted on humans, carried out with qualitative or quantitative approaches that require data collection from the participants by using survey, interview, focus group work, observation, experiment, interview techniques, Ethics committee approval was not obtained because it was not included in the scope of studies conducted on animals and the sources examined in the study were publicly available sources.

FINDINGS

The studies analyzing the vocabulary items in secondary school Turkish textbooks were evaluated according to their publication years, methods, examined textbooks, purposes, frequency of using the vocabulary items and keywords, and the findings obtained as a result of the analysis are given below.

1. Findings Related to the Publication Years of the Studies

The studies examined in the research were listed according to the years of publication, and the findings obtained are given below.

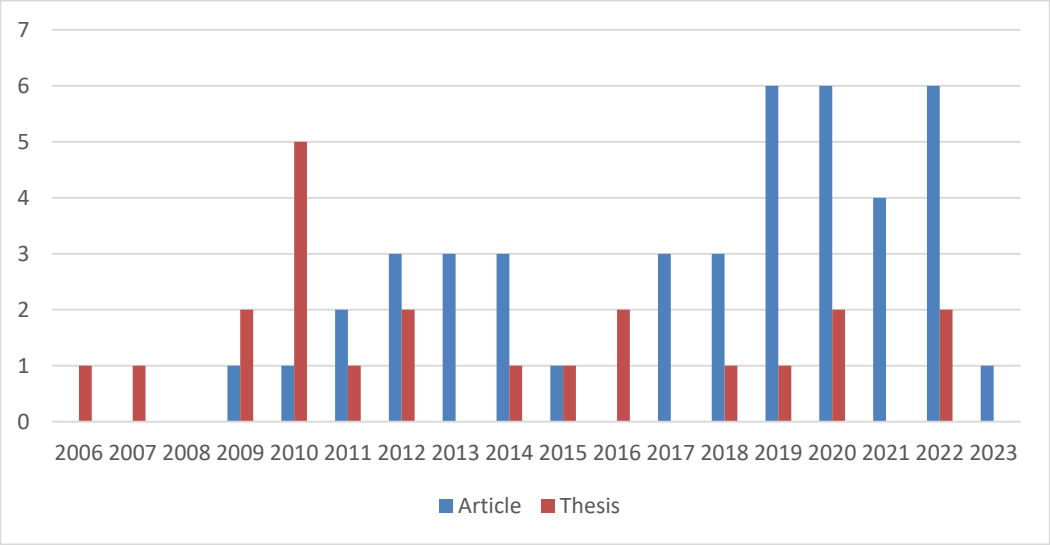

Figure 1. *Distribution of Studies Conducted on the Vocabulary Elements in Secondary School Turkish Textbooks by Research Type and Years*

As seen in Figure 1, studies were conducted in the years 2006 through 2023. It was found that there are no studies published on this subject in 2008. The highest number of studies (9 studies) was carried out in 2022, while the years in which the least number of studies were published are 2006, 2007, and 2023 with 1 study. It was determined that the highest number of theses (5) related to the research subject were published in 2010, while the highest number of articles (6) were published in 2019, 2020, and 2022. It was also observed that only theses related to the subject were published in 2006, 2007, and 2016; on the other hand, only articles were published in 2013, 2017, and 2023. Considering the general distribution, it can be said that studies were not normally distributed by year.

2. Findings Related to the Methods of the Studies

The distribution of the studies included in the scope of the research according to their methods was analyzed, and the obtained results are presented in Figure 2.

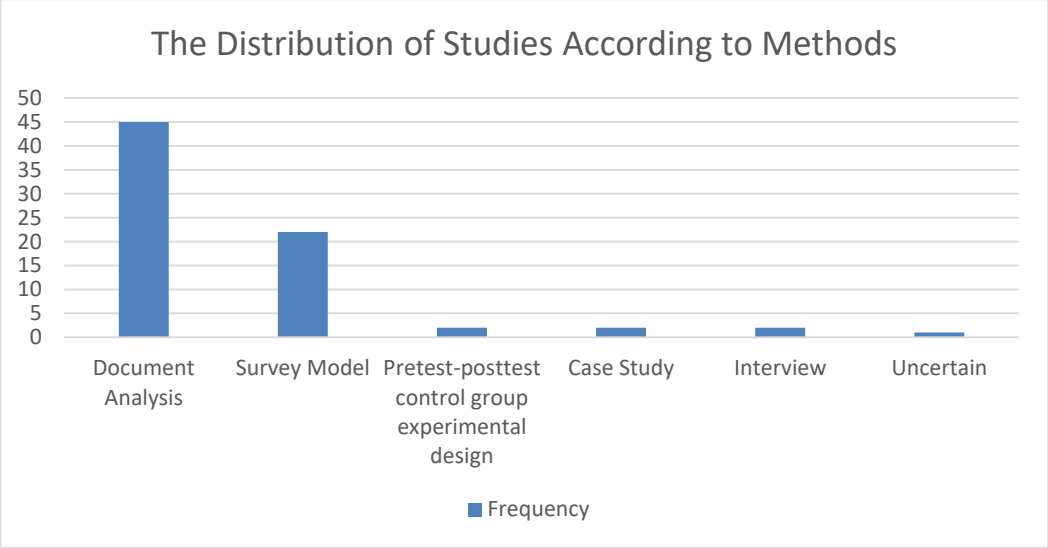

Figure 2. *Distribution of Studies Conducted on the Vocabulary Elements in Secondary School Turkish Textbooks by Research Method*

As illustrated in Figure 2, it is revealed that 64 studies were examined within the scope of the research, and 5 different methods were included in these studies 74 times. The reason for this case is that two different methods were included in 10 studies included in the scope of the research. Based on the analysis of 64 studies within the scope of the research according to their research methods, it can be said that qualitative methods were generally preferred in the studies. The most frequently used method among the qualitative approaches is the document analysis technique. The other methods following the document analysis are various qualitative methods such as the survey model, case study, and interview. A pretest-posttest control group experimental design was used only in two studies. No information has been presented about the research method in one study.

3. Findings Related to the Textbooks Examined in Studies

The distribution of the studies in the scope of the research according to the studies examined was analyzed, and the obtained results are presented in Figure 3 and Table 2.

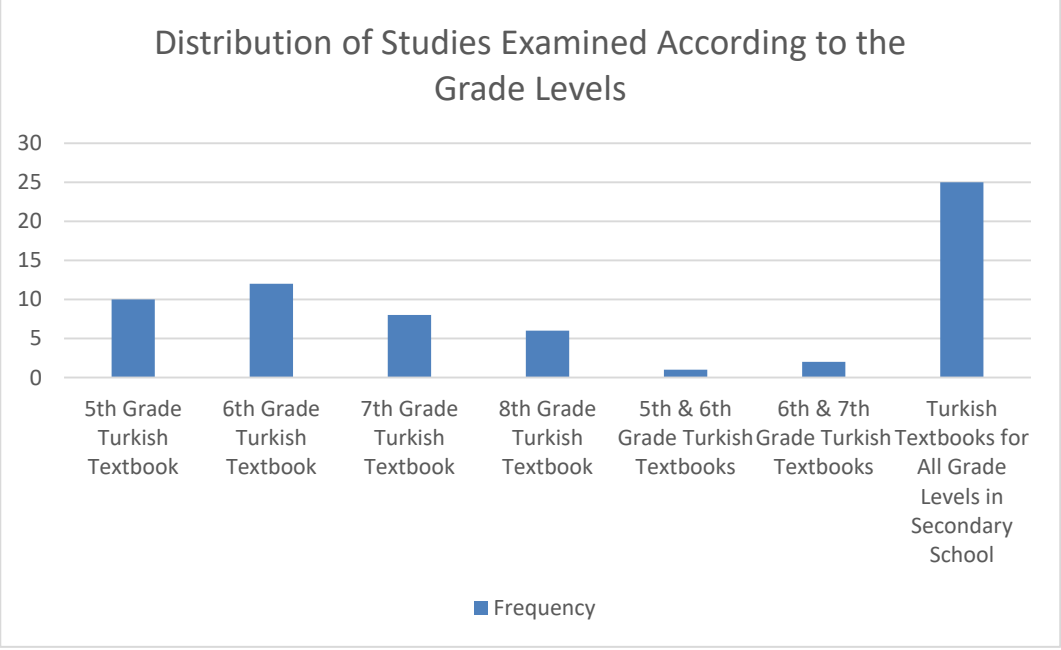

Figure 3. *Distribution of Textbooks Examined in the Studies Conducted on the Vocabulary Elements in Secondary School Turkish Textbooks by Grade Levels*

As seen in Figure 3, only the 5th-grade Turkish textbook was examined in 10 studies, only the 6th-grade Turkish textbook in 12 studies, only the 7th-grade Turkish textbook in 8 studies, and only the 8th-grade Turkish textbook in 6 studies. On the other hand, 5th and 6th-grade Turkish textbooks in one study in the scope of the research, 6th and 7th-grade Turkish textbooks in two studies, and Turkish textbooks for all grade levels in secondary school in 26 studies were examined in terms of vocabulary.

Table 2. *Distribution of Textbooks Examined in the Studies Conducted on the Vocabulary Elements in Secondary School Turkish Textbooks by Grade Levels and Publishing Houses*

Grade Levels	**Publishing House and Book Genres**	**f**	**%**
5	Anıttepe Publications Turkish Textbook	8	5,2
	MEB Publications Turkish Textbook	17	11
	MEB Publications Turkish Textbook	1	0,6
	Engin Publications Turkish Textbook	1	0,6
	Özgün Publications Turkish Textbook	1	0,6
6	Eksen Publications Turkish Textbook	4	2,7
	Başak Publications Turkish Textbook	1	0,6
	Koza Publications Turkish Textbook	2	1,3
	MEB Publications Turkish Textbook	25	16
	MEB Publications Turkish Textbook	3	1,9
	Ekoyay Publications Turkish Textbook	3	2
	Tuna Printing Company Turkish Textbook	1	0,6
	Evren Publications Turkish Textbook	1	0,6
	Evrensel İletişim Publications Turkish Textbook	1	0,6
	Pasifik Publications Turkish Textbook	1	0,6
	Özgün Publications Turkish Textbook	2	1,3
	Tutibay Publications Turkish Textbook	1	0,6
	Gizem Publications Turkish Textbook	1	0,6
7	Pasifik Publications Turkish Textbook	1	0,6
	Ders Destek Publications Turkish Textbook	2	1,3
	Meram Publications Turkish Textbook	2	1,3
	MEB Publications Turkish Textbook	2	1,3
	MEB Publications Turkish Textbook	26	16,8
	Özgün Publications Turkish Textbook	2	1,3
	Ez-De Publications Turkish Textbook	1	0,6
	Ez-De Publications Turkish Textbook	1	0,6
	Koza Publications Turkish Textbook	1	0,6
	Pasifik Publications Turkish Textbook	3	2
	Cem Publications Turkish Textbook	2	1,3
	Erdem Publications Turkish Textbook	1	0,6
	Harf Publications Turkish Textbook	1	0,6
	Yıldırım Publications Turkish Textbook	1	0,6
8	MEB Publications Turkish Textbook	23	14,8
	Yıldırım Publications Turkish Textbook	1	0,6
	MEB Publications Turkish Textbook	1	0,6
	Koza Publications Turkish Textbook	3	2
	TAV Publications Turkish Textbook	3	2
	Pasifik Publications Turkish Textbook	2	1,3
	Batu Publications Turkish Textbook	1	0,6
	Harf Publications Turkish Textbook	1	0,6
	Pasifik Publications Turkish Textbook	1	0,6
	Total	**156**	**100**

In 64 studies examined within the scope of the research, 41 different Turkish textbooks were evaluated 156 times. Of these 41 different textbooks, 9 are students' workbooks and 32 are textbooks.

Workbooks used at different grade levels and published by different publishers were examined 13 times in the above-mentioned studies. In two of the studies, books according to the grade levels were mentioned, but there was no information about the publishing houses.

Based on the general tendency in the studies, it is observed that the number of studies examining the textbooks for all grade levels in secondary school in terms of vocabulary was high (25). Among the 41 different textbooks examined, it is clear that the textbooks with the most research were the 6th Grade Meb Publications Turkish textbook (25), the 7th Grade Meb Publications Turkish textbook (26), and the 8th Grade Meb Publications Turkish textbook (23). Despite the fact that the publishers of the examined textbooks were the same, content and authors may change according to the publishing period.

4. Findings Related to the Purposes of the Studies

The distribution of the studies in the scope of the research according to their purposes was analyzed, and the obtained results are presented in Table 3.

Table 3. *Distribution of Studies Conducted on the Vocabulary Elements in Secondary School Turkish Textbooks by Purposes*

Purposes	**f**	**%**
To examine the texts in the textbooks in terms of vocabulary	25	39
To examine the activities in the textbooks in terms of vocabulary	10	15,6
To examine the textbooks in terms of idioms and proverbs	8	12,5
To examine the textbooks in terms of word frequency	5	7,8
To examine the listening-watching texts in the textbooks in terms of vocabulary	4	6,3
To examine the stereotyped vocabulary in the textbooks	4	6,3
To examine the textbooks by cultural elements	3	4,7
To examine the listening-watching texts in the textbooks according to the methods and techniques used	2	3,1
To develop activities related to vocabulary teaching	1	1,6
To determine the level of knowledge of words in the textbooks by the students	1	1,6
To develop a dictionary with the words that secondary school students need to know	1	1,6
Total	**64**	**100**

According to Table 3, based on the evaluation of the studies in terms of their purposes, it is observed that 25 (39 %) of the studies aimed to examine the texts in the textbooks in terms of vocabulary; 10 (15,6 %) of them were conducted to examine the activities in the textbooks in terms of vocabulary; 8 (12,5 %) of them handled especially the idioms and proverbs among the vocabulary elements, and these 8 studies were conducted to examine the textbooks in terms of idioms and proverbs.

It was determined that 5 (7,8 %) of the studies were conducted to examine the vocabulary in the textbooks according to word frequency, 4 (6,3 %) of them to examine the listening-watching texts in the textbooks according to vocabulary; 4 (6,3 %) to examine the textbooks according to the stereotyped vocabulary; 3 (4,7 %) to examine the textbooks according to the cultural elements; 2 (3,1 %) of them to examine the listening-watching texts in the textbooks according to methods and techniques. Apart from these, 1 study aimed to develop activities related to vocabulary teaching, and another study aimed to determine the level of knowledge of words in the textbooks by the students. 1 study also aimed to develop a dictionary suitable for the secondary school level.

5. Findings Related to the Frequency of Using the Vocabulary Elements in Studies

Studies in the scope of the research were analyzed based on the frequency of using the vocabulary elements, and the obtained results are presented in Table 4.

Table 4. *Distribution of Studies Conducted on the Vocabulary Elements in Secondary School Turkish Textbooks According to the Frequency of Using the Vocabulary Elements*

Vocabulary Element	Number of Studies Included (f)	Ratio of the Study Compared to Other Studies (%)
Idioms	48	75
Proverbs	46	72
Formulaic Expressions	25	39
Reduplications	24	37,5
Proper Names	19	29,7
Routine Words	12	18,8
Terms	10	15,6
Foreign Words	9	14,1
Aphorisms	8	12,5
Exclamations	8	12,5
Compound Words	7	10,9
Onomatopeic Words	6	9,4
Abbreviations	6	9,4
Verbs	5	7,8
Rhymes	5	7,8
Metaphors	5	7,8
Dialect Features	5	7,8
Numerical Expressions	4	6,3
Preposition-Conjunction	2	3,1
Gerundial	1	1,6
Nouns	1	1,6
Metonym	1	1,6
Basic Words	1	1,6
Titles	1	1,6
Politeness Expressions	1	1,6

Table 4 shows that 48 of the studies examined within the scope of the research included idioms; 46 of them included proverbs; 25 of them included stereotyped words, and 24 of them included reduplications. Vocabulary elements that are used the least in the studies are gerundial, nouns, metonyms, basic words, terms, titles, and politeness expressions.

In the studies examined, it is observed that just a single study included more than one vocabulary element. Therefore, it is evident that the most frequently used vocabulary elements in the studies examining the vocabulary elements in secondary school Turkish textbooks are idioms (75 %) and proverbs (72 %).

6. Findings Related to the Keywords of the Studies

Studies in the scope of the research were analyzed according to their keywords, and the obtained results are presented in Table 5.

Table 5. *Distribution of Studies Conducted on the Vocabulary Elements in Secondary School Turkish Textbooks According to the Keywords*

Keywords	f	%
Vocabulary	39	16
Turkish Textbooks	30	12,2
Turkish language learning and teaching	17	7
Textbook	14	5,7
Vocabulary teaching	11	4,5
Text	7	2,9
Idioms	7	2,9
Language	6	2,4
Vocabulary	6	2,4
Dictonary	5	2

Turkish Course Curriculum	5	2
Proverb	5	2
Stereotyped Vocabulary	5	2
Teaching Idioms	5	2
Frequency of Word	4	1,6
Turkish	3	1,2
Secondary School 5th Grade Turkish Textbook	3	1,2
Culture	3	1,2
Vocabulary	3	1,2
Word Power	3	1,2
Listening-Watching Texts	2	0,
7th Grade	2	0,8
Corpus	2	0,8
Cultural Transfer	2	0,8
Formulaic Expressions	2	0,8
Activities	2	0,8
Basic Vocabulary	2	0,8
Word	2	0,8
Others	49	20
Total	**246**	**100**

As Table-5 illustrates, a total of 246 keywords were included in 22 postgraduate theses and 42 articles examined. Based on Table-5, it was determined that the most frequently cited keywords are respectively listed as "vocabulary (16 %)", "Turkish textbooks (12,2 %)", "Turkish language learning and teaching (7 %)", "Textbook (5,7 %)", "Vocabulary teaching (4,5 %)". It was also revealed that 49 (20 %) different keywords were included just once in the studies examined.

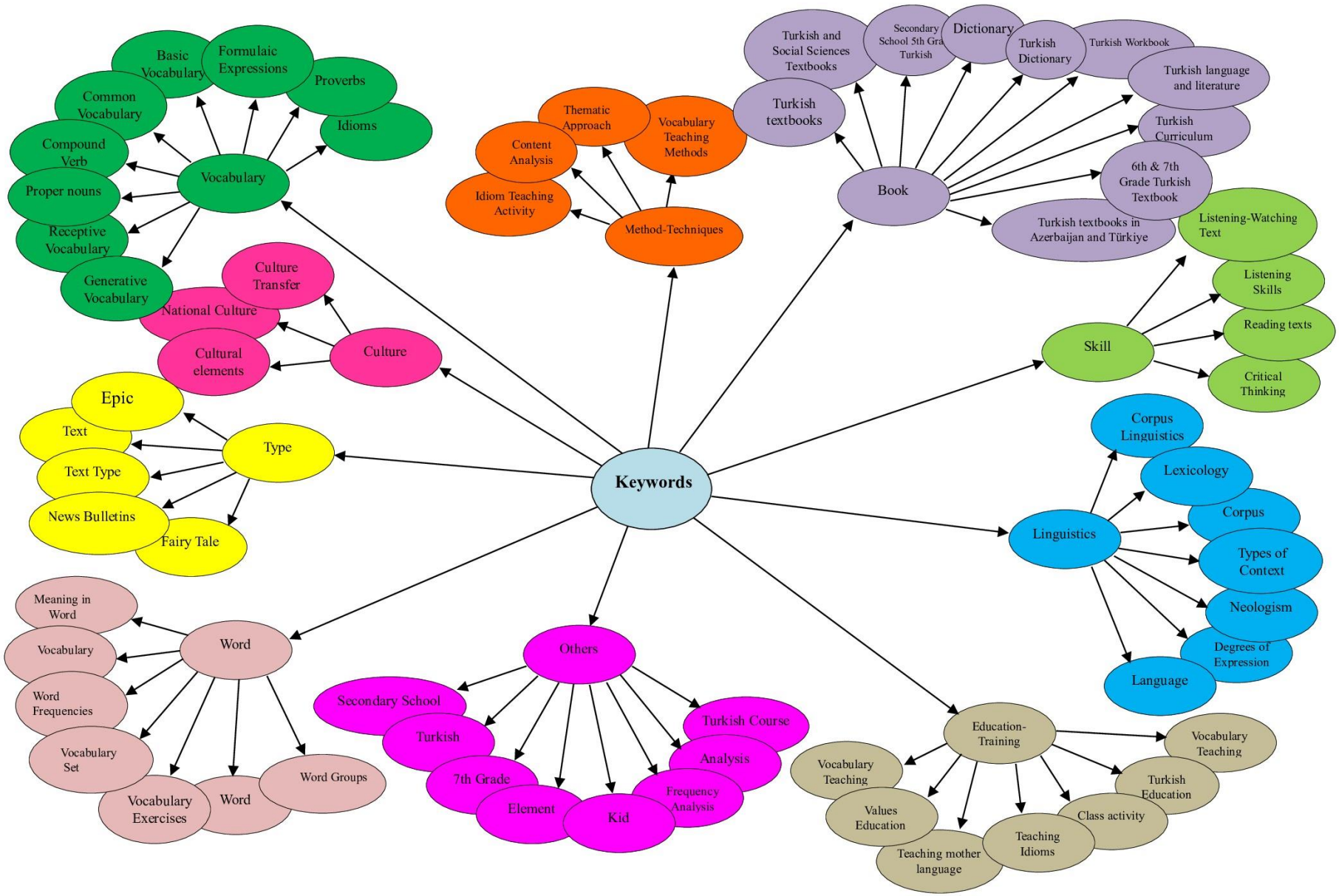

Figure 4. *Distribution of Studies Conducted on the Vocabulary Elements in Secondary School Turkish Textbooks According to the Keywords*

As can be seen in Figure 4, the keywords included in the studies conducted on the vocabulary elements in secondary school Turkish textbooks were related to vocabulary (idioms, proverbs, formulaic expressions, basic vocabulary, common vocabulary, compound verb, proper nouns, receptive vocabulary, generative vocabulary), methods and techniques (Idiom teaching activity, content analysis, thematic approach, vocabulary teaching methods), books (Turkish textbooks, Turkish and Social Sciences textbook, secondary school Turkish textbook, dictionary, Turkish dictionary, Turkish workbook, Turkish language and literature, Turkish Curriculum, 6th and 7th-grade Turkish textbook, Turkish textbooks in Azerbaijan and Türkiye), skills (listening-watching texts, listening skill, reading texts, critical thinking), linguistics (corpus linguistics, lexicology, corpus, types of context, neologism, degrees of expression, language), education-training (vocabulary teaching, values education, teaching mother language, Idiom teaching, class activity, Turkish education, vocabulary teaching), words (meaning in word, vocabulary, word frequencies, vocabulary set, vocabulary exercises, word, word groups), types (epic, text, text type, news bulletins, fairy tale), and culture (culture transfer, national culture, cultural elements).

DISCUSSION, CONCLUSION, RECOMMENDATIONS

In the present study, studies conducted on the vocabulary elements in secondary school Turkish textbooks between 2006-2023 were evaluated according to various criteria such as years, methods, textbooks examined, purposes, keywords, and vocabulary elements included. In this section, findings obtained within the scope of the study will be discussed.

1. Conclusion and Discussion Related to the First Sub-goal

According to the findings obtained from this study, it was determined that of the studies conducted on the vocabulary elements in secondary school Turkish textbooks, 34,4 % was thesis, while 65,6 % was articles. As a result of the analysis, no doctoral thesis has been found in the literature.

Literature review indicates that in his study, which aimed to determine the trends in postgraduate studies conducted in Turkish education between 2011-2015, Özçakmak (2017) revealed that the majority of the studies conducted previously were at the postgraduate level. Maden (2021) who aimed to determine the trends in postgraduate theses related to Turkish textbooks, and Temizkan (2021) aiming to examine the postgraduate theses conducted on the Turkish textbooks according to various criteria obtained similar results.

Considering the distribution of the studies by years, it was determined that the highest number of studies was conducted in 2020, while the least number of studies was done in 2008. It was also revealed that the studies conducted increased especially after 2010, but this increase was not a steady one

The related literature shows that in his study which aimed to determine the trends in the studies conducted on Turkish textbooks, Sur (2023) determined that the number of studies regarding the research subject has increased since 2010. In this respect, it can be stated that the results of the present study are similar to those of the studies in the literature.

2. Conclusion and Discussion Related to the Second Sub-goal

Another finding in this study shows that 95,3 % of the examined studies were carried out as qualitative research, while 3,1 % were conducted through quantitative research. The method regarding the 1,6 % of the studies was not indicated. There are no studies conducted using mixed methods in the studies within the scope of the research.

The literature review indicates that in their study, which aimed to examine the trends in Turkish education studies published between 2000-2011 according to various criteria such as method, subject, data collection tools, and sample, Varışoğlu et al., (2013) determined that the least preferred method and design in Turkish education studies was mixed research designs. In their study aiming to determine

the research tendencies of post-graduate and doctoral theses regarding Turkish education designed between 2015-2019, Önal & Maden (2021) stated that the most commonly used method in theses regarding Turkish education was the qualitative research method.

Document analysis (review) was used in 73,8 % of the studies examined in the scope of the research, which used qualitative research methods.

Literature review shows that Maden (2021) and Sarı (2020) found in their research that document analysis was mostly used in the theses they examined.

As can be seen, the findings of the study show similarity with the findings of other studies in the literature.

3. Conclusion and Discussion Related to the Third Sub-goal

Based on the third finding of the present study, it was found that of all the studies examined, only 5th-grade Turkish textbooks were examined in 15,4 % of the studies, only 6th-grade Turkish textbooks in 18,5 % of them, only 7th-grade Turkish textbooks in 12,3 %, only 8th-grade Turkish textbooks in 9,1 %, 5th and 6th-grade Turkish textbooks in 1,4 %, 6th and 7th-grade Turkish textbooks in 2,9 %, textbooks for all grade levels (5th, 6th, 7th, and 8th-grade) of secondary school in 40,4 %.

When the literature is examined, Maden (2021) determined that in the great majority of the theses conducted on the textbooks, analysis was conducted on the textbooks for all grade levels (5th, 6th, 7th, and 8th-grade) in secondary school. Kanat (2021), who aimed to consider graduate theses on grammar teaching in secondary school Turkish textbooks with a holistic approach, also obtained similar results. The results of the present study are similar to those of the other studies in the literature.

4. Conclusion and Discussion Related to the Fourth Sub-goal

The fourth finding of the research shows that it was aimed to determine the vocabulary elements in the texts of the textbooks in 39 % of the studies examined, to examine the activities in the textbooks in terms of vocabulary in 15,6 % of them, to examine the textbooks in terms of idioms and proverbs in 12,5 %, to examine the textbooks in terms of word frequency in 7,8 %, to examine the listening-watching texts in the textbooks in terms of vocabulary in 6,3 %, to examine the stereotyped vocabulary in the textbooks in 6,3 %, to examine the textbooks according to cultural elements in 4,7 %, to examine the textbooks according to the methods and techniques used in listening-watching texts in 3,1 %, to develop activities related to vocabulary teaching in 1,6 %, to determine the level of knowledge of words in the textbooks by the students in 1,6 %, and to design a dictionary with the words that secondary school students need to know in 1,6 %. According to the findings of the study, various elements which form the book such as texts in a textbook, activities, and listening-watching texts were evaluated in terms of vocabulary in the studies.

When the literature is analyzed, no study overlaps with this result of the research.

5. Conclusion and Discussion Related to the Fifth Sub-goal

The fifth finding of the research reveals that 75 % of the studies examined within the scope of the research were based on idioms, 72 % on proverbs, 39 % on formulaic expressions, 37,5 % on reduplications, 29,7 % on proper nouns, 18,8 % on related words, 15,6 % on terms, 14,1 % on foreign words, 12,5 % on aphorisms, 12,5 % on exclamations, 10,9 % on compound words, 9,4 % on onomatopeic words, 9,4 % on abbreviations, 7,8 % on verbs, 7,8 % on rhymes, 7,8 % on metaphors, 7,8 % on dialect features, 6,3 % numerical expressions, 3,1 % on preposition and conjunctions, 1,6 % on gerundial, 1,6 % on nouns, 1,6 % on metonyms, 1,6 % on basic words, 1,6 % on titles, and 1,6 % on politeness expressions. According to the findings of the research, it was determined that the majority of the studies examined included idioms and proverbs as elements of vocabulary.

When the literature is analyzed, no study overlaps with this result of the research.

6. Conclusion and Discussion Related to the Sixth Sub-goal

According to the last finding of the research, the keywords in the studies conducted on the elements of vocabulary in secondary school Turkish textbooks are grouped under the titles of vocabulary, culture, genre, method and technique, book, skill, linguistics, word, education & training. The most frequently used keywords in the analyzed studies were determined as vocabulary, Turkish textbooks, Turkish education and teaching, textbook, and vocabulary teaching. It was observed that the keywords used in the studies and the purposes of the studies overlapped with each other.

When the literature is examined, Cin Şeker (2020), in his study on the keywords of postgraduate theses on listening and speaking skills in the field of Turkish education, concluded that the subject of the theses and the keywords used in the theses support each other, similar to the finding of the study. In Boyacı and Demirkol's (2018) study aiming to examine doctoral theses in the field of Turkish education, it was determined that the most commonly used keywords in theses were Turkish education, Turkish teaching, Turkish education & teaching. This word order frequently used is consistent with the frequency order of the keywords in the studies analyzed in the research.

Accordingly, it can be said that these findings of the present study overlap with the findings of other studies in the literature.

Recommendations

1. It is observed that the qualitative method was mostly used in the analyzed studies. Conducting studies on the subject using different methods such as quantitative, experimental, or mixed methods will provide a huge contribution to the diversity of the literature on the subject.

2. Considering the lack of a standard regarding the vocabulary elements included in the analyzed studies, it would be useful to conduct studies to create a generally accepted vocabulary index.

3. Conducting a study on which vocabulary should be taught in which grade level when designing Turkish textbooks would be beneficial to fill the existing gap in the literature.

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How IT Course Improves Digital Competencies: An Experimental Study in Science Education

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ABSTRACT

The rising significance of technology in society has caused a surge in the requirement of individuals possessing digital competencies. In the current era, digital skills are progressively vital for both personal and occupational growth. Governments have acknowledged the value of digital competencies and have incorporated them as part of fundamental proficiencies in numerous countries. Pre-service teachers have a paramount role in molding forthcoming generations, highlighting their necessity to possess robust digital competencies. This research centers on how an "Information Technologies in Science Education" course influences the digital competency progression in pre-service teachers. The study deployed a pre-test post-test experimental design with a single group to gauge the course's efficacy in enriching pre-service teachers' digital literacy abilities. The study results show that the IT course designed for the science field had an evidently positive effect on the digital competency of pre-service teachers. The mean scores in the post-test indicate a noteworthy level of digital competency in the study group. Moreover, the study notes the absence of experimental research in this domain, highlighting the necessity of further investigation into this area. The study's outcomes have implications for education of science teachers and the integration of digital technologies. The study recommends that programs for teacher education enable future teachers to develop their digital expertise via courses and training schemes. Additionally, it is crucial to incorporate digital technologies into scientific education to provide pupils with the essential abilities to flourish in a digital world.

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INTRODUCTION

In the modern world, societies that want to live in peace and affluence must adapt to the demands of the age in which they live. It has taken centuries. In fact, societies that meet the demands of the industrial revolution lead the world in science and technology, especially in economics, while societies that cannot adapt to these developments lag. Industry and urbanization gained momentum in the period that began with the use of water and steam instead of human labor in production. The industrial revolution improved production possibilities, and this led to changes and needs in consumption. The emerging new needs have led to new technologies, and new technologies have led to the further development of industry and industrial revolutions (Yener, 2022). Especially with Industry 4.0 (Schwab, 2016), artificial intelligence and robotic technologies have been widely used in production. This situation pushes societies toward innovation and development.

The concept of digital competency is one of the priority agenda items in developed countries (Ilomäki et al., 2016; Pettersson, 2018). With the fourth industrial revolution, digital competencies have been identified as a basic competency (Choi, 2018). These competencies are effectively involved in accessing, evaluating, producing, and sharing information using digital technologies. In today's world, individuals who are not at the desired level of digital competence have problems adapting to society. Moreover, societies with low levels of digital literacy lag with regard to economic competition and other social aspects (Bejakovic & Mrnjavac, 2020). Digital competencies are essential for success and social development in today's rapidly evolving world. Thus, the development of digital skills by individuals is vital for the future of societies.

Digital literacy and digital competence are often used synonymously (Godhe, 2019; Pettersson, 2018; Sánchez-Caballé et al., 2020). Digital literacy includes individuals' ability to acquire, evaluate, use, and share information in digital environments (Fraillon et al., 2019). Digital literacies can be categorized as digital literacies, media literacies, and information literacies (Coiro et al., 2014; Fraillon et al., 2019). On the other hand, digital competency is often associated with education and includes individuals' ability to learn, work, communicate, entertain, and perform other activities throughout life using digital technologies effectively. Digital competence is not only about IT skills but also about the ability to use, manage, and solve problems with technology effectively (Falloon, 2020; Tømte, 2013). To summarize, digital literacy encompasses the processes individuals use to access, understand, and evaluate information in digital environments, while digital competence involves the effective use and management of technology in a broader context (European Commission, 2013; Fraillon et al., 2019).

There are many projects, initiatives, and protocols to develop digital competencies. Some examples include the European Digital Skills Framework (DigComp, DigComp 2.0, and DigComp 2.1), the Digital Skills Framework for Educators (DigCompEdu) (European Commission, 2013; 2017), and the UNESCO Information and Communication Technologies Skills Framework for Educators (UNESCO, 2018). Additionally, specific projects such as Microsoft's "Microsoft Education" program, which provides access to technology in education; Intel's "Intel Teach" program, developed to support the use of technology in education; and Google's "Google for Education" program, where Google provides digital competency training for educators, are among other examples of digital competency initiatives.

The European Commission (2017) launched a "Digital Education Action Plan" to support using technology and developing digital competency in education. It contains measures to help EU Member States meet education challenges in the digital age. Figure 1 shows digital education in schools in Europe.

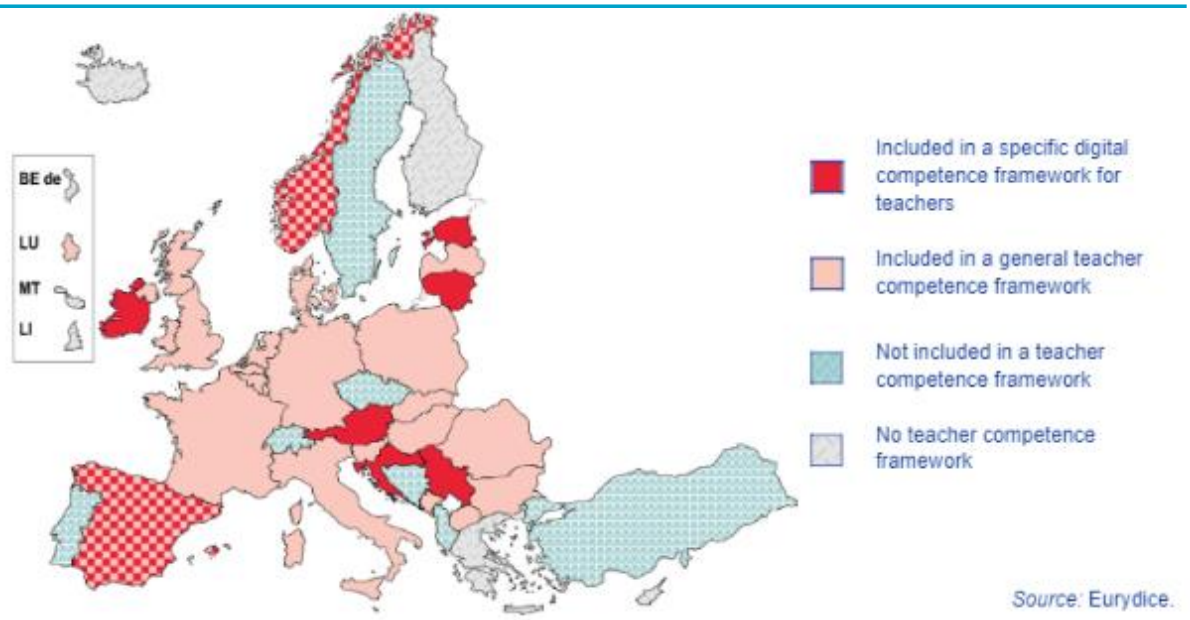

Figure 1. *Digital Education at Schools in Europe (Eurydice, 2019)*

Most European education systems recognize digital competencies as a basic requirement in their teacher qualification frameworks. Countries such as Spain, Croatia, and Lithuania have developed specific frameworks for teacher digital competencies. Estonia and Ireland have frameworks for only basic competencies. The teaching qualification frameworks in the Czech Republic, Portugal, Bosnia and Herzegovina, and Switzerland do not yet cover digital competencies (Eurydice, 2019).

The development of digital competency in the education system is a crucial issue for the future of society (Redecker et al., 2017). Educational programs and technology-enhanced learning methods develop these skills and competencies (Sang et al., 2010). IT education is believed to have an important place in developing these competencies. This is because the information technologies course allows students to learn using technological tools and devices. An IT course aims to increase students' skills and knowledge in the use of technology (Ertmer & Ottenbreit-Leftwich, 2010). IT courses also enable students to adapt to the evolving technological world's demands and use technology creatively (Ertmer & Ottenbreit-Leftwich, 2010; Sang et al., 2010). IT courses emphasize that digital competencies are not limited to technical skills but include digital citizenship, ethics, security, and privacy (Fraillon et al., 2014; Ribble et al., 2004; Ohler, 2011).

Examining the literature reveals that there are several research on digital competence. The studies are often aimed at determining the level of digital competence (Barri, 2020; Cote & Milliner, 2018; Kuzminska, 2018). Spiteri and Chang Rundgren (2017) conducted a study in Malta, and the results showed that teachers' digital competence was low. Contrary to this study, another study by Karakuş and Ocak (2019) concluded that pre-service teachers' digital competencies were high. In another study, it was found that digital competencies were at medium levels (Dias-Trindade & Moreira, 2020). On the other hand, some studies have examined the concept of digital competencies according to variables such as gender and seniority (Goswami & Dutta, 2015; Karakuş & Ocak, 2019; Keskin & Yazar, 2015; Keskin, 2016). However, experimental studies on digital competencies are limited (Çebi & Reisoğlu, 2019).

Teachers play a critical role in the development of digital competencies (Cavanaugh et al., 2011; Ertmer & Ottenbreit-Leftwich, 2010). Teachers need to model the use of technology for students and teach them according to the demands of the digital age. Research shows that teachers' strengths in technology are used to increase students' motivation, sense of self-efficacy, and digital competencies (Ertmer & Ottenbreit-Leftwich, 2010). Therefore, developing teachers' digital competence and using technology in teacher education programs will contribute to developing students' technological

competence (Pettersson, 2018). This study investigated the effect of information technologies in science education (ITSE), structured by science courses, on the digital competence of pre-service teachers. Since the course content was structured according to the science course, this study differs from many studies in the literature. The aim of this study is to determine the effect of IT courses taken by university students on their digital competencies. In this context, the difference between the digital competence scores of the students before and after the IT course was examined.

METHOD

Research Design

The study used one of the weak experimental designs, the one-group pre-test-post-test design. It tests the significant difference between the pre-test and post-test scores of one group (Fraenkel et al., 2012). This method involves applying an independent variable to a random group and administering pre-test and post-test measures before the experiment (Karasar, 2013).

Table 1. *Research model*

Group	Pre-Test	Procedures	Post-test
G	$T_{1.1}$	X	$T_{1.2}$
	Digital Competencies Scale	ITSE Procedures	Digital Competencies Scale

The study's dependent variable is the students' Digital Competencies Scale scores. The independent variable is the ITSE implemented for 14 weeks.

Study Group

The research study group comprised 24 pre-service teachers who took the ITSE course in the Department of Science Education at the Faculty of Education. Nineteen were women and five were men. Students' demographics are shown in Table 2.

Table 2. *Demographic information about the study group*

		f	%
I have already taken an information technologies course	Yes	19	79.2
	No	5	20.8
I know something about digital competency	Yes	16	66.7
	No	8	33.3
Graduated school type	Anatolian high school	19	79.2
	Science high school	2	8.3
	Vocational high school	3	12.5
I have a computer	Yes	16	66.7
	No	8	33.3
I have internet access	Yes	21	87.5
	No	3	12.5
Interest levels in technology	Very little	5	20.8
	Middle	11	45.8
	Too much	8	33.4

Table 2 shows that they had previous experience with an IT course (f=19; 79.2%). Most of them have heard of terms such as digital and technological competency (f=16; 66.7%). Anatolian high schools are an exception regarding the type of school graduates (f=19; 79.2%). All pre-service teachers have smartphones. 87.5% have Internet access, and 66.7% have a computer.

Data Collection Tools

Personal Information Form

Researchers developed the “Personal Information Form” to collect study group personal information. The form includes questions such as gender, school of graduation, etc.

Digital Competences Scale

The Digital Competences Scale was developed by López-Meneses et al. (2013). It is based on the Basic Digital Competencies of University Students 2.0 (COBADI®) scale and the European Commission’s Digital Competence (DigCom) framework (Adanır & Gülbahar, 2022). The original scale consisted of 4 factors and 31 items. Adanır and Gülbahar (2022) adapted the scale into Turkish. The adapted scale consisted of five factors and 29 items. Factor 1 was named "digital content development", factor 2 "information and data literacy", factor 3 "communication", factor 4 "virtual tools and social communication at the university", and factor 5 "problem solving". Cronbach`s alpha was calculated to be .907).

Data Collection and Analysis

Research data were collected through electronic forms in the fall semester of 2022-2023. Descriptive analysis and paired sample t-tests were used. A descriptive statistical analysis was conducted to obtain a picture of the data. The paired sample t-test was used to determine the effect of the experimental procedure. All statistical analyses used a 0.05 significance level.

Procedures

The research was conducted in the fall semester of 2022–2023 in the ITSE course. The researcher conducted this course. The course "Information Technologies in Science Education" is 3 hours per week. The duration of the experimental procedures was 14 weeks. The pre-test was conducted in the first week, and the post-test in the last week. The experimental implementation was conducted in a computer lab with 30 desktop computers connected to the Internet and a projector. All research activities occurred in this lab. In the first week, the students received information about the research to conduct, the content and scope of the study, and the issues to consider during the study. Then, the pre-tests were done online.

The course is structured to maximize the benefits for pre-service teachers. The course includes Microsoft Word, Microsoft PowerPoint, and Microsoft Excel programs that pre-service teachers frequently use in their education and professional lives. The basic features of these programs have been explained to pre-service teachers. All examples and applications were designed to cover science education. The last 30 minutes of the lessons were dedicated to Web 2.0 applications that would be useful in professional life. The Web 2.0 applications introduced are: 1. Kahoot, 2. Canva, 3. Tinkercad, 4. Mindmeister, 5. Onedrive, 6. Padlet, 7. Wordart, Classdojo, 8., 9. Wix, 10. Aurasma, 11. Scratch, and 12. Google Forms. All pre-service teachers had the opportunity to create sample applications.

In the 14th week, the experimental procedures were completed by conducting post-tests.

RESULTS

In this study, the data were tested for normality before analysis. The analysis was performed for the whole scale and its sub-factors. Table 3 shows the results of the descriptive statistics for the pre-test and post-test scores of the experimental group.

Table 3. *Descriptive analysis results of the students' scores on the Digital Competences Scale*

	Factors	N	Min	Max	$\bar{X}$	Sd	S-W
Pre-test	Digital Content Development	24	10	23	15.04	3.90	0.06
	Information and Data Literacy	24	19	36	28	5.33	0.26
	Contact	24	4	11	7	2.10	0.06
	The University's Virtual Tools and Social Communication	24	6	15	10.33	2.35	0.41
	Problem Solving	24	4	12	7.92	1.86	0.17
	Total	24	52	90	68.04	11.04	0.24
Post-test	Digital Content Development	24	11	26	19	3.96	0.32
	Information and Data Literacy	24	10	40	31.67	5.16	0.56
	Contact	24	6	11	7.46	1.69	0.05
	The University's Virtual Tools and Social Communication	24	4	15	10.54	2.87	0.11
	Problem Solving	24	5	11	7.92	1.61	0.29
	Total	24	56	94	77.58	9.92	0.46

The pre-test and post-test scores are both within acceptable normalcy ranges (Table 3). As a result, a paired sample t-test was performed to evaluate whether there was a significant link between the experimental group's pre-test and post-test results. These findings are shown in Table 4.

Tablo 4. *t-test results of pre-test and post-test mean scores on the digital competences scale*

Factors		N	$\bar{X}$	Sd	df	t	p
Digital Content Development	**Pre-test**	24	15.0	3.9	23	-3.872	<0.001
	Post-test	24	19.0	3.9			
Information and Data Literacy	**Pre-test**	24	28.0	5.3	23	-3.177	0.00
	Post-test	24	31.6	5.1			
Contact	**Pre-test**	24	7.0	2.1	23	-2.676	0.01
	Post-test	24	8.4	1.6			
The University's Virtual Tools and Social Communication	**Pre-test**	24	10.3	2.3	23	-0.426	0.67
	Post-test	24	10.5	2.8			
Problem Solving	**Pre-test**	24	7.9	1.8	23	0.000	1.00
	Post-test	24	7.9	1.6			
Total	**Pre-test**	24	68.0	11	23	-5.000	<0.001
	Post-test	24	77.5	9.9			

($p<0.05$)

Table 3 shows that there is a significant difference in favour of the post-test between the averages of the experimental group's pre-test and post-test total scores ($t(23)=-5.000$; $p<0.05$). The mean score of the students before the experimental procedures were calculated as $\bar{X} = 68$; after the experimental procedures, it was calculated as $\bar{X} = 77.5$. This result can be considered that the course positively impacted students' digital competency.

Considering the factors, t-test results for the digital content development ($t(23)=-3.872$; $p<0.05$),

information and data literacy ($t(23)=-3.177$; $p<0.05$), and contact ($t(23)=-2.676$) show that there is a significant difference between the pre-test and post-test mean scores in favor of the post-test. However, no significant difference was found between the pre-test and post-test mean scores in the problem solving ($t(23)=-0.000$; $p>0.05$) and virtual tools, and social communication of the university ($t(23)=-0.426$; $p<0.05$).

DISCUSSION

Digital competencies are recognized as essential competencies for teachers. It has been observed that teachers' classroom practices and professional approaches change depending on their level of digital competence (Moltudal et al., 2019). Teachers' digital competence levels significantly influence students' digital competence development (Krumsvik, 2008; Ovcharuk, 2020). Although digital competencies are still a new concept, they are considered a basic skill for future generations (Toker et al., 2021). In fact, many developed countries have defined digital competencies as one of the basic competencies for the future (Sefton-Green et al., 2009).

As can be seen, the findings of research on digital competencies are highly disparate. In some studies, the level of digital competence of individuals is high (Benali et al., 2018; Sciumbata, 2020). In some, it is medium (Çebi & Reisoğlu, 2020; Dias-Trindade & Moreira, 2020), and in some, it is low (Komsu, 2017; Spiteri & Chang Rundgren, 2017). This may be due to the differences in methodology, sample groups, and geographical locations of the studies. Furthermore, studies are generally seen as survey models (Ghomi & Redecker, 2019; Sciumbata, 2020).

Teachers have a critical role in transferring digital competencies to future generations. For this reason, improving teachers' digital competency skills is essential for the well-being of societies. This study implemented a 14-week training program to increase pre-service teachers' digital competencies. The training program significantly improved the students' average digital competency scores. Studies with similar results can be found in the literature. A study by Çebi and Reisoğlu (2019) investigated the effect of a digital competence training program. As part of the study, pre-service teachers' pre- and post-training situations in computer education, instructional technology, and other fields were also compared. The study found generally positive results.

Studies on digital competencies have been conducted with students (Calatayud et al., 2018; Escario et al., 2017) and teachers (Ghomi & Redecker, 2019; Kožuh et al., 2021). A study of students at the University of Zaragoza found a 1-point increase between the pre-test and post-test (Escario et al., 2017). Kožuh et al. (2021) found similar results in a study with 500 Serbian primary and secondary teachers. In his research, Ergül (2019) applied a digital competence learning module integrated into the field of statistics. The study results showed that the module positively affected the students.

The factors were analyzed separately, following the research objectives. While digital content development, information, and data literacy increased significantly, virtual tools and university social communication and problem-solving factors did not significantly increase. Ramírez-Montoya et al. (2017) state that practices related to increasing digital competence improve information and data literacy. Çebi and Reisoğlu (2019) state that competency training is effective in creating digital content. Šerbec et al.'s (2016) study in Macedonia found similar results in problem-solving factors. In another study, the mean scores were quite low before experimental problem solving, knowledge, and content-creation procedures. After the training, all the mean values were higher than those at the beginning of the course (Calatayud et al., 2018). In contrast to this study, another study found a significant improvement in problem solving (Çebi & Reisoğlu, 2019).

A review of the literature reveals that there is a limited amount of experimental research on the digital competencies of teachers or pre-service teachers. The researchers state that there is a need for experimental studies on developing the digital competencies of pre-service teachers (Ramírez-Montoya et al., 2017; Røkenes & Krumsvik, 2016). These studies can be a guide for teachers in the development of their digital

competencies appropriately and effectively. Furthermore, increasing the number of experimental studies on teachers' digital competencies is also essential for the education system to keep pace with technological developments.

CONCLUSION

The purpose of the study was to investigate the impact of an information technology course structured for science education on digital competencies. The study used a one-group, pretest-posttest experimental design, and the sample consisted of 24 pre-service teachers who had taken the course.

The results of the study indicated that the IT course had a significant impact on the development of digital competencies among pre-service teachers. When considering the different sub-factors of digital competencies, significance was found in favor of the post-test in all factors except problem solving. This indicates that the course was effective in the development of digital competencies among pre-service teachers in areas such as communication, collaboration, and digital content creation.

The mean scores of the post-test indicated that the pre-service teachers had a high level of digital competencies, indicating that the course had a strong positive impact. It is noteworthy that there are few experimental studies in this area, indicating the need for further research on the effectiveness of similar courses in improving pre-service teachers' digital competencies.

Limitations and Future Research

This study has been done with 24 participants. Other studies can be done with larger groups, including experimental and control groups, and comparing the results. More comprehensive evaluations can be conducted by including qualitative research. Digital literacy activities for pre-service teachers can be developed. The current study can be replicated in a variety of settings, and the results can be subject to comparison. A variety of experimental studies can be carried out to increase the digital literacy of pre-service teachers.

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Preschool Teachers' Understanding of Children and Childhood: Rights, Responsibilities and Working with Children [1]

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ABSTRACT

In this study, it was aimed to evaluate preschool teachers' understanding of childhood. The study group of this qualitative case study consisted of 51 preschool teachers working in the central districts of Ankara, who were reached by using the convenient sampling technique from the purposeful sampling method. Semi-structured interview questions were used as data collection tools. The interview questions included preschool teachers' perspectives on children and childhood, what they think about children's rights and basic requirements, their views on the advantages and difficulties of working with children, and their responsibilities towards children. The interview questions were analyzed using a content analysis approach. As a result, it is thought that preschool teachers who participated in the study have a generally positive perspective towards children and childhood. According to preschool teachers' understanding of rights and requirements, it is seen that children requirement love the most, have the right to be protected and safe, and the most important right is the right to have a mother and father. Regarding the right to participation, it was determined that children's opinions should be consulted at home, at school and in society, that children's opinions were taken into consideration in the selection of activities at school and that children's opinions were more effective in the decisions taken. According to preschool teachers' understanding of working with children, the biggest advantage of working with children is that children are natural and innocent, and the most difficult aspect is the communication problem with parents. In addition, it was determined that preschool teachers' professional responsibilities towards children are to raise children as good individuals, they feel conscientious responsibility towards children and as an adult they feel the responsibility to help all children in requirement and in difficult situations.

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INTRODUCTION

Childhood is a concept that is evaluated differently in every society, has undergone many changes from the past to the present, but a clear definition cannot be made even today. When we look at historical studies on children, it seems more possible to obtain information about childhood, which is considered as a period rather than information about the concept of child (Elkind, 1999; Heywood, 2003; Onur, 2005; Postman, 1995; Tan, 1989). When socialization processes are examined, people have gone through great changes throughout history. In this process, as childhood became a concept that adults were interested in, societies' approach to children also differed. It has been observed that studies on the concept of childhood, which has been kept separate from adulthood especially since the Middle Ages, have increased after the 20th century and the perspective on children and childhood has changed significantly (Postman, 1995; Elkind, 1999; Heywood, 2003; Archard, 2004; Sorin, 2005; Onur, 2005).

In addition to historical change, societies' approaches to childhood vary sociologically and geographically (Jenks, 2005; Mayall, 2002; Mckendrick, 2000; James & Prout, 1997). In the pre-sociological period, it is seen that the child was conceptualized as the bad or Dionysian child (Hobbes), the innocent or Apollonian child (Rousseau), the immanent (inherent) child (Locke), the naturally developing child (Piaget), the unconscious child (Freud), and childhood was viewed in this context. However, in the sociological period after the 1980s, it has been emphasized that children are active in the construction and management of their social lives and should be seen as such (Corsaro, 1997; James, Jenks, & Prout, 1999). These views, which have been dominant in the sociology of childhood for the last forty years or so, are referred to as the "new sociology of childhood" (Christensen & Prout, 2002; Prout, 2011). In the "new" sociology of childhood, children are positioned as social actors, which has led to the growth of child-focused research, the deepening of ethical approaches and the increase in innovative research methods (Swauger, Castro, & Harger, 2017). Today, the sociology of childhood goes beyond "new" sociological studies and is at a crossroads in developing the subject matter, methods and processes of research on children (Gu, 2021).

In addition to sociological studies on childhood, both the physical and psychological characteristics of the environment in which childhood is experienced are also thought to affect the understanding of childhood (Jenks, 2005). This effect is defined in the literature with the concept of "geographies of childhood" (McKendrick, 2000) as a change in the understanding of childhood depending on all conditions/context in the home environment, school environment and society. According to the bioecological model, which focuses on children's relationships with their physical and social environments, the child is at the center of all contexts, from the macrosystem, which includes social events, to the microsystem, which consists of family, school, neighborhood and peers. Children interact with society both directly and indirectly in contexts at different levels. Considering the importance of this interaction, the meanings attributed to childhood by individuals representing the systems connected to the child will significantly affect all systems in general.

When all historical, sociological and geographical factors are taken into consideration, it is concluded that societies should view childhood as a process in which the child makes sense of his/her environment through active participation. This perspective reflects the understanding of the "participatory child". The application of participatory methods in all matters related to children is defined as the "gold standard" today (Hammersley, 2017). In our country, it will be possible to evolve our perspective on childhood towards a participatory understanding of the child by addressing the concept of childhood from a sociological and geographical perspective and describing it in detail.

It is emphasized by researchers working on this issue that the view of childhood is more in line with the nature of children when it is from a "participatory child" perspective (Avcı, 2019; Hammersley, 2017; Sorin, 2005). The progress of the understanding of childhood towards the understanding of participatory children, in which children are seen as social individuals participating in their own lives and education (Sorin, 2005; Quennerstedt & Quennerstedt, 2014) will increase the quality of services to be provided to children. Education is at the forefront of the services provided to children, and preschool is at the heart of

education. Considering the developmental stages of preschool children, it is seen that they are in a critical period and school experience is of great importance for children. The most obvious reason for the importance of school experiences is that environmental influences are not limited to the environment at home and interactions within the family (Bee, 2009). The closest witnesses of children's lives are their families, friends and teachers. At this point, based on the sociological reasons explained above, it is thought to be obvious that especially individuals perspectives on children and childhood who witness children's lives closely will directly affect their interactions with children. The importance of examining the understanding of childhood of preschool teachers working with preschool children, who are in a critical developmental period, is an undeniable fact. This is because preschool teachers are the ones who can make essential decisions for the benefit of children in line with their education and work one-on-one with children (Türker, 2023). In addition, it is frequently stated by researchers that preschool teachers' understanding of childhood is effective not only in the field of education but also in health and social service policies and practices to be provided to children (Fern, 2008; Johnny, 2006; James & Prout, 1997; Sorin, 2005; Uprichard, 2008). In the light of all these reasons, the aim of this study was determined to reveal the understanding of childhood of preschool teachers working in Ankara.

The sub-objectives of this research;

1. How teachers view children and childhood,
2. What are the basic requirements of children according to teachers,
3. What are teachers' thoughts on children's rights and children's right to participation,
4. What are the difficulties and advantages of working with children according to teachers,
5. What are the responsibilities of teachers towards children.

METHOD

Research Design

In this study, which aims to describe preschool teachers' understandings of childhood, phenomenology, one of the qualitative research designs, was used. This design is a qualitative research method that enables people to express their understanding, feelings, perspectives and perceptions about a particular phenomenon or concept and to describe how they experience this phenomenon (Creswell, 2014; Glesne, 2015; Rose, Beeby & Parker, 1995; Yin, 2017).

Study Group

The participants of this study consisted of 51 preschool teachers working in the central districts of Ankara province affiliated to the Ministry of National Education (MoNE). Convenient sampling technique, one of the purposeful sampling methods, was used to determine the participants. In qualitative research, situations are selected purposively and purposive sampling is the most commonly used type of non-probability sampling method (Creswell, 2014; Glesne, 2015; Merriam, 2015; Punch, 2011). Convenience sampling, which is a technique of purposive sampling method, involves the accessibility of the researchers to the participants (Glesne, 2015). Determining the number of samples also depends on the whole process, from the sources supporting the study to the questions asked in qualitative studies. The important point for determining the number of participants in purposive sampling is to consider the information about the research in the process. Sample selection according to the purpose of the study ends when no new information is obtained from the participants (Patton, 2014). In qualitative studies, it is recommended to collect data until it reaches the level of saturation and excess (Patton, 2014). In this study, when the number of teachers interviewed was 47, it was understood that data saturation was reached, and since an appointment was made, 4 More participant interviews were conducted and a total of 51 participants were reached.

Research Instruments and Processes

The research data were collected face-to-face using a semi-structured interview technique. The interview questions consisted of questions about the participating preschool teachers' views on children and childhood, their general views on children's rights and their ideas about children's right to participation, their views on children's basic requirements, their views on the benefits and challenges of working with children, and their responsibilities towards children as teachers and adults.

The first interview question, "How did you decide to work with children?" was prepared as an "ice breaker" to motivate and relax the preschool teachers participating in the interview and to expand the boundaries of communication (Chlup & Collins, 2010; Kilanowski, 2012). After the ice-breaker question, as suggested by Patton (2014), questions that would reflect the views and experiences of the participants were prioritized, and questions with more detailed comments were left to the end.

Validity/ Credibility Study

In this study, expert opinion, which is one of the validity methods in qualitative studies, was applied. In qualitative research, validity is ensured by the researcher presenting the subject he/she is investigating as objectively as possible and avoiding manipulation (Merriam, 2015). The prepared questions were sent to 13 faculty members working in different universities who have research on childhood and qualitative methodology in terms of methodology, and five experts gave feedback to the form. In line with the expert opinions, one question with a difference of opinion was removed from the interview form.

Reliability/Consistency Study

For the reliability of the study, an independent researcher who has studies on child participation and the first researcher examined the interview transcripts separately and evaluated them according to the categories determined. Then, the results of their evaluations were calculated with the formula Reliability = Consensus / Consensus + Disagreement (Miles & Huberman, 1994), and as a result, the overall reliability of the study was determined as 90% (Reliability =193/193+22= 0.90=90%). In addition, the second researcher was consulted in cases where there was a difference of opinion between the evaluators. The second researcher examined the interview records and the cases where a two-thirds majority was achieved in the number of opinions were accepted.

Data Analysis

The analysis of the research data was carried out by content analysis method. Before the analysis of the data, the steps of data transcription, pre-analysis preparations and then inductive analysis were followed (Creswell, 2014; Glesne, 2015; Merriam, 2015). Data transcription was carried out by the researcher after the interviews were completed. The transcription of the records was written in the order of the interviewees, without any corrections, as they were heard, and the pages where the records were written were numbered. After the transcription of the recordings, the first researcher and an expert listened to the recordings and checked the transcripts. After the transcription of the interviews, each page was numbered, and after the numbering, all data were read and possible categories, subcategories and codes were extracted. In the process of determining the codes, it was observed that almost all of the participants' responses contained more than one code.

After the themes, categories, sub-categories and codes formed, the same process was carried out by an expert independent of the researcher, that reached a consensus were determined by comparing them. The determined themes, categories and subcategories are shown in Figure 1.

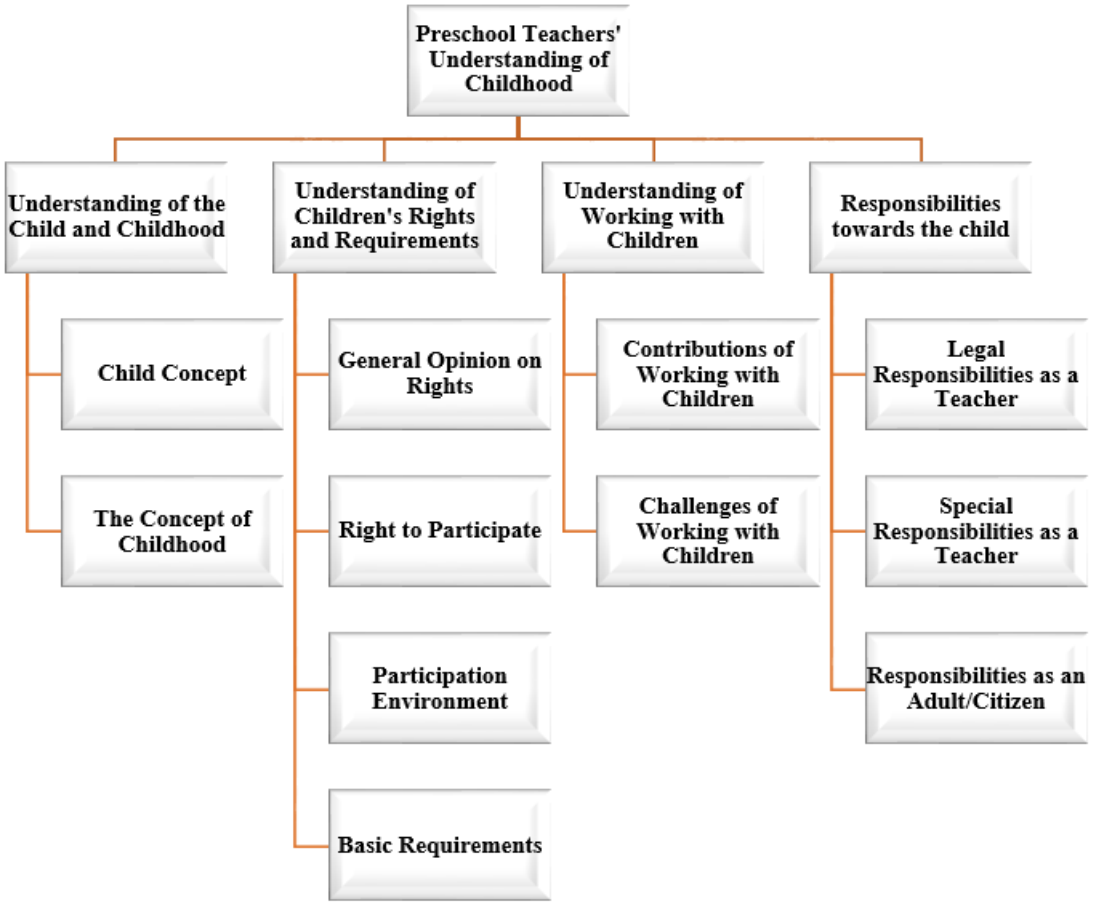

Figure 1. *Themes, categories and subcategories*

Ethic

Ethical principles (Miles & Huberman, 1994) were taken into consideration throughout the study. Before starting the study, legal permission was obtained from the Ministry of National Education. After the legal permission, preschool teachers' participation in the study was voluntary. A consent form was presented to the preschool teachers, assuring them that their participation was voluntary and that they could freely terminate their participation at any point in the study. In addition, the participants were informed about the research topic and their permission was obtained to make voice recordings during the interview. At the stage of transcribing the audio recordings and presenting them in the findings section, each participant was given a pseudonym in line with the principles of confidentiality (Glesne, 2015).

FINDINGS

In this study, it was aimed to reveal preschool teachers' understanding of childhood. The findings obtained from the interviews were interpreted under the themes of "Understanding of Children and Childhood, Understanding of Children's Rights and Requirements, Understanding of Working with Children and Responsibilities towards Children". The categories and subcategories under these themes are given in Table 1. The codes created are presented in the text in the form of tables with subcategories under each category heading.

Table 1. *Themes, categories and subcategories*

Themes	Categories	Subcategories
Understanding of the Child and Childhood	Child Concept	Thoughts on the Nature of the Child
		Feelings about the Child's Disability
		Glorified Feelings Towards the Child
		Negative perspective of the Child
		Feelings that involve expectation

	The Concept of Childhood	Thoughts on the Nature of Childhood
		Ideas that Define Childhood as Inadequacy
		Glorified Feelings Towards the Child
		Negative Perspectives on Childhood
		Feelings about the Past
Understanding of Children's Rights and Requirements	General Opinion on Rights	Must-Have Rights
		Rights Considered Most Important
	Right to Participate	Definition of the Right to Participate
		Topics on which children's views were sought
		Impact of Opinions on Decisions
	Participation Environment	Child Participation in the Home Environment
		Child Participation in the School Environment
		Child Participation in Society
	Basic Requirements	Physiological Requirements
		Psychological Requirements
		Requirements for Knowing and Understanding the World
Understanding of Working with Children	Contributions of Working with Children	Personal Topics
		The Child and the Contributions of Childhood
	Challenges of Working with Children	Challenges as a Teacher
		Challenges perceived to be child-related
		Environment Related Challenges
		Communication Challenges
		Nonexistence
Responsibilities towards the child	Legal Responsibilities as a Teacher	Child Related Responsibilities
		Developmental Responsibilities
		Professional Responsibilities
		Educational Responsibilities
	Special Responsibilities as a Teacher	Individual Responsibilities
		Child Related Responsibilities
		Professional Responsibilities
		Developmental Responsibilities
	Responsibilities as an Adult/Citizen	Universal Responsibilities
		Traditional/cultural Responsibilities
		Individual Responsibilities

Themes 1. Understanding of the Child and Childhood

Preschool teachers' conceptions of children and childhood were analyzed in two categories: “child concept” and “childhood concept”. Participants' views on the concept of “child” and “childhood” are presented in Table 2.

Table 2. *Subcategories and codes of the child and childhood concept category*

Category	Subcategories	Codes
Child Concept	Thoughts on the Nature of the Child	Natural (8), Love (6), Moving (5), Creative (4), New (3), Excitement (3), Doing what comes to mind (3), Free (2), Different (1), Smile (1), Trust (1), Play (1)
	Feelings about the Child's Disability	Innocent-pure (23), Clean (7), Clean Blank slate (6), Small (6), Needy (1), Undeveloped (1)
	Glorified Feelings Towards the Child	Happy (7), Joy (5), Cute (4), Cute (3), Truthfulness (3), Kindness (2), Mercy (1), Compassion (1) Fun (1), Funny (2)
	Negative Perspectives of the Child	Noise (1), Irresponsible Families (1)
	Feelings that Involve expectation	Future (5), Beautiful Emotions (5), Past (2), Hope (1), Life (1), Individual to Grow Up Beautiful (1)
The Concept of Childhood	Thoughts on the Nature of Childhood	Play (6), Freedom (5), Curiosity (3), Research - sense of discovery (2), Trust (2), Living in the moment (2), Novelty (1), Experience (1), Naturalness (1)
	Ideas that Define Childhood as Inadequacy	Innocence (11), Cleanliness (3)
	Glorified Feelings	Cuteness (3), Friendliness (1)

	Towards the Child	
	Negative Perspectives on Childhood	Destruction of childhood (2), Selfishness (1), Error (1), Authority (1)
	Feelings about the Past	A period of human life (19), My own childhood (7),

On the one hand, the participants defined the concept of child with expressions reflecting the nature of the child such as "*natural, love, creative...*" and on the other hand, they emphasized concepts that see the child as inadequate such as *"innocent-pure, needy, undeveloped..."*. As an example of expressions reflecting the thoughts of preschool teachers about the concept of child; Yeliz defined children as both natural and innocent with the statement "*The child is the most natural version of the human state, the most natural, that is, there is no artifice, no bad intentions, his feelings, thoughts, everything is very innocent, he is already the most beautiful thing in the world*". Kübra responded with the statement *"...love, innocence, beauty, goodness, goodness, truthfulness, I mean, all kinds of things make me feel all warm and fuzzy inside when I hear the word 'child'*", which includes multiple codes related to both the nature of the child and inadequate feelings towards the child. Tuba said, "*Small. Small in every personal physical aspect. The fact that he/she has not fully grown up as an adult. Small in every aspect of thought. Undeveloped*." She stated that she saw the child as both physically and cognitively underdeveloped. As an example of the negative view of the child subcategory; Melda stated that children are actually very natural, but when she thinks of children, she thinks of noise.

The thoughts of preschool teachers about the concept of childhood; Pelin's statement "*The period in which the behaviors seen in children are experienced*", Özlem's statement "*The most beautiful periods in human life that will never come back again*" and Esra's emphasis on "*A beautiful fun process*" can be given as examples of the subcategory of defining childhood as a period of human life. In addition, Kübra emphasized innocence in her statement "*Again, innocence, especially the sense of research and discovery, comes to my mind*", referring to the answer she gave in the concept of "child", but she also defined childhood as a sense of research and discovery, reflecting her belief in the nature of childhood. Şerife defined childhood with negative expressions such as mistakes and selfishness with the words "*Childhood can be a mistake, for example, it can be selfishness, self-centeredness, there can be mistakes*".

Themes 2. Understanding of Children's Rights and Requirements

Preschool teachers' understanding of children's rights and children's basic requirements were categorized into four categories: "General Opinion on Rights", "Right to Participate", "Participation Environment" and "Basic requirements".

General Opinion on Rights Category

Participants' general views on children's rights are shown in Table 3.

Table 3. *Rights related opinions category*

Category	Subcategories	Codes
General Opinion on Rights	Must-Have Rights	Right to be safe (14), Right to have parents (10), Right to play (10), Right to education (10), Right to love (10), Right to nutrition (9), Right to health (8), Right to express oneself (7), Right to live (6), All rights (5), Right to be free (4), Right to live their childhood as children (1), Right to spend quality time with adults (1), Right to clothing (1), Right to personal care (1), Right to have their requirements met (1)
	Rights Considered Most Important	Right to have parents (10), Right to be safe (9), Right to play (9), Right to education (8), Right to express oneself (7), Right to love (7), Right to live (6), Right to respect (5), Right to health (4), Right to nutrition (3), All rights are important (3), Right to be free (2), Right to live their childhood as children (1), Right to spend quality time with adults (1), Right to clothing (1), Right to

personal care (1), Right to have their requirements met (1)

As an example of the participants' views on the rights that children should have; Fatma mentioned a right that children should have with the statement *"... they have the right to play in a beautiful and clean environment, but they do not have such a right in this environment."* but emphasized that this is not possible in the environmental conditions she lives in.

> Burcu said, *"... they have the right to play. I feel that this right is being taken away from them. Shopping malls have entered our lives a lot. They cannot play, they cannot play. They spend time sitting. We have a curriculum. We don't want them to hold a pencil in kindergarten, we want them to play. We want more drama-oriented studies. I think this should be emphasized even in universities. They start without connecting the dots. We don't want this anymore."*

In parallel to Fatma's statement, Fatma mentioned children's existing but unexercised right to play.

After the participants were asked about the rights that children should have, they were asked to say which rights they thought were the most important. The striking point here was the "right to respect", which was mentioned by 5 participants when asked what the most important rights of children are, but was not among the codes of the rights that children should have. For example, Sinem *"... for example, they deserve respect..."*, Tuba *"... to respect them..."* and Zeynep *"... they need to receive love and respect."* emphasized that respect is among the most important rights of children.

Table 4 presents the findings comparing these two situations in which the participants were asked one after the other, first about the rights that children should have and then about the most important rights that they believe children should have.

Table 4. *Comparison of the rights they should have and the most ımportant rights*

Category	Codes	Subcategories	
		The most İmportant rights	**The rights they should have**
General Opinion on Rights	The right to have parents	10	10
	The right to be safe	9	14
	Right to play games	9	10
	Right to education	8	10
	The right to express oneself	7	7
	The right to love	7	10
	Right to life	6	6
	The right to respect	5	0
	Right to health	4	8
	Right to nutrition	3	9
	All rights matter	3	5
	The right to be free	2	4
	The right to live their childhood as children	1	1
	The right to quality time with adults	1	1
	Right to clothing	1	1
	Right to personal care	1	1
	The right to have their requirements met	1	1

When the findings in Table 4 are analyzed, it is determined that the code "the right to have a mother and a father" is equally common in both cases. In addition, it was wondered whether this equal number of codes was uttered by the same participants or by different participants, so the data were analyzed. As a result of the analysis, it was determined that the same participants mentioned the code "the right to have parents" in

both cases. The same is true for the codes "Right to express oneself", "Right to live", "Right to live their childhood as a child", "Right to spend quality time with adults", "Right to clothing", "Right to have their requirements met" and "Right to personal care". These codes were mentioned by the same participants in equal numbers in both cases.

While the right to be safe was mentioned by 14 participants for the rights that children should have, it was emphasized by 9 participants for the most important rights. Similarly, the codes "Right to play", "Right to education", "Right to love", "Right to health", "Right to nutrition", "Right to be free" and "All rights are important" were mentioned less by the participants in the most important rights subcategory.

Right to Participate Category

Preschool teachers' responses regarding the right to participation are presented in Table 5.

Table 5. *Subcategories and codes for the right to participate category*

Category.	Subcategories	Codes
Right to Participat e	Definition of the Right to Participate	Children having a say (34), Participation in everything (10), Participation in the educational environment (5), Participation in games (2), Going to the theater (1), Participation in establishing order (1), Not forcing children to participate in anything (1)
	Topics on which children's views were sought	In choosing the type of activity (26), In establishing classroom rules (11), In the problem solving process (9), In changing the location of centers/toys (9), In free time activities (6), In choosing materials in activities (4), In nutrition (2), In choosing games (2), In choosing songs (2), About everything (2), In determining the duration of the activity (2), In choosing the guard (1), In choosing friends (1)
	Impact of Opinions on Decisions	The child's opinion is effective (22), Joint decision is taken (13), The teacher's opinion is effective (9), Opinions in accordance with the classroom organization are effective (6), The opinions of the majority are effective (2)

As examples of the participants' thoughts on the definition of the right to participation; Pelin *"... having a say in situations where she will make her own decision."*, Hilal *"... having a say in matters that concern her."* and Selin *"... having a say in matters that concern them" can* be given as examples of the participants' explanations that giving children the right to have a say in matters that concern them is the right to participation.

In addition, the participants were asked what kind of situations they consulted children's opinions at school. When the responses of the participants were examined, Fatma gave an example of these situations as follows; *"I sometimes ask them in activity choices. I ask their opinions in feedings. I ask them which game to play about the activity. I ask their opinions about classroom rules. I get their opinions about solutions in case of problems. I get children's opinions about the locations of our centers. In center changes, if it is appropriate, the children say."* Elif said, *"In every situation. I offer options. I also set limits, of course, I don't say let's do whatever you want. I give options. If the options are more or less equal, then whoever wants what, I separate the tables, I give it that way. Then it is even more beautiful." Elif* said that she consulted the opinions of the children on every subject, but she did this by setting limits and offering options.

In the interviews, the participants were asked to what extent the opinions of the children were influential in the decisions they would make, and Didem gave some examples of remarkable statements in line with the answers given; *"... what the children say is dominant in the decisions I make. Because if it is not dominant, I cannot give them what I want. I also have my own authority, but when they have what they want, when I say I did what you wanted, okay, but now do what I want, they do it happily." Didem explained that the* opinions of the children are dominant, but she has an authority and she attaches importance to the opinions of the children in order to get them to do what she wants. As an example of the opinions indicating that they make joint decisions with the children; Sevda stated that *"... the effect is like this: I have to do what I say and they have to do what they say. I want there to be an equal and fair environment in the classroom. How will this always happen? It will be by giving importance to children's ideas. But since they are young,*

they cannot decide everything. I am also an individual in the class. I want them to know my opinions as well..." with the answer that she cares about the opinions of the children, but her own opinions are also important. As an example of the participants who stated that their opinions were more effective than the opinions of the children in the decisions taken; Ebru stated that she was more effective by giving a degree with the answer *"... let's say 40% because if we leave them completely during the day, they may want to play house all day.* As an example of the statements of those who stated that children's opinions are effective in decisions that will not disrupt the order of their classrooms; Seda stated *"... I leave children free if it will not affect other children. I mean, if what one child wants is done, the balance of the class will be disrupted. It takes us how many months to establish that balance anyway."* As an example of the participants who emphasized that the decisions of the majority would be more effective; Şerife expressed this view as follows*: "... it actually depends on gender. Boys want moving games, girls want housekeeping. Since there are a lot of boys in my class, what boys say happens more often."*

Participation Environment Category

Preschool teachers' opinions about the participation environment are given in Table 6.

Table 6. *Subcategories and codes for the participation environment category*

Category	Subcategories	Codes
Participation Environment	Child Participation in the Home Environment	Asking his/her opinion on issues related to the home (22), Asking his/her opinion on issues related to the child (8), Giving responsibility for issues related to the home (8), Listening to his/her feelings and thoughts (7), Organizing activities with family members (3), Family seeing children as individuals (3), Family understanding the child (2), Ensuring that the child is free (2), Raising awareness of the family on this issue (2)
	Child Participation in the School Environment	Taking their opinions while doing activities (33), Creating environments where they can express themselves at school (8), Not forcing the child to participate (3), Preparing activities for children (3), Ensuring their participation in everything in the classroom (2), Not discriminating (1), Ensuring a peaceful environment in the classroom (1), Ensuring that they make friends with whomever they want (1), Providing alternatives (1)
	Child Participation in Society	Taking children's opinions in decisions related to children (19), Increasing activities for children (12), Activating children (6), Creating child-friendly environments (3), Preventing physical and psychological violence (2), Conducting family trainings (2), Valuing children (1), Having environments where they can defend their rights according to their age groups (1), Getting help from non-governmental organizations (1), Ensuring that children can enter and exit every area (1)

For example, Didem said, *"Children's opinions should be taken into consideration at home as well. I want children to participate in all the decisions I make. For example, when my children were young, they witnessed some events. I would say, "Come, son, let's tell you about it." Sometimes very good ideas can come out. Children can also come up with things that you never expect from them..."* and stated that children's participation can be ensured by taking their opinions on issues related to the home. Kübra said, *"At home, especially in matters related to the child, for example, when buying a piece of clothing, you can convince the child if you put him/her in the place of a big man and give importance to him/her. You can convince him if you ask the child's opinion when you say, "I want to buy clothes for you."* With this statement, she emphasized the importance of consulting children's opinions on issues related to the child, and as an example of this situation, she said that the child's opinion should be asked when choosing clothes for the child. Sema said, *"I guess I don't pay much attention to my own child at home. When they reach puberty and start shouting, maybe you think that they are an individual and give them the right to speak. I don't pay attention to my own child at home. Even when buying something, they should be asked."* She emphasized that the child's opinion can be consulted when buying something at home.

As an example of the participants who defined participation in the school environment as taking

children's opinions while doing activities; Didem said, "*For example, in activities, I ask questions such as "Children, should we do this like this? How would you like it more if we did it like this? I get different answers from them." Didem* stated that she asked children questions about how they wanted the activities to be and Tuğçe said, *"... their opinions should be taken in the activities to be done. When we get their ideas, we have already ensured their participation."* In parallel with the previous opinion, Tuğçe stated that she consulted children's opinions in activities. As an example for the code of providing environments where children can express themselves at school; Özlem stated *"Participation can be ensured by creating environments where children can express themselves at school."*, Berrin stated *"... to ensure that they can express themselves in a good education, in a healthy environment offered to them. Ensuring that they are in good communication." Berrin* mentioned the importance of providing appropriate environments for participation. In addition, as an example of another striking response, Gökçe said, *"When we are doing an activity here, if the child does not want to do it, we do not have to involve them. He is a child, we cannot put him under pressure." Gökçe* stated that participation in the school environment means not forcing the child to participate in an activity that he does not want to do.

As an example of the participants' views on how children's participation can be ensured in the society; Kübra said, *"As I said in the society, children's opinions should also be taken into consideration. I think their opinions should be taken into consideration when making decisions about them. When we make decisions about the class, we make them together. That is also a social decision. After all, we live collectively at school." Burcu* stated that children's opinions should be taken into consideration in the society, especially in decisions related to children, that she pays attention to this in the classroom and that the classroom is also a society. Burcu said, "*In the society, it is necessary to ensure that children's opinions are taken in everything that is done for children. I mean, we try to instill this in both parents and children." Burcu stated that* children's opinions should be taken in everything done for children in society.

Participants Ayşe and Senem explained that children's opinions should be consulted in decisions related to children with the example of playgrounds. Ayşe said, "*If children are going to play in that area in the community, in the parks, if I had such authority, I would create a council where all children would gather. I would ask them what they want to happen." Ayşe* stated that children's opinions could be consulted for playgrounds by establishing children's assemblies.

> *Senem said, "Local governments in the community can gather children and families to get their opinions. For example, they built a playground next to us. The best example is the playground, but they didn't do it in consultation with children and teachers. However, before those equipment arrived, children were running there more freely. They were playing soccer. They brought two or three plastic devices, come on, the children don't like doing the same thing after two or three slides. They should consult, I mean, in the landscaping they will do. Maybe the child will say, "I want an area where I want to run freely."*

With his response, he stated that local governments should not only take the opinions of children into consideration when building playgrounds, but also the opinions of parents and teachers should be taken into consideration.

Basic Requirements Category

Participants' opinions on the basic requirements of children are presented in Table 7.

Table 7. *Subcategories and codes for the basic requirements category*

Category	Subcategories	Codes
Basic Requirements	Physiological Requirements	Nutrition (12)**,** Health (2)**,** Dressing (2)**,** Meeting self-care requirements (4)**,** Shelter (4)
	Psychological Requirements	Love (44)**,** Trust (12)**,** Care (11), Family (9**),** Seeing children as individuals (3**),** Understanding children (3**),** Valuing children (3), Preparing an environment where children will be happy (2), Freedom (1)
	Requirements for Knowing and	Play (5)**,** Education (5)**,** Supporting their development (2), Being in a social environment (1)**,** Satisfying their curiosity (1)

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While explaining their views on the basic requirements of children, preschool teachers stated that children requirement "love" the most. As examples of the participants' thoughts on love; Pelin *"...children need love the most..."*, Hilal *"...love because when you teach something with love, they understand it better and I have seen in my 16 years of professional life that you can be successful in many things in this way..."*, Gökçe *"..."*, Gökçe *"... Love is the greatest basic requirement, love is the greatest basic requirement, a child wants love even if he/she is hungry or has torn clothes..."*, and Senem stated that *"... children are nourished with love, children grow with love, you give food, but when you give that food to that child, don't expect him/her to grow, but when you approach him/her with love, I think the child develops better..."*.

Of the 51 preschool teachers who participated in the study, 44 emphasized that the most basic requirement is love and that other requirements cannot be met without love. They also stated that the education given with love is more beneficial, that the child will want love first and foremost, and that love should be given not only to preschool children but also to children of all ages.

Other views that were emphasized were on nutrition, trust, care and family. The participants who expressed these views stated that nutrition, trust, care or family alone are not sufficient requirements, and that other requirements should also be included. For example, Özlem stated that *"... love is the most basic requirement, followed by nutrition..."* and that nutrition comes after love, while Zeliha stated that nutrition, love and trust are equally important with the statement *"... nutrition... then love is also very important and it is very important that they are safe..."*.

Themes 3. Understanding of Working with Children

Preschool teachers' understanding of working with children was analyzed in two categories: "Contributions of Working with Children" and "Challenges of Working with Children". Preschool teachers' opinions on the contributions of working with children and challenges of working with children are presented in Table 8.

Table 8. *Subcategories and codes for the category of contributions of working with children*

Category	Subcategories	Codes
Benefits of Working with Children	Personal Topics	To be rewarded for the effort (12), To always remain a child (8), To stay young (8), To always be energetic (8), To get away from troubles (7), To think positively (7), To have a comfortable classroom environment like home (3), To benefit my own child (2), To be patient
	The Child and the Contributions of Childhood	Children being natural and innocent (16), Having ease of communication with children (5), Having a lot to learn from children (2), Children being creative (2)
Challenges of Working with Children	Challenges as a Teacher	Need to be energetic and healthy at all times (5)**,** It becomes more difficult as the age of the teacher increases (4)
	Challenges perceived to be child-related	Demanding constant attention and care (11)**,** Having children with special requirements (2)**,** Children's negative behaviors (2)**,** Small age group (2)
	Environment Related Challenges	Too crowded classroom (5)**,** Lack of auxiliary personnel (4)**,** Ensuring the safety of the child (3), Too much noise (2), Having different age groups in the same classroom (2)
	Communication Challenges	Communication with families (18), Communication with children (7)
	Nonexistence	I have no difficulty (3)

It was found noteworthy that the participants especially emphasized the innocence of children and the reward for their efforts. As an example of these situations; Fatma stated *"...it is very nice to be among them. They are very natural and very innocent."* and Özlem said, *"...first of all, they are natural. They have no ulterior motives."* They attributed the contributions of working with children to the positive

characteristics of children, which they characterized as innocent and natural. Ayşe said, *"Working with children is very enjoyable, incredibly enjoyable. I think we are the luckiest group among the teachers. You have people who are clean, their emotions are clean, they are clean, innocent, innocent inside and out. If they like you, they say they love you, if they don't like you, they say they don't like you. For example, my student says that he got sick today. He says I don't love you. I said my love is enough for both of us. You can see love, beauty, hate and everything very clearly in children." She* explained that working with children is very enjoyable and that preschool teachers are the luckiest group among teachers by emphasizing the positive characteristics of children. Didem said, *"One of the most beautiful things about working with children is that you stay young. You never grow up. Their actions make you happy and you stay young. Whether you are 50 or 60, it is like this..."* They stated the advantages of staying young.

For example, Özlem said, *"There is no difficulty in working with children. The only difficulty is their parents. For example, a problem that we can solve with the children gets very complicated when the family is involved." Özlem* stated that children have difficulties with their parents and that they cannot solve a problem when the family is involved when they can solve it with the child. Didem said, *"It is a very difficult profession. It is a more difficult profession than classroom teaching. You can't leave it for a moment, you can't let it go. You don't know what you will encounter the moment you leave it. Therefore, it is a profession that requires constant attention and care." Didem* emphasized that working with children, especially preschool children, is difficult, that it is necessary to be constantly careful and that children always demand attention. Ebru said, *"As I said, sometimes it can be very tiring and exhausting. As in other branches, it is not possible to say, "Let me read this for 5 minutes, let me write what is on the board in the notebook, or let me do this or that, I will come and do it. Always be good. You have to be healthy and dynamic. This is the disadvantage."* She attributed the difficulty of working with children to the fact that preschool teachers should always be healthy and energetic and should work without taking a break. Pınar said, *"There is a lack of auxiliary staff in our classrooms. Preschool teachers are not given importance. In special education classes, there is one helper each. Okay, their job is not easy, but every child requirements special attention. In kindergartens, there should be at least two teachers in each class." Pınar* made a comparison between preschool classrooms and special education classrooms and stated that she thinks that every child requirements special attention and therefore, two teachers are needed in preschool classrooms as in special education classrooms.

Themes 4. Responsibilities towards Children

The thoughts of preschool teachers about their responsibilities towards children were presented in three categories: "legal responsibilities as a teacher", "special responsibilities as a teacher" and "responsibilities as an adult/citizen". These categories are presented in Table 9.

Table 9. *Subcategories and codes for the legal responsibilities as a teacher category*

Category	Subcategories	Codes
Legal Responsibilities as a Teacher	Child Related Responsibilities	Raising children as good individuals (12), Ensuring children's safety (7), Being a good example for children (7), Making children love school (6), Giving love (3), Making children happy (2), Not harming children's personalities (2), Acting justly (1), Establishing authority over children (1)
	Developmental Responsibilities	Working on developmental areas (9), Developing prosocial behaviors (7), Preparing children for primary school (4), Developing children's ability to express themselves (2), Respecting children (2), Giving children responsibility (1),
	Professional Responsibilities	Paying attention to clothing and being well-groomed (2), Deserving the money received (1), Being friendly (1), Improving oneself (3), Cooperating with the school administration (1),
	Educational Responsibilities	To be able to provide training (4), To ensure the participation of parents (1), To ensure that the training period is productive (1),

Special Responsibilities as a Teacher	Individual Responsibilities	Feeling conscientiously responsible (21), Taking the place of one's own child (10), Not being bound by legal responsibility (2)
	Child Related Responsibilities	Showing love (8), Ensuring children's safety (7), Setting a good example for children (2), Acting compassionately (1), Not discriminating (1)
	Professional Responsibilities	To deserve the money received (1), To do one's job with love (1)
	Developmental Responsibilities	Helping with self-care (3), Supporting children's social-emotional Development(2)
Responsibilities as an Adult/Citizen	Universal Responsibilities	Helping children in need and in difficult situations (21), Ensuring equality in education (6), Using resources efficiently (5), Leaving a livable world (3), Being a good example in society (12),
	Traditional/cultural Responsibilities	Transferring traditions and customs to children (2), Providing moral support (1)
	Individual Responsibilities	Improving oneself (1), I don't feel much responsibility (1)

As an example of the legal responsibilities that preschool teachers feel as a teacher towards children;

Didem said, *"We are the foundation of the building. Unless the foundation is solid, that building will surely shake. My aim is not to get children to do line work, writing or anything else. My only goal is to raise children as good individuals. Because children learn to read and write in the first grade, but they learn love, respect, order and tidiness in kindergarten in order to be a good individual."*

In her response, she emphasized that preschool is very important and that her aim as a preschool teacher is not to make children do academic studies but to raise them as good individuals. She also stated that children can always learn academic skills such as reading and writing, but they can only learn love and respect to be a good individual in preschool. In another remarkable example, Fatma asked, *"Did I educate? Am I enough? Do I give love? Do I act justly? Do I appeal to their developmental areas? Do I make them love school? Can I do things that increase their awareness in order to become self- confident, honest, open to communication, curious to learn, healthy individuals who love their homeland and nation?*" In her statement, the participant stated that it is her professional responsibility to educate children, give them love, treat them fairly, work on their developmental areas, make them love school and raise healthy individuals. Gözde said, *"I think it is to ensure their safety. Every parent at the school, even the parents who are preschool teachers, come here with uneasiness. For example, there are children with temper. It is up to us to organize children's communication and relations with them. I think it is our biggest duty to make sure that the child likes this place and feels safe." Gözde* stated that parents are worried about their children's safety and therefore, as a teacher, her responsibility towards children is to ensure their safety.

Participants were asked whether they feel a special responsibility towards children other than the responsibilities determined by laws and regulations, and if so, what these responsibilities are. Regarding this situation, Sema said, *"Of course you feel it. For example, when I go home in the evening, I think, that child was crying there and you cut paper for the activity. What happened when you cut paper? If you had taken care of that child, if you had listened to his/her problems, I think about these things more. Sometimes I feel something conscientious even if I can't do it."* İpek said, *"Of course, I mean, the laws can be restrictive sometimes. Of course we obey them. After all, we are teachers of the state. They are applied, but sometimes there are situations where you can go beyond this. That's why I do my responsibilities according to my own conscience." İpek* emphasized that they felt conscientious responsibility towards children and that they obeyed the laws and regulations, but their behavior towards children in the classroom environment was related to their conscience. Sinem said, *"To be honest, the laws do not bind me much. I act according to the mental state of the child that day. When I start a plan, I don't necessarily say I will finish it. I don't want to finish the activities that children really suffer. I see that they are not interested, I stop. I don't find the laws and regulations very applicable anyway."* With her response, she said that she did not adhere to legal responsibilities, acted according to the mental state of the children that day, and did not force an activity that

the child did not want.

As an example of preschool teachers' views on their responsibilities as an adult/citizen, İpek said, *"Of course. Especially street children, traumatized children, peer bullied children or children who do. Anyway, it looks like I will definitely work for UNICEF in the future. I have sensitivity towards them. I am also sensitive to the children of martyrs and veterans. I am sensitive to the children of soldiers."* With this response, she stated that as an adult, she was sensitive to children in difficult situations in the society and that she even considered working in non-governmental organizations with this sense of responsibility.

> Sinem said, *"I feel it, but if you ask what I do, I don't do anything visible. But like everyone else, if a mother beats her child, I intervene. Or if a tiny child is begging without slippers, I try to do something. If someone is begging with a child on their lap, I give it to them. I don't look for the problem, but if I come across it, I try to intervene."*

She said that he felt responsible but could not intervene much. However, she explained with examples that when she sees a child in a difficult situation, she is not indifferent and tries to do something. Senem emphasized that as an adult, she felt a sense of responsibility towards children and especially wanted to support children in hospitals with the words *"I feel it. For example, I want to retire, there are children with cancer in hospitals, I want to go there every day and give free lessons for an hour or two hours. This is my whole thought in my head."* Pelin said, *"The world does not only belong to us. It is necessary to set a good example in society for the next generation. I feel responsible for using resources efficiently." Pelin* emphasized that it is necessary to set a good example and use resources efficiently for the next generation. Tuba also said, *"Yes, especially as a thing, nature and future shortage. Planting trees, irrigation, resources for life"* and mentioned the importance of using resources efficiently.

DISCUSSION AND CONCLUSION

In this study, which aims to determine preschool teachers' understanding of childhood, the results were analyzed under four themes: understanding of children and childhood, understanding of children's rights and requirements, understanding of working with children, and responsibilities towards children. In this section, the opinions on the results in the light of the information and research obtained through the literature review are interpreted under the headings of each theme.

Understanding of the Child and Childhood

It is considered important to reveal individuals' understanding of children and childhood. This situation has a critical place among childhood studies as it will contribute to the field of education as well as sociological studies (Gu, 2021; Prout, 2011; Swauger, Castro, & Harger, 2017; Quennerstedt & Quennerstedt, 2014), which are frequently encountered in the literature on children and childhood. In this study, it was observed that the participants defined the concepts of child and childhood with concepts such as innocent/innocence, pure/purity, clean/clean, small and needy. Seeing children as innocent may indicate that they are perceived as inadequate, in requirement of protection, dependent and as a blank slate waiting to be filled by adults (Haring, Sorin, & Caltabiano, 2019; Sorin, 2005). In addition, the expression "a clean blank slate" was also among the participants' responses. When the studies on the understanding of childhood are examined; in the findings of the studies conducted by Avcı et al. (2014) and Erdiller-Yatmaz, Erdemir, and Erbil (2018) with pre-service teachers and Balasar (2019) with adults, it is seen that the participants used expressions such as needy, innocent, and pure while defining the whole childhood period. In the study of Avcı et al. (2014), pre-service teachers stated that they saw children as individuals who could not think maturely and could not realize their social roles. In the study of Erdiller-Yatmaz et al. (2018), it was seen that the thoughts of pre-service teachers about the child and childhood were in the direction of a passive and passive understanding of the child who is outside theadult world, inadequate, undeveloped, in need of guidance. It can be thought that the teachers in our study defined childhood as a pure, innocent, blank page and that they have an innocent child understanding in this respect. This situation brings to mind the idea that teachers may see children not only developmentally but also sociologically as active subjects of their own

lives but also as inadequate beings who need the support of adults. Kennedy (2009) emphasizes that the innocence of childhood is rich in emotionality but limits children's learning and development. He suggests that children should have experiences in which they can make choices. In addition, she says that it is important to remember that such experiences are linked to children becoming active participants in their communities. On the other hand, teachers' views such as "natural, loving, active, creative...", which reflect the nature of the child and therefore may reflect the participatory understanding of the child, were found to be pleasing. The participatory understanding of the child is an understanding that has come to the forefront in recent years and has taken place in practices. In this understanding, children's opinions are given importance and children are given the same decision-making power as adults (Corsaro, 1997; Sorin, 2005).

After "Innocence", the participants also defined childhood as "a period" and "a process". It is not surprising that it is defined as a period in human life, because the emergence of the concept of childhood in modern society began with the view of childhood as a special period (Heywood, 2003; Holt, 2000; Sorin, 2005). Another noteworthy view is that childhood is seen as the beginning of growing up. This view of the participants confirms Sorin's (2005) image of children as adults in education, which defines the understanding of childhood as practicing for adulthood. In addition, Erikson, Piaget and Freud's developmental theories support this image. According to these theories, children reach adulthood by climbing the steps of competence. It is possible to reach many contents related to Erikson's, Piaget's and Freud's developmental theories in the scope of the courses that preschool teachers graduating from the Faculties of Education take in their undergraduate education. In particular, the fact that childhood is seen as the beginning of growing up brings to mind the idea that the participants adopted the views of developmental theorists during their undergraduate education. In fact, not only in educational institutions but also in society, children are viewed not in terms of what their lives are like today, what their requirements and wishes are now, but in terms of what kind of adults they will be tomorrow (Corsaro, 1997).

Understanding of Children's Rights and Requirements

The theme of understanding children's rights and requirements was analyzed in four categories: general views on rights, right to participation, participation environments and basic requirements. In the category of general views on rights, participants emphasized the right to protection and safety the most in their views on the rights that children should have. Protection rights are the rights that ensure that the child is protected against all kinds of neglect, abuse and exploitation. It was not a surprising result that preschool teachers, who frequently referred to the innocent, pure and needy state of children in the section on

understanding children and childhood, drew attention to the right to protection the most in terms of children's rights. Sorin and Torzillo (2017), while describing adults' images of children, state that the image of the innocent child is linked to adults' instinct to protect. They even attribute the dominance of soft-touch and fenced, protected play environments in toys and play environments to this understanding. In addition to the right to be safe and protected, teachers also mentioned the rights to play, to be educated, to have parents and to be loved. These views cover a part of the rights to life and development in the Convention on the Rights of the Child (UN CRC, 1995). In addition, the right to "express oneself", another right mentioned by the participants, is included in the participation rights in the convention.

The situation emphasized by the preschool teachers participating in the study as "self- expression" in the rights that children should have reflects a part of the definition of the right to participation as mentioned above. The right to participation is defined as a universal expression that includes children's freedom of expression, being listened to and having their views taken into account (Akyüz, 2012; UN CRC, 2009; Lansdown, 2005). When the answers of preschool teachers about the definition of the right to participation are analyzed, it is seen that a significant portion of them express the right to participation as the child's right to have a say. In another study in which preschool teachers' views on children's right to participation were taken, in parallel with this result, preschool teachers defined children's right to participation as children expressing their opinions freely (Kozikoğlu, 2018). These results firstly suggest that the participants may have knowledge about the child's right to participation in both national and international legal texts (UN

CRC, 1995; UN CRC, 2009). However, practices related to child participation require a consciousness that goes beyond knowing that the child has the right to speak. The child's right to speak should include issues that concern him/her. This is explained in Article 12 of the CRC as the right of the child to freely express his/her views on all matters affecting him/her and that these views should be taken into account by adults. In addition, Bae (2010), in his study on the applicability of children's participation rights in pre-school education institutions, provides evidence that children between the ages of one and five have the capacity to express themselves and have a significant impact on the issues that concern them in their daily lives. Children's participation gains meaning when they are allowed to express their views, when their views are supported and when their views are taken into account by adults (Lansdown, 2005). In this respect, evaluating the findings of preschool teachers about the issues on which they consulted children's opinions and the impact of these opinions on decisions may clarify the applicability of their understanding of children's right to participation in the eyes of preschool teachers who participated in this study.

In the responses regarding the issues on which children's opinions were sought, it is seen that their opinions were mostly sought regarding the selection of the type of activity. Other noteworthy statements of the participants reflecting participation were that they sought children's opinions in the problem-solving process, in establishing classroom rules, in the selection of materials for activities, and in changing the location of centers/toys. In the study, preschool teachers' responses about ensuring children's participation were positive and in the expected direction. However, the fact that some participants stated that they implemented the decisions of the majority in the classroom in terms of the effect of opinions on decisions suggests that not all children may have the right to participate. In particular, a teacher in the study stated that since the majority of the children in her class were boys, the games preferred by boys were played, which confirms this view. Taking the opinions of the majority does not reflect its inclusive nature. In Koran and Avcı's (2017) study, findings supporting this idea stand out. It is emphasized that preschool teachers' classroom practices are more traditional and anti- participatory behaviors. This suggests that the participants' verbal statements and classroom practices may not be in the same direction. Likewise, in Le-van and Iakshina's (2021) study, it was stated that despite the teachers' statements about the importance of the participatory approach, it was not actually implemented. How the right to participation is handled in classroom practices is a controversial issue. In the study conducted by Bae (2010), it was also revealed that there were differences in practices, and it was stated that such incompatibilities between practice and laws put children's rights to express their views at risk. Looking at participation in the classroom through the eyes of children, in the study conducted by Zorbay-Varol (2019) examining children's participation in preschool education institutions, children stated that teachers determine the activities implemented in the classroom. This situation reinforces the view that classroom practices can be different with verbal expressions.

Problems related to the understanding of participation are mostly experienced in the influence of children's views on the decisions to be taken. In the findings, it is understood that teachers emphasized the statement that "the child's opinion is effective" more in the decisions to be taken. In Einarsdottir's (2005) study, it was found that children did not express themselves, participated by sitting still and did not prefer activities where only adults were active. According to the understanding of the citizen child, it is essential that not only the opinions of children or only adults are effective, but that joint decisions are taken (Öztan, 2011). The highest level of Hart's (1992) stages of participation also supports this view. It is critical to ensure the balance between adults and children in making joint decisions. Ghirotto and Mazzoni (2013) emphasize that education starts with the potential of the child, but the development of these abilities depends on the adult's ability to be an active listener. It is thought that it is important to ensure that teachers benefit from the cue of being an active listener at the point of achieving the mentioned balance.

Children's participation is made possible by taking their views on issues that concern them and creating various environments where they can express themselves (Venninen and Leinonen 2013). In order to ensure participation as a whole, these opportunities need to be created at home, at school and in the community (Hodgin & Newell, 2002). First of all, regarding participation in the home environment, preschool teachers stated that children's participation can be ensured by "asking their opinions on home-

related issues". In the research findings, it is seen in the examples of preschool teachers that children's opinions can be asked on issues related to house rules in general. The participants who thought that children's opinions should be consulted in situations related to the child in the home environment explained these ideas with examples such as buying clothes for the child and said that they attach importance to children's opinions. A patriarchal structure is observed in family life in our country. When this structure is considered in the home environment, it reflects the situation in which the adult and authority figure in the home makes decisions about household issues (Kuyurtar, 2006). The fact that teachers are mostly concerned with issues such as choosing one's own clothes, which are not among the most important things in household decisions, can be seen as natural for preschool teachers who have grown up and live in this traditional system. The fact that they expressed an opinion in favor of children's participation in decision-making processes can be explained by the fact that they are more familiar with the requirements and nature of children.

When the findings on children's participation in the school environment are examined, it can be said that children's participation includes dimensions such as taking their opinions in activities and making participation voluntary. In Zorbay-Varol's (2019) observational study on child participation practices in preschool classrooms, it was determined that children did not participate in the classroom in matters such as activity selection, deciding on the content of the activity, and initiating activities. At this point, it is thought that this study, which is based on teacher opinions, and Zorbay-Varol's (2019) study, which is based on observing one-to-one practices, are not similar, and that the difference in these studies is due to the discrepancy between discourse and practice. Akyol's (2020) study, which was also a recent study using the interview technique with children, confirms our view that children participate in the decision-making process in the classroom in a limited way and that children's participation is supported to a limited extent. In the participatory understanding of children, children's opinions are valued and adults and children are given equal decision-making power (Sorin, 2005). In this framework, not only teachers' opinions but also children's statements should be listened to. Getting opinions from all parties involved in participation is an important outcome of the accountability aspect of participation. Furthermore, the Committee on the Rights of the Child draws attention to the issue of ensuring children's active participation in school life in Article 12 of the Convention (UN CRC, 1995).

Regarding children's participation in society, the participants stated that they were in favor of "taking children's opinions in decisions related to children" not only at home and at school, but everywhere. The Convention on the Rights of the Child also supports the participation of children in all areas of society and their ability to express their views (UN CRC, 1995). Participants emphasized that children's views should be taken especially about playgrounds for areas in society where children can participate. In the declaration on the right to play adopted by the International Children's Right to Play Association, society's "indifference to the right to play" is characterized as dangerous trends and a negative impact on children's development (Hodgkin & Newell, 2002). Another view of the participants on child participation in society was to increase activities for children and to make children active. Article 31 of the Convention on the Rights of the Child recognizes the child's right to rest, leisure, play and age-appropriate entertainment/activities and to participate freely in cultural and artistic life. The same article emphasizes that States Parties should promote the provision of appropriate and equal opportunities in this regard (UN CRC, 1995). However, in General Comment No. 17, which was reported at the meeting held in 2013, it was emphasized that there is concern that children are not sufficiently recognized the rights in Article 31 (UN CRC, 2013). In a study on the problems faced by children in the implementation of children's rights, it was revealed that children had the most problems about play and entertainment (Ersoy, 2011). Similarly, in Serbest's (2015) study, children stated that they could not use their rights to play, rest and free time. However, the right to participate in play-entertainment activities is one of the most fundamental rights and requirements of children. More resources and care are needed for children to participate in age-appropriate activities in society and for all children to benefit equally from these rights (Hodgkin & Newell, 2002). At this point, it is very important for the state to provide incentives in all necessary situations and areas and to take care of all children.

The basis of national and international children's rights is the fulfillment of children's requirements,

which are necessary for a good life and are more universal than rights. The basic requirements of children should be different from classical need theories. Because in the most important years of life, the priority order of their requirements may change. Children's physiological (sleep, nutrition, toileting, etc.), psychological (love, trust, etc.) and world recognition and understanding (exploration, play, etc.) requirements are among their primary requirements and are of great importance for their optimal development in all areas. Children whose requirements for love and affection are not adequately met may experience developmental problems. Neuroscience studies emphasize that children are open to development and learning when they feel safe and happy (Cozolino, 2014; Masterson, 2013; Van der Kolk, 2020). The fact that the participants emphasized psychological requirements such as love and trust at the top of children's requirements in the 21st century can be considered as a pleasing finding as it suggests their awareness of the importance of meeting children's psychological requirements (Woodhead, 2004). After "love", preschool teachers think that children's most basic requirements are nutrition, trust, attention and family. Meeting the basic requirement for nutrition provides physical satisfaction. Meeting psychological requirements such as love, attention and belonging, which are mostly behaviors and whose amount cannot be defined, is also very important for the best interests of the child (Sunal, 2009). The most basic requirements of all children are good nutrition, healthy care and a loving family environment. These three basic requirements must be met together for children to survive (Oktay, 1991).

Understanding of Working with Children

The preschool teachers who participated in the study were curious about their understanding of working with children, and the participants' responses were analyzed under the theme of understanding of working with children in the categories of contributions of working with children and challenges of working with children. First of all, in the contributions of working with children, the participants especially emphasized the innocence of children and that they were rewarded for their efforts. It is not surprising that the participants' views on the innocence of children are reflected here. Considering the connection between children's innocence and their perceived inadequacy mentioned earlier, this perspective suggests that it may reflect an overprotective understanding of teaching and low expectations related to children's inadequacy.

When the other results are examined, it is seen that preschool teachers say that they always feel like children by working with children, that they do not age, that they remain young, and that they are in a luckier group among teachers compared to other branches. According to these results, it is thought that preschool teachers who participated in the study achieved professional satisfaction. The fact that preschool teachers do their profession willingly and lovingly is considered very valuable for both children and themselves. This situation is defined as "Occupational Satisfaction" which includes the pleasurable and positive feelings that occur when a person thinks about his/her profession (Çek, 2011). This literature information strengthens the idea that teachers experience professional satisfaction.

Participants stated that working with children has challenges as well as benefits. Preschool teachers reported that they had the most difficulties in communicating with parents. Explaining the reasons for their difficulties in communication, they stated that their profession is not respected and that parents only see them as personnel who care for their children. Lack of respect for their profession is an issue frequently emphasized by teachers in studies conducted with preschool teachers (Başturan & Görgü, 2020; Demir & Arı, 2013; Moloney, 2010). Although the years of the research differed, it is seen that there is no change in preschool teachers' views on respect for their profession. Moloney (2010) states that preschool teachers do not receive the same respect as teachers working in the upper grades of the school, which jeopardizes the value of early childhood and is the main problem of those working with preschool children.

At this point, it is thought that adults' conceptions of childhood are also reflected on teachers who play an important role in children's lives. As a result of the research on adults' understanding of childhood, it was revealed that they have an innocent child image that defines children as innocent, needy and undeveloped (Balasar, 2019). A society that has these thoughts about children may also be reflected in the understanding of preschool teachers, who are the teachers of the youngest age group, towards their profession.

Preschool teachers' profession requires constant attention and care, they have difficulties in communicating with children, they need to be energetic and healthy at all times, and overcrowded classrooms are among the issues that the participants have difficulty with. Current research on this topic also reveals that preschool teachers experience difficulties in similar areas. For example, a study conducted by Başturan and Görgü (2020) shows that preschool teachers have difficulties with "the high number of students and difficulties based on physical facilities". In another study conducted by Yalçın, F. A., & Yalçın, M. (2018), it was stated that they had difficulties in dealing with children and communication, especially because the classroom conditions were not suitable for the number of students.

Responsibilities towards Children

The theme of responsibilities towards children was analyzed in three categories: legal responsibilities as a teacher, special responsibilities as a teacher, and responsibilities as an adult/citizen. Preschool teachers have some legal responsibilities towards the department and ministry they are affiliated with. These obligations are clearly set out in the legislation and regulations of the MoNE (2021) on preschool education institutions. When the research findings are analyzed, it is seen that most of the legal responsibilities stated by the participants in the child-related, developmental, professional and educational dimensions reflect the obligations determined by these laws and regulations. However, the most frequently mentioned legal responsibility related to children is that it is important to raise children as good individuals. This view is not only among the legal but also among the universal responsibilities of preschool teachers, and the MoNE (2013) Preschool Program philosophically supports this view. In addition, preschool teachers stated that developing prosocial behaviors such as sharing and cooperation, setting a good example for the children they spend important hours of the day with, and making children love school so that they can come to school happily should be seen as a legal responsibility. Teachers' views in this direction were found to be in line with the principle of "Developmentally Appropriate Practices", which is an effective philosophy in early childhood education around the world (National Association fot the Educaiton of Young Children [NAEYC], 2021).

The participants' views on supporting children's development, ensuring children's safety by protecting them from possible dangers, doing the necessary work to ensure that children who will start primary school after preschool are as ready as possible for the new period they will enter, and providing good education to children cover their professional responsibilities as stated in the regulations. According to NAEYC's (2019) standard on the professionalism of early childhood educators, early childhood educators should be informed advocates for young children and their families and for their profession. It also emphasizes the importance of knowing and practicing their professional responsibilities specified in the regulations (NAEYC, 2019). In the Australian education standards (New South Wales [NSW] Education Standards, 2021), educators are expected to define children and know how they learn, master content and how to teach it, plan and implement effective teaching and learning, create supportive and safe learning environments, provide feedback to children, engage in learning, and interact with colleagues, families, and the community. Communication and collaboration, which were not mentioned by the teachers in this study but are also included in NAEYC Standard 6 and emphasized in 21st century skills, are thought to be valuable for everyone working with young children.

In their opinions about their special responsibilities as teachers, the participants stated that they could not work with children without feeling special responsibilities in addition to legal responsibilities, that they thought they had a conscientious responsibility towards children, that they protected children from dangers and that they saw them as their own children when necessary. The most critical and valuable years of life coincide with the preschool education period (Dalbudak, 2006). For this reason, it is thought that not only preschool teachers but also all personnel working with preschool children should work by considering human values in addition to their legal responsibilities. Morrison (2003) stated that the competence that preschool teachers should have has four dimensions: social, personal, educational and professional experience; the personal dimension consists of four elements: character, emotional qualities, physical and mental health. It is possible to associate both the legal and private professional responsibilities that preschool teachers feel

towards children with the competencies they possess. Morrison (2003) considered these competencies of teachers within the scope of emotional qualities within the personal dimension together with characteristics such as loving and respecting children, acting compassionately, understandingly and reassuringly towards them. In addition to all these, caring is stated as the most important emotional quality and it is stated that the point where qualified educators differ from others is the value they give to children.

In the other findings of the study, teachers' responsibilities as adults, a significant number of the participants stated that as adults, they have many responsibilities towards children in society, that they are especially sensitive to children who work on the streets or who are in difficult situations in their environment, and that they should set a good example not only for the children in their classrooms but for all children. They also stated that they want to ensure that all children receive education under equal conditions, use natural resources (such as water) carefully for future generations, leave a livable World without wars for children, and pass on traditions and customs to children. Considering the NAEYC (2019) standards, it should not be forgotten that these ideas are not only a conscientious responsibility, but should also be ensured and secured by communities.

RECOMMENDATIONS

In order to raise the understanding of teachers whose view of childhood is described as "innocent" to the understanding of "participatory child", it should be added to the course content in undergraduate programs. However, as a learning approach, attitude-changing approaches and active learning methods should be put into practice to develop perspectives and understandings in the direction of the participatory child. More importantly, teacher training programs can be updated to reflect the participatory child as a philosophy. In-service programs for teacher-child collaboration and the reflection of the participatory child understanding in classrooms can be expanded. Preschool classrooms should be organized in a way that every child can receive education in line with universal design principles. Teachers' knowledge and skills about family involvement activities can be increased, based on the fact that the most important problem they experience is their relations with families and that this situation may negatively affect their views on children. Measures can be taken to increase the quality of family involvement in schools. Children's views (citizen children) should be taken into account in all activities to be carried out in all areas related to children in society, and children should be provided with adequate support and conditions to express their views.

In general, the opinions of preschool teachers in all subheadings of the study can be associated with an overprotective approach towards children, but it would be more accurate to reveal this relationship with other studies. According to the results of this study, it is our greatest hope that the views of teachers, who are thought to have an "innocent child" understanding, will evolve towards a "participatory child" understanding of childhood.

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Examining Turkish Graduate Theses on Mathematics Education for Hearing Impaired Individuals

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ABSTRACT

The aim of this research was to conduct a systematic review to examine the theses written in Türkiye on mathematics education among individuals with hearing impairment. Studies were identified through searches of the electronic database of the Higher Education Council Publication and Documentation Department Thesis Center. Theses were the full text of which can be accessed until 30 September 2022. The inclusion criteria were met by 9 theses. In this research, theses were classified in terms of aim, study design, the sample definition of hearing impairment, the main results, and recommendations related to the learning and teaching process of mathematics education. The studies primarily focused on the impacts, due diligence, relationship identification, and perspectives concerning the teaching of mathematics to students with hearing impairments. A wide range of teaching methods, tools, activities, and resources were found to influence learning outcomes. The analysis of the theses underscored the significance of factors beyond hearing loss, such as teaching methods, students' experiences, and the ability to connect mathematical concepts to real-life situations. Sign language and gestures emerged as crucial for mathematics education. Despite some highlighted challenges in problem-solving and geometry performance, a plethora of recommendations was provided to enhance mathematics instruction for students with hearing impairments, ranging from classroom utilization to supporting and evaluating students. This comprehensive review underscores the need for diversified and tailored strategies to enhance mathematics education for students with hearing impairments.

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INTRODUCTION

Education is a fundamental aspect that plays a crucial role in the development of individuals. It is widely accepted that all individuals, regardless of their differences, should acquire social qualities and acquire affective, cognitive, or psychomotor skills through education to effectively participate in their respective societies. However, the acquisition of these skills is contingent upon effective communication, with hearing playing a central role in this regard (Diefendorf, 2015). Indeed, hearing is a critical sense in the process of learning to communicate effectively (Chen et al., 2014). Hearing impairment (HI), a condition characterized by a decrease in hearing sensitivity due to congenital or subsequent issues, is the result of the loss of this sense (Ministry of National Education [MoNE], 2008). Simply, the term "hearing impaired" refers to anyone who has experienced some degree of hearing loss, whether in one or both ears or who relies on hearing aid technology (Turkish Statistical Institute [TUİK], 2010). HI can be better comprehended and approached holistically by acknowledging the diverse range of definitions associated with it (Woods, 2022).

According to the World Health Organization [WHO] (2021), there exists a population of approximately 430 million individuals who necessitate hearing loss rehabilitation services. This translates to a staggering 1.5 billion people globally who experience hearing loss. The Center for Barrier-Free Access, Population and Housing Research of the Ministry of Family and Social Services has reported that 836 thousand individuals, equivalent to 1.1% of population of Türkiye, have some degree of hearing loss. The Turkish National Disability Data System (General Directorate of Services for Persons with Disabilities and the Elderly [GDSPDE], 2021) indicates that around 228,589 living persons have been identified as hearing impaired.

Distinct learning styles are inherent to individuals and are most appropriate for their specific circumstances. Similarly, individuals with HI who require special education have diverse educational needs. The varying degrees of HI – from mild to extremely severe – along with different influencing factors like the cause of the impairment and duration of hearing aid use, underscore the need for customized teaching methods that cater to the unique needs of each student (Shields & Lennox, 2017). Moreover, it is recognized that such individuals employ sign language for their interaction needs (Sandler & Lillo-Martin, 2006; Valli & Lucas, 2000). Consequently, lesson plans and classroom settings should be tailored to address these unique instructive necessities. Sign language, particularly when accompanied by gestures, is emphasized as a vital tool for effectively teaching mathematics to students with HI (Heslinga & Nevenglosky, 2012; Krause, 2019). This is because every individual has the right to an education on an equitable basis with others, and these rights are safeguarded by decisions made both within Türkiye and on the international stage. For example, several documents, including the Individuals with Disabilities Education Act (IDEA, 2007), the Salamanca Statement (UNESCO, 1994), the Principles and Standards for School Mathematics (NCTM, 2000), and the No Children Left Behind Act [NCLB] (2001), emphasize the significance of education for all individuals. Furthermore, in Türkiye, the Ministry of National Education (MoNE, 2020) has established specific goals for special education services. These objectives correspond with the overall aim and core principles of Turkish National Education. This alignment serves to facilitate individuals with special educational needs to fully utilize their capacities, in harmony with their educational requirements, qualifications, interests, and abilities. Furthermore, these objectives also aim to prepare these individuals for higher education, professional life, and active participation in society, reflecting the comprehensive vision of Turkish National Education. In light of this, it is imperative that individuals with hearing loss who require special education receive equal educational opportunities and participate in social life, acquire knowledge, and have equivalent educational prospects as individuals with normal development. Therefore, it is crucial to create accessible learning environments for individuals with HI, promote educational opportunities, and fully integrate them into society (MoNE, 2016).

Owing to differences in learning characteristics and contexts, students who are hard of hearing may have trouble in acquiring the same amount of information as their hearing peers over a given period. Consequently, individuals with HI face prejudice and bias irrespective of their socioeconomic status or

gender. This is primarily attributable to the fact that hearing loss not only affects learning but also growth in other areas. Furthermore, the inability to comprehend and process auditory cues from the environment negatively impacts the cognitive, social, and linguistic capacities of hearing-impaired individuals. Studies have shown that when individuals with HI are placed in environments where sign language is used, they tend to naturally pick up and learn this form of communication (Goldin-Meadow, 1993). Many challenges encountered by these persons in the educational setting, as well as performance issues, can be traced to communication difficulties arising from hearing loss. In such instances, hearing-impaired individuals may not grasp everything that the teacher says and may have to make guesses at certain points (Reuterskiold et al., 2010). Nonetheless, hearing deficiency does not affect the cognitive abilities required for learning. With the right support mechanisms in place, hearing-impaired individuals can catch up to their peers in cognitive abilities, even if there is a two or three-year age gap (Reuterskiold et al., 2010). Unfortunately, the learning environment for those who are hard of hearing or deaf is significantly more restricted than that of their typically developing peers (Wilkens & Hehir, 2008). In this context, it's vital to draw upon a variety of methodologies to provide a comprehensive evaluation of complex educational practices (Lahdenperä et al., 2023; Miller-Young & Poth, 2022; Ocean & Hicks, 2021). Due to the necessity of using individualized education plans that consider student characteristics such as age at which HI occurs, prior learning, preference for learning channels, parental interest, and ability to use hearing, education and training for individuals with HI are more challenging than for their typically developing counterparts. Employing diverse data collection tools is instrumental in these situations. It can enable teachers and researchers to acquire a more detailed understanding of the mathematical skills and attitudes of students with HI, as well as to gain better insights into their experiences and perspectives (Rishaelly, 2017; Sarı & Pürsün, 2018). By gaining insight into students' learning perspectives, teachers are empowered to design learning environments that better cater to their students' needs (Nurhasanah & Suryaman, 2022). The challenges in the educational process for students with HI primarily stem from the unique characteristics of both the teachers and the students. One of the most significant challenges that teachers in schools for individuals with HI face is their inability to choose the best teaching strategy for a given lesson (Sarıkaya & Börekçi, 2016). Undoubtedly, teachers hold a central position in the education of students with HI, thereby underlining the importance of offering them professional support (Li & Miloň, 2022). Given its abstract nature and dependence on mathematical terminology, mathematics is one subject where instruction and training for hearing-impaired individuals may encounter difficulties (Traxler, 2000).

Hearing Impaired Students and Teaching Mathematics

Due to the enhancement of people's logical and intellectual capacities through the study and appreciation of mathematics, those who possess such skills will have a significant advantage in today's rapidly evolving world (National Council of Teachers of Mathematics [NCTM], 2006). As such, the acquisition of mathematical knowledge is essential for the success, effectiveness, and independence of both hearing and deaf or hard of hearing individuals. However, studies have revealed that individuals who are deaf or hard of hearing face particular difficulties in acquiring mathematical skills (Mousley & Kelly, 1998; Nunes & Moreno, 2002; Pau, 1995; Swanwick et al., 2005). Most notably, it has been emphasized by various studies that students with hearing loss encounter greater difficulties in learning mathematics than their typically developing peers, and that this difficulty increases with the severity of their hearing loss, age, school environment, and the type of hearing aids they use (Davis & Kelly, 2003; Gottardis et al., 2011; Hyde et al., 2003; Kritzer, 2008; Traxler, 2000; Vosganoff et al., 2011). Moreover, studies have shown that individuals who are deaf or hard of hearing require a longer period to learn new content (Drigas et al., 2005; Epstein et al., 1994), which may negatively impact their progress in school and their ability to learn (Frostad, 1996). Attempts have been made to identify the causes for the difficulties experienced by hearing-impaired individuals in mathematics, and several explanations have been posited regarding their performance in such lessons (Epstein et al., 1994; Hitch et al., 1983; Kelly et al., 2003; Nunes & Moreno, 2002; Pau, 1995; Swanwick et al., 2005; Traxler, 2000). These include a lack of experience in learning during early childhood, insufficiencies in language, the nature of mathematical language, insufficiencies related to mathematical

concepts, language as an essential component of learning mathematical concepts, difficulties with reading comprehension, difficulties in solving verbal mathematical problems, difficulties with learning speed, difficulties with short-term memory performance, and difficulties with attention skills. While these are the most common challenges, other issues may be related to instructors and technological advancements. Some of these drawbacks include the teachers' inability to choose appropriate teaching methods (Sarıkaya & Börekçi, 2016) or use the wrong teaching method (Arnold, 1996), their inability to create suitable learning environments (Kelly et al., 2003), the low perception of teachers' expectations from students (Arnold, 1996; Kelly et al., 2003), and a lack of materials for hearing-impaired students (Frostad, 1996). Despite these challenges, it is recognized that hearing-impaired individuals can learn mathematics just like their peers. Meadow-Orlans (1980) posited that there exists no discernible difference in mathematical thinking between individuals with HI and their hearing counterparts. In a study conducted by Hitch, Arnold, and Phillips (1983), it was observed that typically developing and hearing-impaired individuals displayed remarkable similarities in their reaction strategies. To expand the learning opportunities and enhance the arithmetic abilities of the hearing-impaired, researchers (Nunes & Moreno, 2002; Tanrıdiler, 2012) have experimented with novel instructional designs. The researchers reported that the hearing-impaired individuals exhibited significant improvements in mathematical performance, real-world relevance, and language proficiency upon the conclusion of their investigations. In line with the "Every child can learn" principle of the Ministry of National Education (2005), it can be deduced that every child, albeit at their own pace and through different means, can learn mathematics under suitable conditions. Therefore, it is crucial to tailor the mathematics instruction to the unique combination of learning styles, prior knowledge, and hearing-impaired status of each student. Those who are hard of hearing require greater economic support, social and cultural inclusion, and educational opportunities. In keeping with the principle of equal opportunity in education, studies must be conducted to develop learning environments that align with the individual characteristics of hearing-impaired individuals to meet their educational needs. Therefore, it is essential for teachers to utilize a range of teaching strategies and resources to enhance the mathematical learning process for students with HI (Adeniyi & Kuku, 2020; Burley et al., 1994; Jadhav & Gathoo, 2018; Makinde, 2012; Mtuli, 2015; Ovadiya, 2021). Adopting a multidimensional approach is essential in meeting the specific learning requirements of students with HI (Pradhan, 2020; Tongwa & Atemnkeng, 2019). It is critical to note that the significance of family support, instructional approaches, teaching materials, and notably academic studies cannot be denied. However, there is a lack of research on the mathematics education of hearing-impaired individuals, which hinders our understanding of their learning experiences. As a result, the educational environments of individuals with HI are often overlooked. To ensure the academic success of individuals with HI, their cognitive and emotional strengths and weaknesses in the classroom must be identified. Examining the research conducted about how hearing-impaired individuals learn mathematics can help researchers, teachers, and parents comprehend their situation in mathematics education, the outcome of studies, and recommendations to improve educational environments (Wilkens & Hehir, 2008). This can also provide an opportunity to create accessible mathematics curricula for hearing-impaired individuals. It is crucial to understand the trajectory of changes in the educational process, its status, and the results it produces in order to effectively track how mathematics is taught to students with HI (Opfer et al., 2020). The objective of this research is to analyze the graduate theses on the education of individuals with HI in mathematics teaching from the Databases of National Thesis Center of the Council of Higher Education in Türkiye through the lens of the following research questions:

1. What is the aim of the theses?
2. How do the theses handle study design?
3. How are participant characteristics determined in the theses?
4. What are the main results of the theses?
5. What teaching practices are recommended in the theses?

Importance of the research

The significance of this research is profound. This research will contribute to the existing body of knowledge by offering a unique perspective on the mathematical education of individuals with HI, focusing on the current situation in Türkiye. The choice of Türkiye as the research context is pivotal; Türkiye has a unique educational landscape that is influenced by various social, cultural, and political factors. There is a paucity of research focusing specifically on the mathematical education of individuals with HI in Türkiye, which creates a critical gap in the literature (Atış & Doğaner, 2022; Gürefe, 2018; Solak Berigel & Karal, 2021; Şimşek & Çağlıyan, 2020). Furthermore, the extant body of literature encompasses research conducted in Türkiye pertaining to the distance education of individuals with disabilities (Karabey et al., 2020), pedagogical approaches in the education of individuals with disabilities (Kızılcık, 2022), and the education of individuals with visual impairments (Coşkunçay & Horzum, 2022). These studies provide a restricted amount of material that specifically pertains to the mathematics education of individuals with HI. This is expected to contribute to the subject's corpus of knowledge and aid in the formulation of educational policies in similar contexts. Within the above framework, the objective of this study is to gather and analyze graduate theses pertaining to the education of students with hearing impairment in Turkey. The rationale behind selecting graduate theses stems from the assertion made by Karadağ (2009) that the examination of theses pertaining to a certain scientific discipline holds significance in elucidating the overall perspective of said discipline. By analyzing the teaching practices proposed in these theses, the research will provide valuable insights that could improve the educational experience of students with HI. The outcomes of this investigation could be instrumental in shaping educational policies. Moreover, this study has particular importance for Türkiye as it may influence educational policymaking in the country. By identifying the obstacles and proposing solutions in the mathematical education of individuals with HI, this research could guide Türkiye in creating more inclusive and effective educational policies. Educational policies could be made more inclusive and effective by identifying the obstacles encountered in the mathematical education of individuals with HI and proposing solutions to these obstacles. Moreover, this study has the potential to increase awareness regarding the education of individuals with HI. This can help teachers, parents, and the broader community better comprehend the educational needs of individuals with HI. In the Türkiye context, where disability education might not always receive the attention it deserves, this study can act as a catalyst for change by informing and mobilizing the educational community. This research may promote more inclusive, effective, and equal educational opportunities for individuals with disabilities by enhancing general knowledge and comprehension regarding the education of people with disabilities.

METHOD

In this research, a systematic review approach was employed. By utilizing definite criteria for inclusion and exclusion, a systematic review determines which studies should be incorporated in a compilation and integrates the outcomes of those studies in the context of research questions (Petticrew & Roberts, 2006). According to Bellibaş and Gümüş (2018), systematic review studies can be conducted in three ways: meta-analysis, meta-synthesis, and descriptive content analysis. In this research, descriptive content analysis, which is a methodological research design that scrutinizes the patterns found in related subjects, was performed. The present study systematically examined the theses that had previously been subjected to a jury review. This scrutiny entails evaluating the aims, study design, characterization of hearing-impaired students, main results, and recommendations for improving the mathematics instruction of individuals with HI.

Inclusion and Exclusion Criteria

Determining the criteria for the inclusion and exclusion of theses in systematic literature review studies is a crucial step. The reliability of the findings is significantly influenced by these criteria. In this research, included studies were selected based on several criteria. Firstly, the theses should have been published by 30th September 2022. Secondly, only students with HI should have been included in the participant group. Thirdly, the theses should have been related to education and instruction regarding the teaching of

mathematics. Fourthly, the theses should have focused on mathematical education. Fifthly, the study should have completed the jury process and deemed appropriate as a thesis study in its field. Sixthly, the theses should have been based on original data. Finally, the theses should have been fully available in the text.

Several criteria were also used to exclude certain theses from this research. Firstly, the theses should not have been conducted with students who have comorbidity or multiple disabilities. Secondly, the theses should not have relied on previous research. Finally, theses that were not freely available in databases were also excluded.

Research Identification Process

The theses were acquired through exploration of the database of the National Thesis Center of the Higher Education Council of Türkiye. In addition to the Turkish language, English keywords were utilized for the search process, specifically, all possible keywords such as “hearing impairment”, “hearing impaired”, “hearing loss”, “işitme engeli”, “işitme engelli”, and “işitme kaybı” for the subject of “education and instruction”. The search code is (("hearing impairment" OR "hearing impaired" OR "hearing loss" OR "işitme engeli" OR "işitme engelli" OR "işitme kaybı") AND ("education" OR "instruction")). During the initial stage of the search process, a total of 471 theses were identified, with the study including theses published until September 30, 2022. In the second stage (identification phase), the titles, abstracts, and keywords of the identified research were reviewed, and the relevance of these theses to mathematical education was later determined, whereby the theses that were unrelated to mathematics education were discarded. A total of 28 theses were compiled because of the scanning process. These theses were then analyzed for consistency with the research criteria based on the basic research criteria, and the full-text accessibility of each thesis was verified, with those that were inaccessible being excluded. This method resulted in obtaining twenty-three theses, while five were eliminated. Thirteen duplicate theses were disqualified, and the final step was to ensure that students with disabilities are not further disadvantaged. In this way, one thesis was eliminated. The study incorporated nine theses, as illustrated in Figure 1, and Table 1 displays the characteristics of the theses included in the research based on the information obtained from this source.

Table 1. *The characteristics of the theses included in the research*

Code, Author, Year, Type, University	**Code, Author, Year, Type, University**
T1, Şen, 1990, M, Anadolu University	T6, Cağlıyan, 2018, M, Gazi University
T2, Güldür, 2005, M, Anadolu University	T7, Doğan Fırat, 2018, PhD, İnönü University
T3, Yıldırım, 2009, M, Eskişehir Osmangazi University	T8, Ada, 2021, M, Bursa Uludağ University
T4, Tanrıdiler, 2012, PhD, Anadolu University	T9, Ertaş, 2021, M, Ege University
T5, Gürefe, 2015, PhD, Gazi University	

(T: Thesis, M: Master’s Thesis, PhD: Philosophy of Doctorate Thesis)

Three out of the nine theses were composed as doctoral theses, whereas the remaining six were crafted as master's theses, as delineated in Table 1. The prime motive behind these theses was to facilitate the instruction of mathematics to students with HI. The preponderance of theses in Table 1 were inscribed at Anadolu and Gazi University.

Analysis Process

Employing content analysis, a standardized methodology was adopted, and a comprehensive reporting template was crafted, through which data from each thesis illustrated in Figure 1 were examined. Key variables were carefully considered during this process: publication year, university, thesis type, author's full name, research aim, study design, and participant characteristics. The latter included grade level, age, gender, participant number, status of HI, communication method, and the definition of HI. Additionally, the main results of each thesis and recommendations for improving pedagogical practices were thoroughly reviewed.

In the research examination form, each thesis was scrutinized based on the following components: research aim, study design, participant characteristics, main results, and recommended teaching practices.

This study utilized the research problems, purpose statements, objectives, and findings of the theses to carry out an analysis of the aims of the theses. The study design of the theses was examined in three categories: research models, types of data collection tools, and the data collection process. In this context, attention was paid to the research models, as well as how the data collection tools were obtained following a particular process. Characteristics of the participants, including which age group, at what grade level, gender, number of participants included in the study, their preferred communication methods, and their hearing status were assessed. Also, the definition of hearing impairment preferred in the theses was taken into consideration. While analyzing the main results obtained in the theses and the given recommendations, results and recommendations that concern the teaching of mathematics to students with hearing impairments were considered. Other results and recommendations have been noted within the scope of this study.

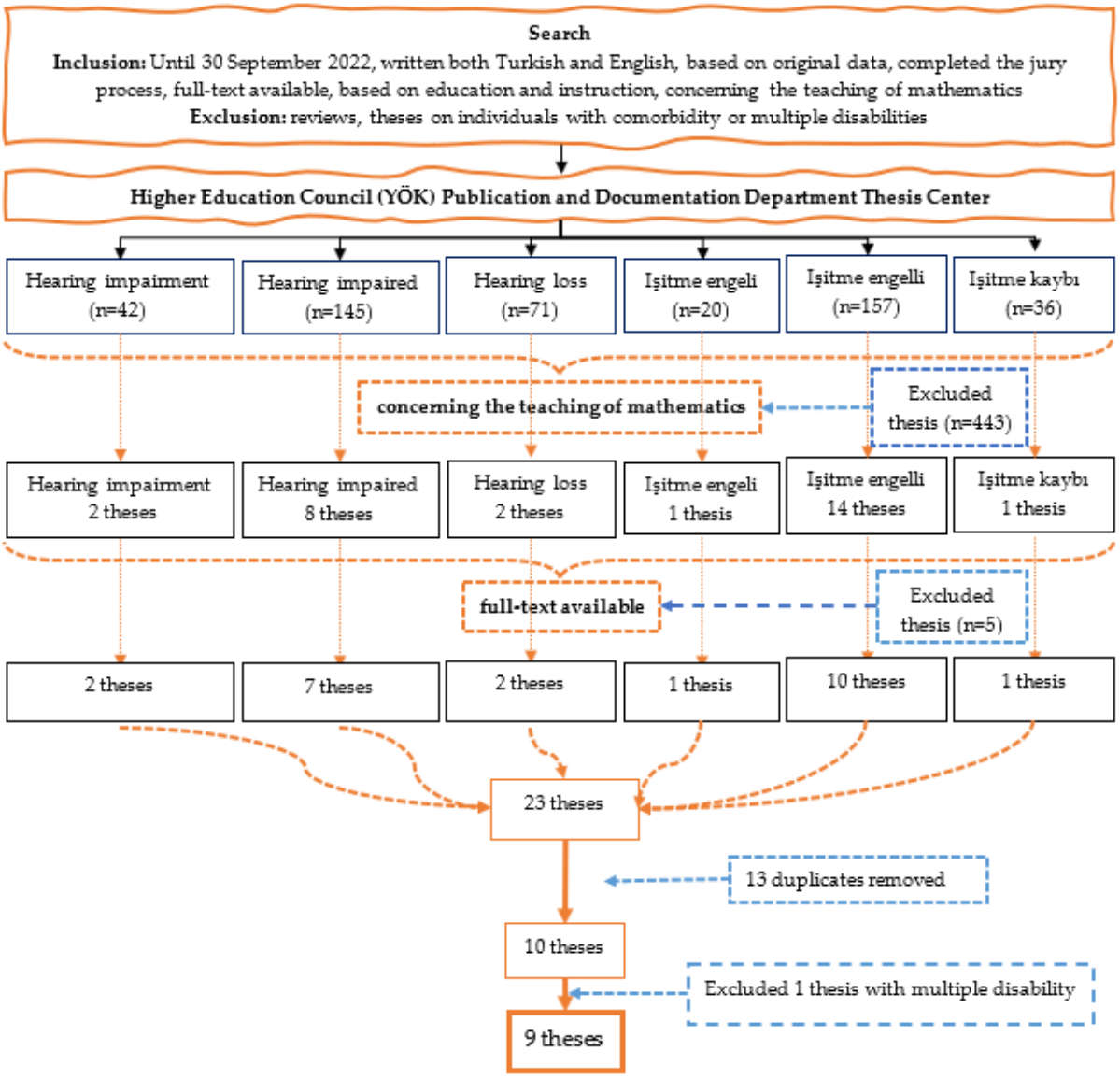

Figure 1. *The review search strategy* (Adapted from: Moher etc., 2009).

Inter-Coder Reliability

Using the "consensus / [consensus + disagreement] X 100" formula prescribed by Gast (2010), the inter-coder reliability of the research was determined by comparing the results of the initial analysis conducted by the researcher to those of a subsequent analysis conducted by the same researcher two months later. The obtained level of coding consistency was a notable 95%. For the 5% of the group that could not be aligned, a final decision was made with the assistance of an additional researcher with a Ph.D. in mathematics education.

Ethical Declaration

This study is an investigation of the theses published openly to public on YÖKTEZ. Therefore, there is no ethical issue in the conduct of the research and no ethical board approval is required. Additionally, it is important to note that this study rigorously complies with the ethical rules and regulations set forth by the Council of Higher Education in Turkey (YÖK). This commitment guarantees that the research upholds academic integrity and demonstrates due regard for intellectual property rights.

RESULTS

In this section, the aims of the theses, the study design used, the characteristics of students with HI, the main results, and the recommended teaching practices were presented.

The aim of the theses

To ascertain the aim of the theses, it is of utmost importance to accurately discern the purpose statements. Table 2 provides an exposition of the purpose statement and the corresponding themes contained in the body of each thesis. Subsequently, five primary categories were discerned, namely: determining an impact of something, performing due diligence, identifying relationships, examining perspectives, and proposing a teaching model.

Table 2. *The aim of the theses*

	Theme	Statement of The Purpose
T1	-Determining an impact of something (method)	-To determine whether the programmed teaching method will aid in the instruction of mathematics to hearing-impaired students.
T2	-Performing due diligence -Identifying relationships	-To evaluate the mathematical problem-solving behavior of students with HI. -To ascertain the problem-based scores of hearing-impaired students because of solving four-operation mathematical problems. -To ascertain the total scores of hearing-impaired students based on their ability to solve four-operation mathematical problems. -To identify student characteristics that may influence hearing-impaired students' behavior when solving four-operation mathematical problems.
T3	-Determining an impact of something (activity)	-To assess the impact of geometry activities created using the dynamic geometry program Euclidean Reality on students' Van Hiele geometry levels, attitudes, and accomplishments based on their hearing status.
T4	-Determining an impact of something (instructional setting, method) -Identifying relationships -Proposing teaching model	-To analyze in a systematic, regular, reflective, and cyclical manner the interactions of various variables that affect the Balanced Mathematics Teaching in the real systematic environment of hearing-impaired students. -To investigate the changes that occur in students and teachers during the teaching-learning process of Balanced Mathematics. -To propose a model for teaching mathematics to hearing-impaired students.
T5	-Performing due diligence	-To investigate the semiotic resources used by hearing impaired students to express certain geometric concepts
T6	-Performing due diligence -Identifying relationships	-To determine the Van Hiele geometric thinking levels and geometry self-efficacy of hearing-impaired middle school students -To ascertain whether certain variables affect the predetermined situations -To investigate the connection between Van Hiele geometric thinking levels and geometry self-efficacy

T7	-Determining an impact of something (material)	-To investigate the impact of abacus education on students' operational fluency and its continuity on operational fluency when teaching addition and subtraction operations to hearing-impaired fourth graders.
T8	-Determining an impact of something (method) -Examining perspectives	-To investigate the effect of peer teaching on academic success of hearing-impaired eighth graders in fractions, their math attitudes, and their perspectives on peer teaching
T9	-Examining perspectives	-To determine the views of the students with HI regarding the digital teaching material designed for subtraction that necessitates decimal breaking

Table 2 reveals that some graduate theses (T2, T4, T6, T8) concerning the instruction of mathematics to hearing-impaired students were established with multiple aims. Predominantly, these theses analyze the influence of specific teaching environments, methods, activities, or materials. The effectiveness of programmed, balanced, and peer teaching methods as chosen instructional strategies were scrutinized. Their contributions to mathematics education, impact on students and teachers, and effects on student achievement were evaluated. Investigations also encompassed the impact of software-assisted dynamic geometry activities on the geometrical thinking levels, geometry attitudes, and success rates of hearing-impaired students. Furthermore, the influence of teaching addition and subtraction with an abacus, either as a low-level technology or tangible material, on operational fluency was assessed.

An equal number of theses (n=3) studied the situations of hearing-impaired students relative to other factors, and emphasis on the interrelationships between some factors that shape the instructional settings. Theses identified student circumstances by considering elements like problem-solving behaviors and test scores of those with HI, as well as the semiotic resources used to elucidate geometric concepts. One thesis aimed to identify and analyze the geometry self-efficacy and Van Hiele's geometric thinking levels of hearing-impaired students, evaluating these in the context of various variables. Theses that centered on student characteristics and teaching methodologies probed the relationships between diverse factors influencing learning environments. Therefore, one thesis investigated the impact of student characteristics on four-operational problem-solving processes, while other explored various elements affecting balanced mathematics teaching. Another thesis assessed the relationship between Van Hiele geometric thinking levels and geometry self-efficacy of hearing-impaired students. Theses studying perspectives examined student views on peer teaching and digital teaching material utilization in classrooms. One singular thesis aimed to propose a teaching model for mathematics instruction to hearing-impaired students.

The study design of the theses

To comprehend the research design, it is essential to comprehend the context in which the research data were gathered. To ascertain the theses' research designs, research models, data collection tools, and data collection processes were analyzed. In this three-fold context, Table 3 displays the research design of the theses.

Table 3. *The study design used in theses*

	Study design	Theses
Research models	Experimental design	T1, T3
	Single-subject design	T7
	Descriptive model	T2
	Survey design	T6
	Case study	T5, T9
	Phenomenology	T5
	Action research	T4
	Mixed methods	T8
Data collection tools	Tests and scales	T1, T2, T3, T6, T8
	Video and audio recordings	T2, T4, T5, T7, T9
	Documents (reflective diaries, lesson plans,	T4, T9

	etc.)	
	Observations and interviews	T5, T8, T9
Data collection process	Pre-test and post-test applications	T1, T3, T8
	Group and individual applications	T2, T4
	Lon-term education and intervention processes	T3, T4, T7, T8
	Semi-structured and unstructured observations	T5, T9

As illustrated by Table 3, it is apparent that the study design of the theses is approached by employing a variety of research models, multiple data collection tools, and distinct data collection processes, resulting in each thesis adopting a unique approach. Notably, the research models employed among the theses are diverse. The research models include experimental design (T1, T3), case study (T5, T9), single-subject design (T7), descriptive model (T2), survey model (T6), phenomenology (T5), action research (T4), and mixed methods (T8). The T1 and T3 coded theses utilized a pre-experimental design of a single group pre-test-post-test model, while the variable canon model was employed in the T7 coded thesis. Similarly, the theses employed an extensive range of techniques for data collection, encompassing tests and scales (T1, T2, T3, T6, T8), audio and video recordings (T2, T4, T5, T7, T9), documents such as reflective diaries and lesson plans (T4, T9), interviews and observations (T5, T8, and T9). Regarding the process of data collection, the theses included a multitude of long-term education and intervention processes (T3, T4, T7, T8), pre-test and post-test applications (T1, T3, T8), group applications as well as individual applications (T2, T4), and semi-structured in addition to unstructured observations (T5, T9).

The participants' characteristics of the theses

The participants in the theses were examined in terms of grade level, age, gender, number of participants, status of HI, communication methods, and the definition of HI. Information about the participants in the theses is presented in Table 4.

Table 4. *Characteristics of participants*

	Grade level/Age	**Gender**	**Participants' number/Status of HI/Communication method**	**Definition of HI**
T1	7th grade HI students	Not specified	-25 - Students studying at deaf schools and diagnosed with HI	Definition associated with difficulties in development, adaptation, and communication
T2	6th –8th grade students with HI students/ aged between 11 years 9 months-17 years 7 months	Not specified	-In total 19 -Students with severe (n=4) and very severe (n=15) hearing loss -Hearing aid usage periods are between 1 year 6 months and 14 years.	Definitions pertaining to the results of hearing tests and the deviation from normal hearing thresholds
T3	-6th grade typical students/not specified -8th grade HI students/not specified	-15F-12M -14F-11M In total 29 F-23M	-52 -Students diagnosed with HI in schools for the deaf and inclusion schools	Definition related to the degrees and grouping of HI
T4	-7th grade students with HI/aged between 13-15	-5F – 3M	-8 -8 students with bilateral sensorineural hearing loss studying at the school where	General description of the presence of hearing loss

	-Average age is 13,5		hearing impaired students are educated. -1 moderate, 4 severe, 2 very severe hearing loss students, -2 cochlear implant users, 6 behind-the-ear hearing aid users in both ears	
T5	-9th – 11th grade students with HI/ aged between 17-18	-2F – 1M	-3 -Students studying at a high school for the deaf, using hearing aids and having a good command of sign language -Advanced (n=2) and very severe (n=1) Hearing impaired -Congenital (n=1) and HI as a result of febrile illness (n=2)	Definition of difficulties in using verbal language and communication in daily life
T6	-5th – 8th grade students with HI / not specified	-64F – 62M	-126 -Students studying at a middle school for the students with HI and knowing sign language at different levels -Cochlear implant use (n=20), hearing aid use (n=69), fm system use (n=16), no device use (n=21)	Definition related to special education and support education service need
T7	-4th grade / aged between 10-11	-3F	-3 -Students studying at primary school for the hearing impaired who use the verbal-auditory method as a communication method and use cochlear implants.	Definition pertaining to the results of hearing tests and the deviation from normal hearing thresholds
T8	-8th grade / not specified	-4F – 8M	-12 -Students who know sign language studying at middle school for the hearing impaired	Definition of an individual's condition, which is characterized by diminished hearing sensitivity
T9	-Primary school level -Middle school level -Teachers	-2M -3F – 1M -1F – 1M -In total 4F – 4M	-8 -Students who study in middle and primary schools for the deaf, do not use hearing aids, and use Turkish sign language -4 secondary school students (3 girls, 1 boy), 2 primary school students (2 boys) - 2 deaf mathematics teachers (1 secondary school, 1 primary school level)	Definition of HI determined through hearing tests

HI: hearing impairment, F: female, M: male

According to Table 4, the research findings suggest that there is a presence of students with HI across various grade levels in the theses. The grade levels of the students range from primary school to high school. Furthermore, there have been comparative studies conducted on students with normal growing. The age range of the participants falls between 10 to 18 years, and although it is not explicitly stated in some theses, it is generally understood that primary, middle, and high school students are typically the subjects of theses. The focus of the theses was to evaluate students who received education in schools specifically designed for individuals with HI, as well as those who attended inclusive schools. It is worth noting that all participants in the theses were diagnosed with HI. The gender distribution of the participants varies; however, the analysis indicates that there is no significant disparity between the number of male and female students in the theses.

Regarding HI status, it was observed that there exist investigations regarding the instruction of mathematics to pupils with diverse HI within theses. Varying necessities and challenges of students were deliberated, considering factors such as the extent of hearing loss, school category, and communication methods. The hearing loss of the students who were selected as participants in the theses ranged from a minor to an exceedingly severe degree. Furthermore, the duration of the students' utilization of hearing aids, the types of hearing deficits, and the causes of hearing loss were also found to be variable.

The research findings indicated that eight distinct interpretations of the term "hearing impairment" were favored. Specifically, in T2 and T7, HI is defined as the variance between hearing tests results and the standard hearing thresholds. In T1, HI is defined as difficulties in developing, adapting, and communicating, whereas in T3, it is defined based on the degrees and categorization of HI. HI in T4 is described in terms of the presence of hearing loss and difficulties in utilizing verbal language and communication in daily life in T5. T6, on the other hand, defines HI as necessitating special education and support services, while T8 characterizes it as an inability caused by a decrease in hearing sensitivity. Finally, T9 defines HI as hearing loss identified through hearing tests.

The main results of the theses

Table 5 presents the main results on the instruction of mathematics to students with HI as outlined in theses. Through a comparative analysis of the two viewpoints, the main results were scrutinized, encompassing the impact and importance of diverse techniques and tools, as well as the process of acquiring mathematical knowledge.

Table 5. *The main results of the theses*

	Themes	Main results
T1	-The impact and importance of diverse techniques and tools	1.Students with HI can be instructed using a programmed teaching method. 2.Students with HI from all institutions benefited equally from the programmed teaching method in mathematics class.
T2	-The process of acquiring mathematical knowledge	1.Hearing impaired pupils demonstrated low to moderate problem-solving success. 2.As the problem's level of intricacy increases, the students' performance declines. 3.The mean hearing loss is not an independent variable that influences problem-solving abilities. 4.It has been determined that hearing aids are not being utilized properly. 5.It was determined that students did not acquire sufficient and necessary problem-solving experience.
T3	-The impact and importance of diverse techniques and tools -The process of acquiring mathematical	1.Computer-assisted education has led to improvements in the academic achievement and attitudes of both typically hearing and hearing-impaired students. 2.While there was no significant difference in terms of Van Hiele geometry levels among students with HI, there was a significant difference among students with normal hearing.

	knowledge	
T4	-The impact and importance of diverse techniques and tools	1.The students' math performance, their capacity to relate to the real world, and their language skills all improved. 2.It has been determined that the teacher has improved in terms of writing lesson plans, developing applications, and employing direct and indirect learning-teaching strategies.
T5	-The impact and importance of diverse techniques and tools -The process of acquiring mathematical knowledge	1.Sign language should be added to the definition of semiotic source because it has been determined that students with HI use sign language to describe polygons. 2.It was observed that, when defining concepts, pupils employed gestures more than sign language. 3.It has been determined that the features of polygons in the students' minds are manifested by gestures derived from their semiotic resources.
T6	-The impact and importance of diverse techniques and tools --The process of acquiring mathematical knowledge	1.The students' geometry self-efficacy varied according to their sign language proficiency and their grades in mathematics from the first semester. 2.The correlation between the students' Van Hiele geometric thinking levels and their geometry self-efficacy was found to be weakly positive. 3.There was no significant difference in the geometry self-efficacy of students with HI in the fifth, sixth, seventh, and eighth grades, regardless of whether they received support education or not or whether they had other HI in their family.
T7	-The impact and importance of diverse techniques and tools -The process of acquiring mathematical knowledge	1.It has been determined that abacus education is effective for increasing accuracy rates while making simple addition and subtraction operations straightforward and quick for hearing impaired students, as well as for increasing the average number of high-level numbers processed. 2.It has been determined that abacus education is effective in teaching addition and subtraction fluency in operations to the students with HI.
T8	-The impact and importance of diverse techniques and tools -The process of acquiring mathematical knowledge	1.The academic achievement of eighth-grade hearing-impaired pupils in fractions increased statistically significantly because of peer teaching. 2.There was no statistically significant shift in the attitudes of students toward mathematics. 3.The students stated that they found the peer-teaching method beneficial and enjoyable, that they retained their prior knowledge and gained a deeper understanding of the subject matter. 4.The students reported having difficulty being understood and being understood during the peer teaching process, as well as finding mathematics problematic.
T9	-The impact and importance of diverse techniques and tools	1.The devised digital instructional materials enhanced student learning and reduced distractions. 2.Students demonstrated interest in and proficiency with the material; they also requested further development in various subjects.

Based on the findings presented in Table 5, the main results of the theses referred to the impact and importance of diverse techniques and tools employed in the realm of mathematics education for students with HI. Several theses (T1, T3, T4, T5, T6, T7, T8, T9) offer solutions to increase the mathematical performance of students with HI. Various instructional practices have proven to be effective in enhancing the mathematical performance of students with HI. Notable examples include the implementation of programmed teaching methods, computer-assisted education, abacus education, peer teaching methods, and the utilization of digital teaching materials. According to the T4, there exists a close relationship between

students' mathematical performance and their skill to connect mathematical concepts to real-life situations and language skills. T9 demonstrates that the integration of technology in mathematics instruction can facilitate and enhance students' learning process. Moreover, it has been claimed that the presence of hearing loss in isolation is not a significant factor in determining how students with HI learn mathematics. Additional factors, such as the experiences of students and the methods employed in teaching, also exert a significant influence. In T5 and T6, the significance of sign language is underscored in the context of mathematics education for students with HI, with T5 further emphasizing the importance of gestures.

The T2, T3, and T5, on the other hand, highlight particular differences in how hearing-impaired students acquire mathematics. T2 points out the weaknesses in the math performance of hearing-impaired students, whereas T3 claims that they perform similarly in math to students with normal hearing. For instance, in T2, it was discovered that hearing-impaired students had difficulties verifying the accuracy of their operation, drawing a figure or diagram to represent the problem, estimating the problem's result, performing the operations necessary to solve the problem and recording the result, comparing the result they found with their prediction before the solution, and explaining the reason. In other words, T2 asserts that students with HI perform poorly in problem-solving skills, that their success decreases as the difficulty of the problem increases, that hearing loss has no impact on their problem-solving skills, and that the effective usage of hearing aids is inadequate. T3 demonstrates that the academic achievement of students with HI in geometry may not be enhanced through computer-assisted instruction. The T5, on the other hand, presents several viewpoints on the significance of sign language in the mathematics learning process of students with HI as well as the significance of using gestures as a semiotic resource. The T6, T7, and T8 also highlight additional differences in how students with HI learn mathematics. According to T6, there are differences between students' self-efficacy in geometry, sign language proficiency, and mathematics grades. T7 shows how abacus education improves students with HI students' math performance. T8 asserts that while the peer teaching method improves the academic achievement of students with HI in fractions, there is no change in their attitudes about mathematics. Namely, even if the peer teaching method is helpful for hearing impaired students, math is still challenging for them.

The recommended teaching practices of the theses

Figure 2 depicts the recommended teaching practices for theses. Five themes are used to examine recommendations for teaching mathematics to hearing-impaired students. These include recommendations for utilization within the classroom, recommendations for structuring the learning environment, recommendations regarding student characteristics, recommendations for supporting students, and recommendations for evaluating students.

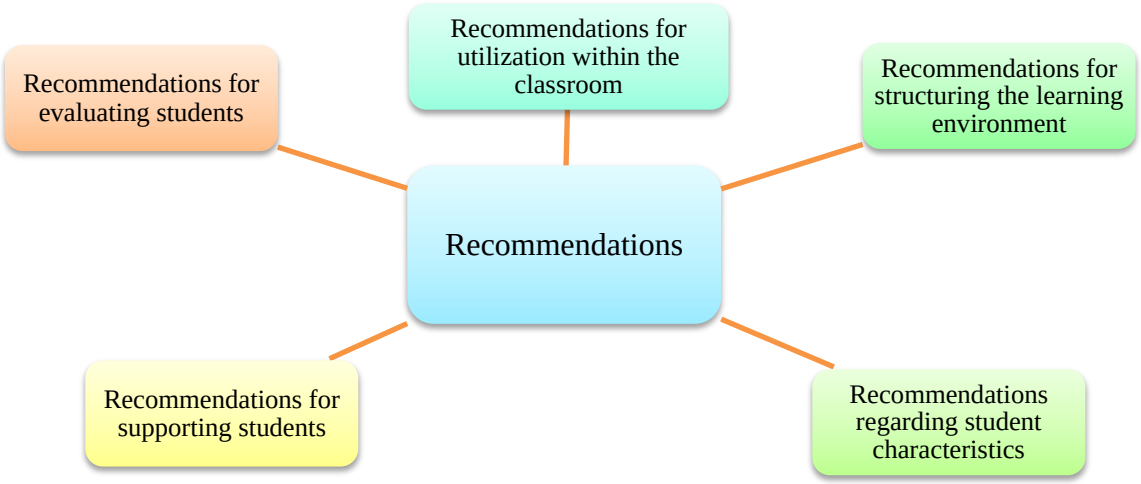

Figure 2. *Recommendations presented in the theses for teaching mathematics to hearing-impaired students*

Figure 2 shows a range of recommendations provided in the theses to support hearing-impaired

students in mathematics instruction. T2 specifies that problem-solving activities ought to be long-term, geared towards individual needs, and incorporate meaningful language inputs. The implementation of sign language is proposed in T5 and T6 to encourage effective communication and support between students and teachers. Abacus training is recommended in T7 to enhance the operational fluency and attention of hearing-impaired students, while peer teaching in T8 is put forth as a means of supporting mathematics learning and improving communication skills. The second theme of recommendations highlighted in the theses focuses on methods proposed for use in the learning environment. Accordingly, in T1, the programmed instruction method is suggested to facilitate mathematics learning for hearing-impaired students, and in T2, problem-solving activities are recommended to foster development of mathematical skills. The third theme of recommendations focuses on learning environment. T3 proposes dynamic geometry software to enrich geometry learning for hearing-impaired students, while T5 advocates for mathematics books to contain definitions and properties of concepts as well as signs and concrete models involving these concepts. The fourth theme of recommendations pertains to student characteristics. T2 suggests that problem-solving skills of hearing-impaired students should be assessed based on their characteristics, while T3 recommends the use of Euclidean Reality software suitable for all levels, given that hearing-impaired students may have varying degrees of hearing loss. Another theme of recommendations focuses on the evaluation of hearing-impaired students. T4 recommends preparing booklets of enrichment activities related to the mathematical topics and developing evaluation tools to assess mathematical knowledge of hearing-impaired students. T9 suggests that digital materials on various topics could be developed to evaluate mathematics learning of hearing-impaired students.

DISCUSSION AND CONCLUSION

This study investigates the intricate landscape of mathematics education for students with HI, focusing on an analysis of Turkish graduate theses. The aim is to uncover the existing educational circumstances and suggested teaching practices in this field. The investigation is based on data obtained from the YÖK National Thesis Center in Türkiye. This data provides valuable information regarding the aims, research methodology, participant profiles, and primary findings of the theses, and recommended teaching practices. This study enhances our comprehension of the complicated relationship between instructional practices and educational results within this unique situation at hand. While the research does not primarily focus on generalization, its objective is to provide a comprehensive overview of the educational landscape depicted in Turkish graduate theses. Specifically, the research examines the teaching of mathematics to this specific population.

Addressing the multifaceted dimensions of mathematics education for hearing-impaired students, the analyzed theses spotlight key issues ranging from pedagogical approaches to the invaluable insights of the students themselves. The theses addressed several subjects, including impacts, due diligence, relationship identification, perspectives, and a proposed teaching method, in alignment with their respective aims. The primary emphasis of these theses was to examine the impacts of teaching mathematics to students with HIs. researchers investigated the impact of different approaches, tools, activities, and resources on learning outcomes. The investigation revealed the success of programmed, balanced, and peer teaching methods, underscoring the need for diverse, individualized teaching strategies for this particular student population. Another consistent theme was the examination of various factors affecting learning environments and student outcomes. The interconnected aspects of student characteristics, problem-solving behaviors, test scores, and semiotic resources were all brought into sharp light by the relationship-focused theses. Teachers' struggles in selecting the appropriate teaching methods were highlighted, pointing the gaps in understanding the factors influencing learning outcomes of hearing-impaired students in mathematics instruction (Sarıkaya & Börekçi, 2016). This emphasizes the necessity for further research into the intricate interactions between diverse variables such as student characteristics and problem-solving behaviors. The importance of understanding students' perspectives was also evident, revealing the value of their feedback in creating an inclusive educational setting (Nurhasanah & Suryaman, 2022). Lastly, innovation in educational approaches was signified by a thesis proposing a tailored teaching model for math education. This resonates with the need for

a multifaceted teaching strategy that addresses the unique educational requirements of hearing-impaired students, as substantiated by various teaching methods such as programmed, balanced, and peer teaching and tools such as software-assisted dynamic geometry activities and abacuses (Pradhan, 2020; Tongwa & Atemnkeng, 2019).

Unveiling the intricate tapestry of methodological diversity, the examined theses collectively signal the imperative for an integrative research paradigm in the realm of mathematics education for hearing-impaired students. The study designs employed in the theses were notably varied, encompassing a spectrum of research models, data collection tools, and processes. This methodological diversity facilitates a broader assessment of educational practices targeting students with HI. Given this context, future research in the mathematics education of hearing-impaired students would benefit from embracing a similarly diverse set of methodologies. The research designs employed ranged from experimental to phenomenological, encapsulating case studies, action research, single-subject designs, surveys, descriptive models, and mixed methods, among others. This varied landscape of research models reflects the myriad questions that have been addressed, underscoring the multi-layered inquiry needed to cater to the unique educational demands of hearing-impaired students. In light of this, no single research design could adequately capture the intricate nuances of this specialized pedagogical environment. Innovative data collection methods, such as longitudinal studies, might serve to augment this multi-methodological approach. Indeed, a variety of methodologies is indispensable for an exhaustive evaluation of complex educational practices (Miller-Young & Poth, 2022; Ocean & Hicks, 2021). The application of varied data collection tools provided researchers with more in-depth and comprehensive insights into the mathematics education of hearing-impaired students. While some theses utilized standardized tests and scales to measure students' mathematical skills and attitudes, others employed methods such as video and audio recordings, reflective diaries, lesson plans, and document analyses to gain more detailed knowledge. Moreover, observations and interviews further enriched researchers' grasp of both student and teacher experiences. Employing such diverse data collection tools can enable teachers and researchers to acquire a more detailed understanding of the mathematical skills and attitudes of students with HI, as well as to gain better insights into their experiences and perspectives (Rishaelly, 2017; Sarı & Pürsün, 2018). Similarly, the data collection process demonstrated a range of approaches, from long-term educational and intervention processes to pre-test and post-test applications, individual and group applications, and structured to unstructured observations. These divergent methods offered avenues for teachers and researchers to explore ways of enhancing the mathematical skills of students with HI. For instance, some theses employed pre-tests and post-tests as a significant measure, particularly in research using single-group pre-test post-test designs and mixed methods. Others adopted more descriptive and survey models to study the status and abilities of these students. Such long-term educational interventions enable a sustainable evaluation of the impact of mathematical practices on hearing-impaired students (Elliot et al., 2020; Tanrıdiler, Uzuner & Girgin, 2015). Studies conducted through methodologies such as action research and single-subject experimental designs allow for closely tracking of educational processes and their effects. This is paramount for understanding the evolving trajectory of educational process and its outcomes in the context of teaching mathematics to students with HI (Opfer et al., 2020).

Probing the intricacies of participant characteristics, the analyzed theses spotlight the heterogeneity inherent in the educational settings for students with HI, thereby illuminating the need for tailored, context-sensitive approaches. Detailed examinations were conducted on the characteristics of the participants, such as grade level, age, gender, the number of participants, school types, status of hearing impairment, communication methods, and definition of HI. Age information was either unspecified or ranged from 10 to 18 years. When gender distribution was articulated, it was either balanced or left unmentioned. Such variations in gender data underscore the role of gender considerations in educational research, as learning environments, attitudes, and outcomes can differ between male and female students (Meyer et al., 1994; She, 2000). This highlights the need for educators to be attuned to these potential divergences when formulating teaching plans. The number of participants in the theses varied dramatically, ranging from as few as three to

as many as 126. This range underscores the diverse scales at which these investigations were conducted, each with its own implications for the scope and detail of data collection. Theses involving larger participants pools could lean towards more generalizable conclusions, whereas small-scale theses might offer more detailed insights. Likewise, the students' grade levels spanned from fourth to eleventh grades, and in one instance, teachers were also included as participants. The inclusion of teachers not only adds another layer of complexity but also elevates the discourse around the importance of teacher training and pedagogical strategies in the context of educating students with HI (Li & Miloň, 2022).

Navigating the complex terrain of student diversity in education for the hearing-impaired, the analyzed theses illustrate the intricate variables at play, such as school type, HI status, and communication methods, thereby punctuating the need for an equally nuanced pedagogical lens. Factors like the type of school attended, HI status, and preferred communication methods were meticulously analyzed to adress the diverse challenges and needs of the students. The students were part of various educational settings, including schools specifically for the hearing-impaired and inclusive schools. This diversity in educational settings indicates the profound impact that the type of school can have on educational experiences and outcomes (Li & Miloň, 2022). The status of HI among the participants also varied widely. Some theses focused on students with severe or extremely severe HI, while others included students with varying degrees of impairment. The varying degrees of HI necessitate the development of tailored teaching strategies that cater to the unique requirements of each student (Shields & Lennox, 2017). Additionally, comparative studies were conducted that included students with normal development patterns. While hearing-impaired students are generally considered to have a slower learning process (Drigas et al., 2005; Epstein et al., 1994; Reuterskiold et al., 2010), these comparative studies enrich our understanding of the specific educational impacts of HI. As for communication methods, they varied significantly across the student population. Methods ranged from sign language and the verbal-auditory method to the use of various hearing aids, such as FM systems, behind-the-ear hearing aids, cochlear implants, and no-device use. Individuals with HI have been shown to naturally adopt sign language in conducive environments (Goldin-Meadow, 1993) and use it as a visual-spatial language for communication (Sandler & Lillo-Martin, 2006; Valli & Lucas, 2000). The heterogeneity in communication methods amplifies the need for adaptable, inclusive teaching strategies in the mathematics education of hearing-impaired students. While the emphasis on the verbal-auditory method was not pronounced in the theses, it has been suggested that verbal communication skills for students with HI should be improved (Li & Miloň, 2022; Rudge et al., 2022). Lastly, the term "hearing impairment" was interpreted in eight different ways across the analyzed theses. This terminological diversity underscores the multifaceted nature of HI, affecting students experiences and outcomes in a myriad of ways (Woods, 2022). This comprehensive understanding can further support the development of diverse, tailored educational strategies, acknowledging the unique challenges that students with HI may encounter.

Charting the landscape of instructional innovation, the analyzed theses shed light on a repertoire of effective teaching methods and technological tools, thereby providing a roadmap for enhancing the mathematical learning experiences of students with hearing impairment. These theses provide in-depth insights into an array of techniques and tools that are effective in teaching mathematics to students with HI. Various teaching strategies-such as programmed teaching, computer-assisted education, abacus-based methods, peer teaching, and the employment of digital materials- were underscored for their positive influence on learning outcomes (Adeniyi & Kuku, 2020; Makinde, 2012). A strong correlation emerged between students' mathematical proficiency and their ability to employ these concepts in real-world contexts. This finding accentuates the significance of fostering practical application skills in students, a focus supported by existing literature (Kemp & Vidakovic, 2021; Loi et al., 2020). Moreover, the incorporation of technology into the educational process was shown to markedly enhance both the learning experience and academic outcomes. Such technological integration is not only beneficial but also crucial for optimizing the educational trajectory of students with HI (Liu et al., 2006; Pagliaro, 1998; Suarsana et al., 2019). Interestingly enough, the theses revealed that HI is not the sole variable affecting learning outcomes in mathematics; other factors like students' backgrounds and the specific pedagogical approaches employed

also have a considerable impact. This suggests that a multifaced approach to understanding learning outcomes is necessary, one that considers variables beyond just HI (Tongwa & Atemnkeng, 2019).

Unpacking the synergies of sign language and personalized teaching strategies, the analyzed theses illuminate the complexities and opportunities in fostering mathematical proficiency among students with HI. The theses underscore the pivotal role of sign language as an essential instrument in teaching mathematics to students with HI, particularly when augmented by gestures (Krause, 2019). The research not only identified challenges-such as the difficulty in portraying mathematical problems and verifying calculations, and rationalizing solutions - but also revealed that these students can achieve academic success comparable to their hearing peers when equipped with suitable instructional approaches like computer-assisted teaching (Reuterskiold et al., 2010). A notable correlation emerged between self-efficacy in geometry, proficiency in sign language, and mathematics grades. The utilization of specific pedagogical techniques like abacus-based education and peer teaching appeared to significantly bolster academic performance, especially when accounting for the interconnected dynamics of self-efficacy, sign language proficiency, and academic grades in mathematics (Mtuli, 2015). However, it was observed that even these effective strategies might not substantially alter students' perceptions of fundamental mathematical challenges. This observation accentuates the complex nature of educating students with HI in mathematics, emphasizing multitude of contributing factors and the efficacy of customized teaching approaches.

Serving as a navigational guide through the complex realm of mathematics education for hearing-impaired students, this study categorizes its findings into five pivotal areas: classroom utilization, learning environment structure, consideration of student characteristics, student support, and evaluation methods. The overarching point of these recommendations emphasizes a learner-centered approach, adapting teaching methodologies and learning environments to each student's unique attributes and needs. In the realm of classroom utilization, recommendations showcase long-term individualized problem-solving activities (Ovadiya, 2021; Kelly et al., 2003), the role of sign language (Heslinga & Nevenglosky, 2012), abacus training (Jadhav & Gathoo, 2018), and peer teaching (Burley et al., 1994) as key elements. This focus on classroom utilization aligns with the study’s theme of a learner-centered approach. When it comes to structuring learning environments, the recommendations point toward the incorporation of programmed instruction, dynamic geometry software, and comprehensive mathematics textbooks. Such structural elements take on added significance given that hearing-impaired individuals have access to fewer learning environments compared to their typically developing peers (Wilkens & Hehir, 2008). In the context of student characteristics, the study highlights the need to evaluate problem-solving skills tailored to each student's unique traits along with the use of adaptable software for varying degrees of HI. For student support, the development of enrichment activity booklets and diverse digital materials were observed to be particularly beneficial, a domain where contributions could be invaluable. In evaluation, the study accentuates the necessity for innovative tools to assess the mathematical knowledge of hearing-impaired students (Lahdenperä et al., 2023). The frequent references to sign language, problem-solving activities, and technological aids like dynamic geometry software and digital materials underline their importance in this educational context. Finally, the consistent integration of these elements into teaching practices is crucial (Heslinga & Nevenglosky, 2012; Kelly et al., 2003).

RECOMMENDATIONS

The results of this research present actionable recommendations that are beneficial for educators, policymakers, and researchers in the realm of mathematics education for students with HI. Emphasizing long-term, individualized problem-solving activities can significantly enhance the comprehension of mathematical concepts among these students. Nevertheless, it is crucial to acknowledge that the research is predominantly grounded in graduate theses originating from Türkiye, hence constraining its applicability to broader educational settings. Furthermore, the integration of sign language as a teaching tool for students with HI is of paramount importance. Given the compelling evidence surrounding the advantages of abacus training and peer teaching, educators are encouraged to consider these methods as part of their instructional

strategies. Although the aforementioned teaching methods have exhibited potential, the study highlights a deficiency in the accessibility of specialized training for educators in these particular approaches.

Adjusting the learning environment to include programmed instruction and the utilization of dynamic geometry software can notably elevate the educational experiences of students with HI. However, the present study emphasizes the constraints associated with the lack of comprehensive technological infrastructure in educational environments, which hinders the effective use of these technologies. Alongside these modifications, there's a clear necessity for more detailed mathematics textbooks tailored specifically to the unique learning needs of these students. It is imperative to acknowledge that the availability of these specific materials is presently constrained, underscoring the necessity for additional advancement. When assessing these students, evaluations of their problem-solving skills should be individualized, reflecting the variety and nuances within the HI category. To achieve this, the adoption of adaptable software solutions specifically designed for this demographic is recommended. Nevertheless, the research highlights a constraint in the accessibility and flexibility of these particular software solutions.

In terms of resources, offering enrichment activity booklets alongside a diverse array of digital materials is vital to meeting the educational requirements of students with HI. These resources play a significant role in enhancing their learning trajectories. The primary constraint in this context pertains to the limited availability of resources that educational institutions may encounter while attempting to provide materials that are more comprehensive and diverse in nature. Moreover, there is an urgent call to design bespoke assessment methods that can accurately gauge the mathematical capabilities of this particular student group, ensuring that educators and policymakers have a deeper, more insightful perspective on their academic growth. However, the approaches examined in this study demonstrate a deficiency in the availability of customized assessment tools.

From a policy and broader system perspective, it is essential for policymakers to prioritize integrating these teaching strategies into tailored educational blueprints for students with HI. There's also a pronounced demand for continuous teacher training programs that emphasize best practices specifically tailored for this student group. Initiatives in this direction promise not only to uplift the quality of education but also to foster an inclusive and accommodating learning atmosphere. Nevertheless, the findings of the study suggest that the implementation of systemic changes tends to be a gradual process, so highlighting a constraint in the immediate practicality of these suggestions.

Lastly, the current research landscape indicates discernible gaps in our understanding of education for students with HI. These voids in knowledge present prime opportunities for future scholarly exploration. By leveraging diverse research methodologies and data collection tools, the academic community can gain a more enriched and comprehensive understanding of effective educational practices for students with HI.

Conflict Interest

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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The Effect of Game Integrated Flipped Classroom Applications on Primary School Students' Mathematics Beliefs and Motivation

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ABSTRACT

The aim of this study is to examine the effect of the game-integrated flipped classroom application on the mathematics beliefs and motivations of primary school 3rd grade students. In the study, a quasi-experimental design with pretest-posttest group was used. For this purpose, two 3rd graders, one experimental and one control group, were determined by random sampling method from public primary schools in Aydın province Efeler district. As data collection tools, "Primary School Mathematics Motivation Scale" and "Mathematics Beliefs Scale" were used. Since the data obtained from the scales did not show normal distribution, Wilcoxon signed-rank test was used for intragroup comparisons and Mann-Whitney U test was used for intergroup comparisons. From the obtained results, it was concluded that there was a significant difference in favor of the experimental group in the comparison of the post-test scores of the experimental group and control group students. This shows that the game-integrated flipped classroom application has a positive effect on students' motivation and mathematics belief levels. Considering the positive effect on students' motivation and belief levels, the game-integrated flipped learning approach can be applied to other mathematics subjects as well.

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INTRODUCTION

With the rapid advancement in technology, information has become accessible anytime and anywhere. Especially during the pandemic period, the resources of technology have become more used. During this period, the continuation of education outside the classroom has also been ensured in educational processes. Educational videos and games, in particular, have been prepared to access information on the internet. Jonathan Bergman and Aaron Sams (2012), recognizing developments in technology and its applicability in the classroom, have proposed the "Flipped Classroom Model, which saves students and teachers time in the classroom through the use of technology. The main purpose of this model is to save face-to-face time in the classroom and increase the quality of it by enabling students to learn actively at their own pace (Ekici, 2021). At the same time, in this model, the process of teaching during the lesson will be reversed and the lessons will be recorded in advance and shared with the students so that they can watch them before the lesson and activities such as educational games, digital games, group work, class/group discussions can be carried out during the lesson (Ök, 2019). Flipped classrooms provide opportunities for practice-based, retention-based learning and relearning (Bolat, 2016). Sergis et al. (2018) stated that the flipped classroom caused a significant increase in students' cognitive learning.

Concretization of abstract concepts by students and making them meaningful is essential in the education and training process. Mathematics in particular is a subject with abstract concepts, and therefore, it is essential to implement innovative teaching methods and techniques into the courses to facilitate students' understanding and organization of concepts. The rapid advancement of technology in particular has brought the integration of technology into teaching to light. More recently, mathematics scholars (e.g., Ford, 2015; Ichinose & Clinkenbeard, 2016; McBride, 2015) have suggested that the flipped learning model holds the potential to improve mathematics instruction (Lo et al., 2017). In the flipped classroom model, the teacher serves as a facilitator, guiding students towards autonomous learning (Bergmann & Sams, 2012). The implementation of flipped classroom practices in mathematics education has been shown to increase students' motivation (Bhagat et al., 2016), enable self-paced learning (Ogden & Shambaugh, 2016), enhance academic achievement (Özler, 2020), and evoke positive perceptions (Acar, 2022). However, despite its advantages, flipped learning can also be seen as a disadvantage as students are disconnected from the pre-class learning process (Durmaz & Alkış Küçükaydın, 2021). To address this issue, it is suggested to incorporate gamification into the model (Lo & Hew, 2017).

In the flipped classroom model, learning theoretical knowledge outside the classroom and performing active learning activities in the classroom are at the forefront (Alsancak Sırakaya, 2017). Teachers may differ when planning teaching, and considering the development of primary school students, games can help teachers as an effective technique in planning. In particular, educational games can be learning aids used as reinforces to support traditional learning (Tsai et al., 2012). Manzano-León et al. (2021) there have been a growing number of attempts to combine games and game integration with flipped learning. The introduction of game elements and mechanics into education, the realization of the learning experience in the context of the game, strengthening students' motivation to learn, actively participating in the learning process, and contributing to an entertaining experience for the things to be learned make students more focused on their learning (Choi & Choi, 2021; Kim et al., 2018; Choi, 2016). The most important feature of environments supported by games is that they provide a learning environment where students are enthusiastically and willingly active (Yıldız et al., 2017). In this way, children test new ideas and concepts and apply problem solving and reasoning skills (Akman, 2002).

In the primary school period, we can use technology and games intertwined to ensure that students actively participate and make better sense of concepts. Children in this period can make information more meaningful through games. The topic of length measurement, which has an important place in the primary school mathematics curriculum, has a critical importance in the acquisition of basic concepts related to measurement (Tan-Şişman & Aksu, 2012). Length measurement can be expressed as the baseline of the concept of measurement in terms of being the first feature that students learn, and it forms the basis for other

measurement areas such as area measurement, perimeter measurement, etc. (Van de Walle et al., 2019). Since students have difficulties in understanding and associating the concepts of length measurement, they draw conclusions by using the formulas they have learned by heart (Tan-Şişman & Aksu, 2009). In this sense, mathematics courses supported by technology and games can contribute to students' learning. It can be said that students will be more active especially in primary school mathematics courses and permanent learning can be supported with technology supported teaching processes.

Game-integrated flipped learning is a learning method that emerged by integrating digital and educational games within the flipped learning model. In this method, students are taught in a way to plan their own learning outside the school with mini videos prepared, and when they come to the classroom, the things they have learned from the mini videos is reinforced by digital and educational games planned by the teacher. In this sense, it supports students to make their knowledge more permanent. Demirel (1999) described educational games as activities that are used to reinforce the place of information in the memory with the necessary repetitions in a certain environment such as a classroom in order to enable learning (cited in Çangır, 2008).

Research has shown that integrating digital games into instructional content can support student motivation, engagement, and sustained attention (Barab et al., 2007; Gee, 2007; Squire & Jan, 2007; Ketelhut & Schifter, 2011; Sánchez & Olivares, 2011; Chang et al., 2012; Hung et al., 2014). Looking at the literature, it has been concluded that the use of flipped learning in teaching has a positive effect on students (Strayer, 2007; Howell, 2013; Çukurbaşı, 2016; Tao et al., 2016; Ekmekçi, 2017; Gökdaş & Gürsoy, 2018; Yorgancı, 2020). Regarding the use of flipped learning integrated with games during teaching, the study of Li, Hou, Li and Kuo (2022) stands out. Therefore, this study aims to reveal the effect of mathematics courses supported by flipped classroom applications integrated with games on students' mathematics beliefs and motivation levels. The problem of the research is: What is the effect of flipped classroom applications integrated with games on the mathematics motivation and belief levels of 3rd grade primary school students?

METHOD

Research Design

This research, in which the effect of mathematics courses supported by game-integrated flipped classroom applications on students' mathematics beliefs and motivation levels was investigated, was an experimental study and consists of a quasi-experimental design with pretest-posttest control group. It was used to reveal the effect of experimental procedures on dependent variables and enabled the data obtained as a result of the research to be interpreted by making cause and effect associations (Creswell, 2016). Accordingly, the quasi-experimental design plan with pretest-posttest control group in the study is shown in the table below.

Table 1. *Design for the research process*

Groups	Pre-Test	Process	Post-Test
Experimental Group	Mathematics Beliefs Scale (MBS) Primary School Mathematics Motivation Scale (PSMMS)	Game integrated flipped classroom practices	Mathematics Beliefs Scale (MBS) Primary School Mathematics Motivation Scale (PSMMS)

Control Group	Mathematics Beliefs Scale (MBS) Primary School Mathematics Motivation Scale (PSMMS)	Practices for the existing curriculum	Mathematics Beliefs Scale (MBS) Primary School Mathematics Motivation Scale (PSMMS)

The independent variable of the study consisted of game-integrated flipped classroom practices while the dependent variable consisted of students' beliefs and motivation levels about the mathematics course.

Research Sample

The study group consisted of students studying at the 3rd grade level in primary schools in the Efeler district of Aydın Province in the 2022-2023 academic year. Simple random sampling method, one of the random sampling methods, was used in the study. Büyüköztürk et al. (2018) stated that all units in the universe have an equal and independent chance to be selected as a sample for simple random sampling. In this sense, an experimental and a control group were randomly selected from 3rd grade students studying at a state primary school in Aydın province Efeler district. Efforts were made to ensure that the selected groups were close to each other for the experimental study. The experimental group consisted of 15 students and control group consisted of 14 students. Within this sense, when comparing, coordination was tried to be ensured in terms of variables such as gender, achievement, and socioeconomic level. To compare students in terms of success, evaluations were made based on common exams on a school basis. Two third-grade classes whose exam success levels were close to the same level formed the experimental and control groups. For this, classes that were close to each other in terms of success were determined in a school located at the middle socio-economic level.

The distribution of the students in the study group according to gender variable is given in Figure 1.

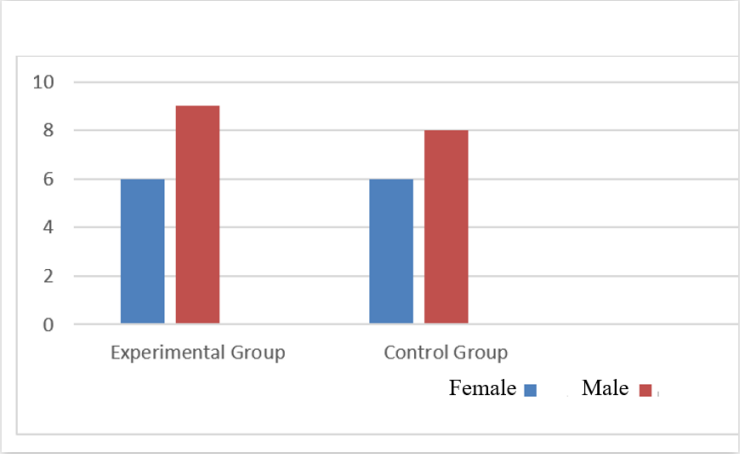

Figure 1. *Gender Distribution of the Students in the Study Group*

As seen in Figure 1, there were 6 female students in both groups. While there were 9 male students in the experimental group, there were 8 male students in the control group.

Data Collection Tools and Processes

In the study, the 5-point Likert-type scale "Mathematics Beliefs Scale (MBS)" developed by Aksu, Demir, and Sümer (2002) was used to determine the effect of the mathematics course supported by game-integrated flipped classroom practices on students' beliefs about the course. There were 20 items in the scale and the items measured the sub-dimensions of learning mathematics (Cronbach's alpha value .75), using mathematics (Cronbach's alpha value .71) and the nature of mathematics (Cronbach's alpha value .66). The

Cronbach's alpha value for the whole scale was .75. In this study, the reliability coefficient for the whole scale was calculated as .75 and for the sub-dimensions as .70, .71 and .71 respectively.

The Primary School Mathematics Motivation Scale (PSMMS), a 3-point Likert scale developed by Ersoy and Öksüz (2015), was used to determine its effect on motivation. There were 33 items in the scale. The scale was intended to determine the degree of motivation towards mathematics by scoring I agree (3), somewhat agree (2), disagree (1). Conducting a reliability test before the study, the reliability coefficient of the scale was found to be .87.

Research Implementation Process

The process regarding the implementation of the research was as following:

After obtaining the necessary permissions to start the research, videos were prepared for the game integrated flipped classroom practice as required by the lesson plan units and outcomes. In addition, questions were prepared on the web 2.0 tool (Wordwall) that could be used for evaluation. The researchers interviewed two classroom teachers in the videos prepared for teaching the subject of length measurement within the scope of the primary school 3rd grade mathematics teaching program. Information was shared about the teaching process and what to do to help students understand the subject regarding length measurement. Support was received from a faculty member who is an expert in instructional technologies in transferring the subject to video and creating the video.

Wordwall questions were created within the framework of the opinions of mathematics field experts and measurement and evaluation field experts. These videos and questions were shared with different classroom teachers and some corrections on important points in the subject expression and question levels were completed in line with their opinions.

Educational games prepared by Aykaç and Köğce (2021) were used in the classroom. These games were about the relationship between meters and centimeters, as well as kilometers and meters, and the writing of values given in meters as centimeters, that is, converting length measurement units. Three educational games were selected by taking the opinions of the mathematics expert and the classroom teacher. These educational games were played by the researchers with material support during one and a half class hours.

The lesson plan for the game-integrated flipped classroom practices planned by the researchers for the experimental group was implemented by the researchers for 2 weeks as required by the unit and learning outcomes.

In determining this period, the course hours foreseen for teaching the subject of length measurement in the curriculum were taken into consideration. Additionally, Palmer (2005) considered the fact that students' motivation was motivated by even a reward that could be given to them during the course; As Sezgin Memnun and Akkaya (2010) stated in their study of mathematics beliefs, considering that the course content is closely related to beliefs, a two-week period was deemed sufficient. For the study, a game that would attract students' attention was integrated into the education and training process, and flipped learning was applied. During this process, the control group carried out their lessons within the lesson plan of the existing teaching plan. To prevent the videos from being seen by the students in the control group, the researcher created a separate Google classroom and WhatsApp system for the videos. Educational games were played by the experimental group students and the classroom teachers in the classroom. The lessons in both groups were taught by the class teachers of those classes.

At the end of the implementation, mathematics belief and post-tests were applied to the study group.

Table 2. *Illustration of the Research Implementation*

Research Implementation		
Grade Level	Third Grade	
Learning Domain	Measuring	
Sub Learning Domain	Measuring Length	
Resources Required	Mini videos, ruler, measuring tape, cards for educational games	
	Before Class	**During Class**
Activities	Note taking, watching lecture videos	Within the scope of the educational games "1 meter is 100 centimeters", "Convert the unit of length measurement while turning", and "I know kilometers and meters", and digital games prepared through Wordwall were used.
Methods of Evaluation	Answering the questions in the videos before coming to the classroom.	Class discussions about the videos, playing digital games and educational games.

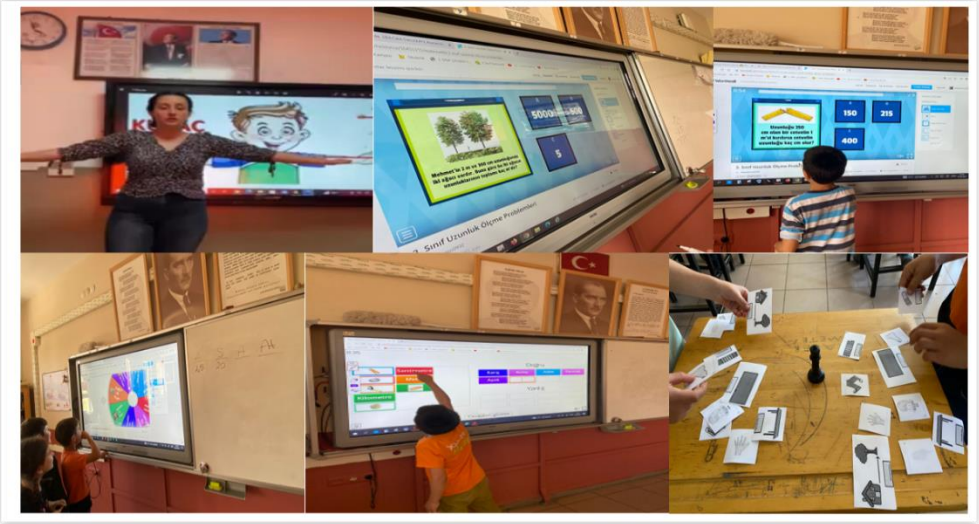

Figure 2. *Practices images*

In the practices, digital games prepared by the researchers were used. Interviews were held with the mathematics field expert, classroom teacher and an assessmeny and evaluation expert regarding the suitability of the content of the games. In addition, the educational games prepared by Aykaç and Köğce (2021) were used with permission.

Data Analysis

The data obtained in the study were analyzed with SPSS 27.0 package program. In the study, Mann-Whitney U test was used for inter-group comparisons and Wilcoxon signed-ranks test was used for intra-group comparisons to compare the data obtained with the mathematics motivation and belief scale in the experimental group where the teaching was carried out with the game-integrated flipped learning practice and in the control group where teaching was carried out with the current program.

To determine the effect of game-integrated flipped learning, statistical analyzes were conducted to determine the equivalence of students in both the experimental and control groups in terms of their mathematics beliefs and motivations. First, normality analysis was performed to test whether the data obtained in the study had a normal distribution and it is shown in the table below.

Table 3. *Normality Analysis Results*

Groups	Tests	Scales		Shapiro-Wilk		
				Statistics	Sd	p
Experimental	Pre	Mathematics Beliefs Scale	Learning Mathematics	0,771	0,862	0,00
			Using Mathematics	0,654	1.280	0 .00
			The Nature of Mathematics	0,898	0,961	0,04
		Motivation Scale	Motivation	0,742	6,01	0 .00
	Post	Mathematics Beliefs Scale	Learning Mathematics	0,931	4,93	0,02
			Using Mathematics	0,955	2,48	0,04
			The Nature of Mathematics	0,898	1,44	0,04
		Motivation Scale	Motivation	0,874	7,92	0,03
Control	Pre	Mathematics Beliefs Scale	Learning Mathematics	0,545	0,611	0,00
			Using Mathematics	0,681	0,938	0,00
			The Nature of Mathematics	0,919	1,05	0,01
		Motivation Scale	Motivation	0,867	5,66	0,01
	Post	Mathematics Beliefs Scale	Learning Mathematics	0,877	2,21	0,04
			Using Mathematics	0,835	1,45	0,01
			The Nature of Mathematics	0,843	1,27	0,01
		Motivation Scale	Motivation	0,881	3,90	0,04

As seen in Table 3, when the data collected from the scales of the students in the groups were analyzed with the Shapiro-Wilk test, it was seen that the significance values were less than 0.05 and the normality of the data was not ensured (p<.05). At the same time, it was seen that the number of groups included in the research was less than 30.

In order to test whether the mathematics beliefs and motivation pre-test results of the students in the study group were equivalent to each other, Mann-Whitney U test, was performed. The values obtained as a result of the analysis are shown in Table.

Table 4. *Pretest results of the study group*

	Scales	Group	N	Rank Mean	Rank Mean	U	p
Mathematics Beliefs Scale	Learning Mathematics	Experimental	15	17.37	260.50	69.50	.73
		Control	14	12.46	174.50		
	Using Mathematics	Experimental	15	15.07	226.00	104.00	.95
		Control	14	14.93	209.00		
	The Nature of Mathematics	Experimental	15	16.33	245.00	85.00	.35
		Control	14	13.57	190.00		
Motivation Scale	Motivation	Experimental	15	16.30	244.50	85.50	.38
		Control	14	13.61	190.50		
Mathematics Beliefs Scale	Learning Mathematics	Experimental	15	17.37	260.50	69.50	.73
		Control	14	12.46	174.50		
	Using Mathematics	Experimental	15	15.07	226.00	104.00	.95
		Control	14	14.93	209.00		
	The Nature of Mathematics	Experimental	15	16.33	245.00	85.00	.35
		Control	14	13.57	190.00		
Motivation Scale	Motivation	Experimental	15	16.30	244.50	85.50	.38
		Control	14	13.61	190.50		

In Table 4, the significance values of the three dimensions of the mathematics belief scale, namely "learning mathematics", "using mathematics" and ""the nature of mathematics", and motivation scale were greater than .05. According to the pre-test results of the two groups, there was no statistically significant difference in the sub-dimensions of the Mathematics Belief and Motivation Scale. The pre-test results of both

groups showed that the groups consisted of equivalent groups (p>.05).

FINDINGS

In the study, Wilcoxon Signed Ranks test was used to compare the mathematics belief and motivation pre-test and post-test scores of the experimental group students. The results obtained as a result of the analysis are given in the table below.

Table 5. *Analysis Results of Experimental Group Students' Mathematics Motivation and Belief Pre-post Tests*

	Scales	Group	End measurement-start measurement	N	Rank Mean	Rank Total	z	p
Mathematics Beliefs Scale	Learning Mathematics	Experimental	Negative Ranks	2	1.50	3.00	-3.244	.001
			Positive Ranks	13	9.00	117.00		
			Non-difference	0				
	Using Mathematics	Experimental	Negative Ranks	0	.00	.00	-3.417	.000
			Positive Ranks	15	8.00	120.00		
			Non-difference	0				
	Nature of Mathematics	Experimental	Negative Ranks	0	.00	.00	-3.420	.000
			Positive Ranks	15	8.00	120.00		
			Non-difference	0				
Motivation Scale	Motivation	Experimental	Negative Ranks	0	.00	.00	-3.408	.000
			Positive Ranks	15	8.00	120.00		
			Non-difference	0				

The results of the analysis in table 5 show that there was a statistically significant difference between the mathematics motivation levels of the students in the experimental group before and after the application (z=-3.408, p<.05). At the same time, in the results of the Wilcoxon Signed Ranks test there was a statistically significant difference between the mathematics belief sub-dimensions (learning mathematics, using mathematics and the nature of mathematics) of the experimental group students before and after the application (learning mathematics z=-3.244, p<.05; using mathematics z=-3.417, p<.05; nature of mathematics z=-3.420, p<.05) and after the implementation, a statistically significant difference was observed between the mathematics belief levels before and after the implementation. According to these results, the fact that the scores were in favor of the positive ranks (after the implementation) showed that the game-integrated flipped learning classroom practices had a significant effect on mathematics belief and motivation levels.

Within the scope of the current curriculum, Wilcoxon Signed Ranks test was applied to determine whether there was a significant difference between the scale mean scores of the students in the control group before and after the lesson. The results obtained from the analysis are given in the table below.

Table 6. *Analysis results of mathematics motivation and belief pre-post-tests of control group students*

	Scales	Group	End measurement-start measurement	N	Rank Mean	Rank Total	z	p
Mathematics Beliefs Scale	Learning Mathematics	Control	Negative Ranks	0	.00	.00	-2.379	.017
			Positive Ranks	7	4.00	28.00		
			Non-difference	7				
	Using Mathematics	Control	Negative Ranks	0	.00	.00	-1.633	.102
			Positive Ranks	3	2.00	6.00		
			Non-difference	11				
	The Nature of Mathematics	Control	Negative Ranks	1	2.00	2.00	-1.518	.129
			Positive Ranks	4	3.25	13.00		
			Non-difference	9				
Motivation Scale	Motivation	Control	Negative Ranks	1	3.50	3.50	-1.084	.279
			Positive Ranks	4	2.88	11.50		
			Non-difference	9				

In Table 6, according to the results of analysis, there was no statistically significant difference between the mathematics motivation levels of the students in the control group before and after the application (z=-1.084, p>.05). As a result of the analysis, no statistically significant difference was found between the sub-dimensions of the mathematics belief levels (learning mathematics, using mathematics and the nature of mathematics) of the control group students before and after the lesson (using mathematics z=-1.633, p>.05; the nature of mathematics z=-1.518, p>.05). Only within the scope of the learning mathematics dimension, a statistically significant difference was observed in terms of the processing of the courses in the current curriculum (learning mathematics z=-2.379, p<.05). In the sub-dimension of learning mathematics, positive ranks also appear to be different. Although the difference in the use of mathematics and the nature of mathematics sub-dimension and the positive ranks of the motivation scale was very small, it was not considered as significant. In this case, it can be said that the topics learned affected students' learning beliefs. However, it was seen that the lessons taught within the scope of the current curriculum did not have a significant effect on the mathematics motivation, using mathematics and nature of mathematics levels of the control group students.

Mann-Whitney U test was conducted to determine whether there was a significant difference between the pretest-posttest means scores of mathematics beliefs and motivation of the students in the experimental group in which game-integrated flipped classroom practices were taught and the control group in which the courses were taught within the scope of the current curriculum. The results are given in the table 7 below.

Table 7. *Analysis results of mathematics motivation and belief post-tests of experimental and control group* students

	Scales	Group	N	Rank Mean	Rank Total	U	p
Mathematics	Learning Mathematics	Experimental	15	20.00	300.00	30.00	0.01

		Control	14	9.64	135.00		
	Using Mathematics	Experimental	15	22.00	330.00	.00	0,00
		Control	14	7.50	105.00		
	The Nature of Mathematics	Experimental	15	22.00	330.00	.00	0,00
		Control	14	7.50	105.00		
Motivation Scale	Motivation	Experimental	15	21.43	321.50	8.50	0,00
		Control	14	8.11	113.50		

In table 7, a statistically significant difference was observed between the motivation levels after the implementation (U=8.50, p<.05). This result shows that game-integrated flipped classroom practices had a significant effect on students. There was a significant difference in favor of post-test scores within the scope of mathematics belief scale sub-dimensions. Mathematics belief scale sub-dimensions, a statistically significant difference was observed in the mathematics learning sub-dimension (U=30.00, p<.05), using mathematics sub-dimension (U=0.00, p<.05) and the nature of mathematics sub-dimension (U=0.00, p<.05). This result showed that game-integrated flipped classroom practices had a significant effect on students' mathematics belief levels.

DISCUSSION, CONCLUSION, RECOMMENDATIONS

In this study, classroom applications were carried out by integrating games into the flipped learning approach. With these applications, the effects of the activities carried out within the scope of the current curriculum on the mathematics belief and motivation levels of primary school third grade students were investigated. It was concluded that there was a significant difference in favor of the experimental group between the mathematics course motivation levels of the experimental group students who were taught with game-integrated flipped classroom practices and the control group students who were taught within the scope of the current curriculum. This situation created a positive effect on students' motivation for the lesson with game-integrated flipped classroom practices. Primary school 3rd grade students received distance education for a while during the pandemic process. In this case, it can be said that the students were familiar with the internet distance education process. In this way, the flipped learning model could also be a suitable method for these students. The literature shows that the flipped classroom implementation increased students' motivation (Çukurbaşı, 2016; Strayer, 2007; Ekmekçi, 2017; Pawelczak, 2017; Yorgancı, 2020). However, Gökdaş and Gürsoy (2018) concluded that the flipped classroom model did not make any difference in students' motivation.

A significant difference was observed between the post-test scores of the experimental and control group students in the mathematics belief scale the nature of mathematics, mathematics belief and using mathematics sub-dimensions, indicating that game-integrated flipped classroom practices had a significant effect on students' mathematics belief levels. This can be said to have a positive effect especially on students' learning and using mathematics. Howell (2013) concluded that the Flipped Classroom Model facilitates students' learning by increasing student responsibility. Li, Hou, Li, and Kuo (2022) showed that the mini-game-based flipped classroom model had significantly higher scores than the control group in terms of learning performance and acceptance. In recent years, as a result of the rapid integration of technology in the

education and training process, flipped learning studies can be planned in which software is more integrated in mathematics courses.

In this study, the motivation and belief levels of the game-integrated flipped classroom practices and the lessons taught within the current curriculum were compared. However, Ahmet (2017), in his study on a third-grade level English course, revealed that the Flipped Classroom Model prepared with educational games gave more successful results than the normal Flipped Classroom Model (cited in Özler, 2020). With this result, comparisons can be made between the game-integrated flipped classroom and the lessons taught with flipped learning.

Within the scope of this study, students' mathematics motivation and belief levels were evaluated. Yorgancı (2020) investigated the effectiveness of the flipped learning model in mathematics courses on associate degree students and concluded that there was an increase in students' mathematics achievement and motivation. The increased use of online education, especially during the pandemic period, has increased students' internet access and use. Considering this, the flipped learning model can be used in different subjects in the fields of learning numbers, geometry, data and measurement in the mathematics course, and students can be compared in terms of success, attitude, and anxiety.

This study is a quantitative study. However, within this scope, studies on mixed research method can be conducted by supporting qualitative studies in which students' opinions are taken and student documents are analyzed. Primary school students like to play games depending on their age and for this reason, flipped learning classroom applications in which different games (verbal games, mechanical games, intelligence games, etc.) are integrated and qualitative studies in which student opinions are taken can be planned.

This study was supported by the game-integrated flipped learning application. Educational games were used in the classroom and the Web 2.0 tool was used for evaluation. With the rapid increase of the internet and softwares, flipped classroom applications with digital game integration can be used, where digital games (applied individually or in groups) are used more frequently. After these applications, students' problem solving processes and skills can be evaluated.

By incorporating technology into the teaching process, teachers can also gain information about different methods, techniques and applications. In this sense, in the study conducted by Dere and Akkaya (2022), they concluded that social studies teachers used EBA, Zoom and some Web 2.0 tools as educational technologies during the distance education period. In line with this result, seminars can be organized for classroom teachers, especially on Web 2.0 tools and flipped learning. Flipped teacher training can also be organized for teachers. In the study conducted by Yaylak (2021), it was concluded that prospective teachers received quick feedback on the tasks given in the lessons conducted with Google Classroom, and errors were observed.

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The Effect of 7th Grade "Cell and Divisions" Unit Teaching with Augmented Reality Technology on Students' Academic Achievement[1]

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Cell and division

ABSTRACT

This study was carried out to determine the effect of the 7th grade 'Cell and Divisions' unit of the science course with augmented reality technology on the academic achievement of the students. The study group of this research, which was prepared in the "pretest-posttest control group" quasi-experimental model, consists of 79 students in the 7th grade attending a public school in the Antakya district of Hatay province in the 2017-2018 academic year. There are 40 students in the experimental group and 39 students in the control group. While the "Cell and Divisions" unit was taught to the experimental group students by using active learning, technology-centered and internet interactive learning methods with augmented reality applications, the control group students received regular education in line with the program. The application was completed by the researcher within 16 lesson hours. The "Cell and Divisions Achievement Test" (CDAT), which was used as a data collection tool and for which validity and reliability studies were conducted, was administered to both groups before and after the application. In the analysis of the collected data, dependent and independent t-tests from statistical procedures were tried to be analyzed using SPSS 21 package program. At the end of the evaluation of the data; it was concluded that the academic achievement of the students in the experimental group was significantly higher than the students in the control group and the effect size was calculated intermediate level effect. It is thought that the use of augmented reality applications in science courses may have positive effects on students' achievement.

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[1] This article is derived from the master's thesis completed by the first author under the supervision of the second author.

INTRODUCTION

In the 21st century, with the development of technology and science, the dimensions of technological tools and applications are getting smaller and smaller, while their impact on people is increasing, which leads to a differentiation in the technological knowledge of students. Technological breakthroughs, which have an important place in the rapid development and changes in the world, inevitably affect the world of education and training. In particular, the rapid changes and inventions in information technologies in recent years have brought significant contributions to the field of education and training as well as the comfort and benefits they bring to all areas of life (Yuen et al., 2013; Pamuk et al., 2013; Somyürek, 2014; Karacaoğlu,2020; Dere & Demirci, 2021). Information and communication technologies have an important role to play in ensuring intercultural and interdisciplinary integration. The importance given to lifelong learning in developed countries is increasing day by day. Although schools have an important place in the achievement of knowledge, they alone are not considered sufficient in today's conditions. For this reason, a new term "learning to learn" is emerging, triggered by developments in education and information technologies (Karacaoğlu, 2018).

When the studies on the nature of technology are examined, it is known that the views on the nature of technology are limited to electronic devices, cell phones and computers, and there are suggestions that studies on this subject should be studied further (Lewis, 1999; Jones & De Vries, 2009; Volk & Dugger, 2005; Topkaya et al., 2015). For this reason, it is thought that each member of the society should be aware of the nature of technology. Williams (2000) states that students should perceive technology in a holistic approach rather than something separated into theory, content, application or process. While society expects citizens to access, use and analyze data, it also requires the use of science and technology. This will be possible through science and technology literacy (Özcan & Yılmaz).

As stated in the science curriculum, it is aimed to raise all individuals as science literate. For this purpose, a holistic perspective was adopted in the Science Curriculum, which was renewed in 2018; in general, the research-questioning-based learning strategy based on the transfer of knowledge, in which the student is responsible for his/her own learning, active participation in the process is ensured by Ministry of National Education (MEB, 2018).

In addition to scienctific literacy, science education also has various purposes for students. Technology has become an indispensable part of our lives thanks to easily accessible and usable applications on tablet computers and smartphones, which are called portable technology. According to TUİK (Turkish Statistical Institute, 2014), the computer usage rate of individuals between the ages of 16-24 is 70.3%, while the internet usage rate is 73.3%. These percentages are increasing every year. When the statistical data are analyzed, it can be said that the use of technology will increase and change according to the needs of society. The effects of the developments in technology have also been in the field of education and science education. Although computer-mediated technologies, or in other words online technologies, have been developed to replace face-to-face interaction, it is a question mark whether they can actually replace the face-to-face interaction seen in the classical classroom environment (Usta & Mahiroğlu, 2008).

Computer-based learning strategies have been used for many years. Recently, many mobile applications have been developed as computers have become portable with mobile devices such as tablets and phones. One of these applications is augmented reality (AR) applications. Mobile augmented reality applications are used in smart glasses, tablet computers and smartphones. Although AR applications used in these devices are basically built on the same logic, they have different features in themselves. Some of the features of AR applications enable their use in educational studies (Specht,et al., 2011).

AR technology first emerged from the work of Ivan Sutherland and his students with computer

graphics at Utah and Harvard Universities in the 1960s and was developed in the 1970s. While AR technology was first officially used in the United States Air Force and NASA, it became widespread and reached more masses after the 1990s (Feiner, 2002). AR technology is an environment where people interact with virtual objects placed in the real world environment through different applications. According to Milgram and Kishino (1994), it is the state of reality obtained with virtual objects placed in the real world environment.

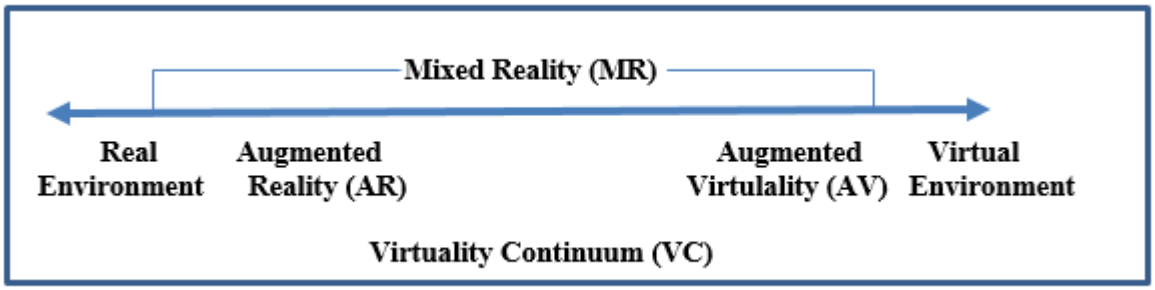


Figure 1. *Augmented reality (AR) Demonstration (Milgram and Kishino, 1994).*

Although research on AR has increased in recent years, most of the research is related to how it is used in learning and teaching (Dunleavy & Dede, 2014). The studies conducted in Turkey are mostly related to physics subjects, but however, there are few studies on the use of AR in biology courses (Arslan, et. al., 2020; Özeren & Top, 2023).

Supporting the teaching environment with visual materials keeps the attention of learners alive, concretizes concepts, and simplifies difficult subjects. It is thought that AR will also have a share in providing this visuality. The recent development of AR technology is remarkable. With AR technology, images combining real and virtual environments have been used in the fields of informatics, education, military, entertainment and health, and simultaneous interaction between environments has been provided (Azuma, 1997).

AR is a multidisciplinary field of computer science that includes computer-human interaction, 3D computer graphics, computer vision, and computer vision, where computer graphics are embedded into real video images in real time, combining virtual reality and the real world (Dias, 2009). Similarly, Cai et al. (2013) defined AR as the transfer of computer-generated two- or three-dimensional virtual information to the real environment with the help of human-computer interaction techniques, computer vision techniques, sensory technologies, 3D graphics technology and multimedia techniques. According to Hsiao et.al, (2012), AR is the projection of virtual objects onto the real world in order to provide interaction between different users.

AR has been used in computer-based applications for many years, but recently it has started to be used in mobile devices with applications developed for mobile devices. Mobile AR applications are mobile applications that enable the creation of augmented reality through a mobile device (smartphone, tablet) and use images, locations or pointer symbols.

When AR applications are analyzed, they are examined as location and image based. Both applications have different and common aspects. Location-based AR applications use the location data of mobile devices with the support of WiFi or GPS systems and transfer the information created on the computer to the mobile screen of the person simultaneously (İbili & Şahin, 2015). The location-based AR application is shown in Figure 2.

Figure 2. *Location based AR example*

When image-based AR systems are examined, the objects defined in the AR environment (photograph, motion, graphic image, sound detection and logo) are used as pointers and graphics, virtual data, or 2D/3D objects are added according to the points determined by analyzing the image of the pointer taken with the camera (Abdusselam & Karal, 2012).

In order to improve the quality of science education, it is considered important to enable students to perceive abstract concepts and to present these concepts to students in a visually enriched way. The use of AR applications in teaching socio scientific issues, astronomy and the structure of matter, which are abstract to students, will create a concrete learning environment by contributing to visuality.

There are various studies on the use of AR in science teaching. In these studies, it is stated that teaching is concretized with AR and students' progress according to their own learning pace. In studies in which not only students but also teachers were included in the study group (Dunleavy et.al, 2009; Clarke, 2013), research was conducted on the beneficial and negative aspects of the use of AR, technological difficulties and feedback from students. Some AR applications for the use of AR in science education are given in Figure 3 (Somyürek, 2014).

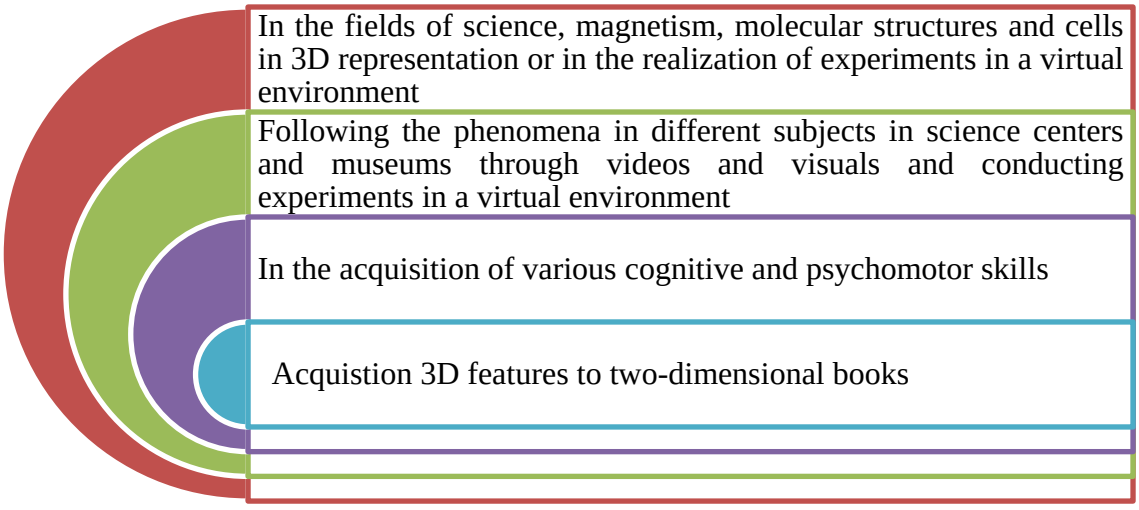


Figure 3. *Uses of AR in Science Education*

Science subjects are made up of events and phenomena that we live and experience in our lives. Precisely, science is intertwined with our daily lives. The fact that science subjects are not selected from students' daily lives prevents the internalization of knowledge and causes students to think that these subjects belong only to laboratories and their concrete environment (Laçin Şimşek, 2011).

Yeşilyurt and Kara (2007) emphasize that the constructivist model approach should be adopted in science teaching. It is not possible to construct knowledge with traditional teaching approaches. For this reason, it was stated that technology-supported teaching would be effective in the structuring process (Kurt, 2006). In order for students to learn science concepts, they should be actively involved in the

teaching process and a teaching environment in which active participation is ensured should be created.

AR-supported learning environments in which information technologies are used can present objects to students as if they were real, thus providing effective learning (Altun & Büyükduman, 2007). In order for students to better understand the subject of cell and divisions, technological content supported by 3D objects should be presented to the learning environment. Students should have the ability to see and comprehend the basic parts of the cell, organelles and their functions, and the characteristics of mitosis and meiosis from different angles. The fact that these topics are interesting increases students' willingness to learn (Yair, 2001). In addition, supporting the teaching process with three-dimensional and interactive images instead of tools in learning environments created with two-dimensional drawings will add a new dimension to the teaching material. With AR technology, which is rapidly being integrated into educational environments, it aims to increase the quality of education, students' achievement, motivation and attention (Korucu et al., 2016).

The main problem of the study was determined as "Do teaching practices supported by AR activities have an effect on students' academic achievement in the teaching of 'Cell and Divisions' unit in Science course?". The sub-problems of the research are as follows;

1. Is there a significant difference between the pretest CDAT scores of the experimental and control group' students before the AR application?
2. Is there a significant difference between the scores of the experimental and control group' students from the CDAT after the AR application?
3. Is there a significant difference between the pretest and posttest CDAT scores of the experimental group (EG) students who participated in the lesson with AR applications?
4. Is there a significant difference between the pretest and posttest CDAT scores of the students in the control group (CG) in which the lessons were planned with the methods suggested by the current curriculum?

METHOD

Quasi-experimental research design, which is one of the quantitative research methods, was used in the study and can be used in cases where control and experimental groups cannot be formed randomly and pre-existing classrooms are used. In this method, experimental and control groups are compared with an intervention without random assignment (Fraenkel & Wallen, 2000; McMillan & Schumacher, 2010). In both groups of the study, the "Cell and Divisions" unit in the science curriculum updated in 2018 was taught. While cell cards developed with AR technology were used in the EG, the CG was taught with the existing textbook and the existing curriculum. "Cell and Divisions Achievement Test" was used to determine the achievement of the students in both the experimental and control groups before and after the application. Since the post-test was carried out by applying different applications to the two groups in the study and the differences and relationships that may occur between the groups were determined, the comparative unequal groups' post-test model was used in the study. The research model of the study is presented in Figure 4.

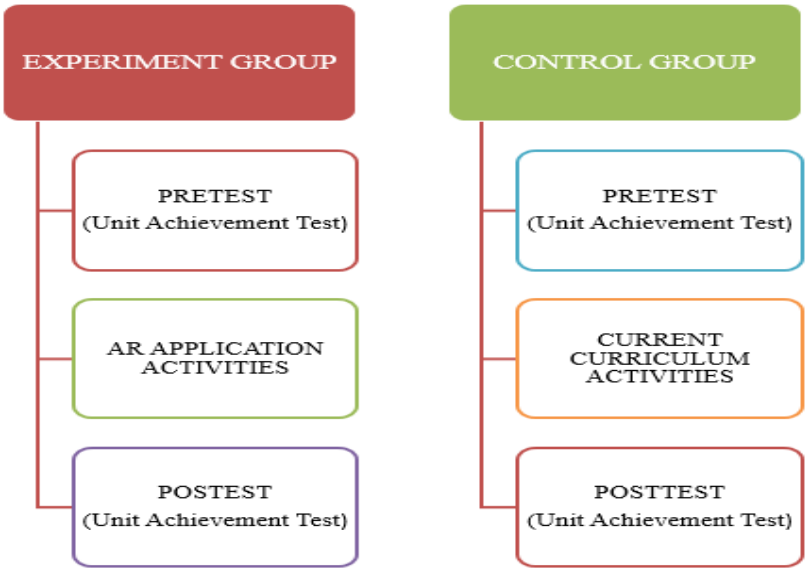


Figure 4. *Research model*

The study group consisted of 79 students attending the 7th grade in a public secondary school in Antakya district of Hatay province in the 2017-2018 academic year. Demographic information about the sample is presented in Table 1.

Table 1. *Data of research group*

Groups	Female	Male	Total
EG	18	22	40
CG	20	19	39
Total	38	41	79

As a data collection tool, the "Cell and Divisions Achievement Test" (CDAT) was used before and after the application to both groups. CDAT consists of 32 questions. After the pilot application of the test, 7 test questions were removed from the test because their discrimination index was below .30, leaving 25 questions remaining. The KR-20 and descriptive statistics results of HBBT are given in Table 2.

Table 2. *CDAT pilot study KR-20 and descriptive statistics results*

Number of questions	N	X	SD	KR-20
25	162	14,75	4,77	0,78

When Table 2 is examined, KR-20= 0.78 was found in the test. This value shows that the test is a reliable test. As a result of the statistical procedures, the test variance was found to be 25.72.

In this study, the achievements stipulated by the curriculum developed by the Ministry of National Education (MEB) in 2018 were applied to the experimental and control groups with different teaching methods. The applied teaching methods are the independent variables of the research. In this study, the achievements stipulated by the curriculum developed by the Ministry of National Education in 2018 were

applied to the experimental and control groups with different teaching methods. The dependent variable used in this study is the academic achievement of the students in the cell and divisions unit of the science course.

Since it may cause bias in the study, the researcher taught both groups. Most of the AR materials used in the EG were created by the researcher. The rest were downloaded as mobile applications from play store and app store. The lessons in the experimental and control groups were completed in a total of 16 hours in 4 weeks, 4 hours each week.

The following steps were followed in order the applying the method prescribed by the current curriculum to the CG.

Achievement 1. "Compares plant and animal cells and cells in terms of their parts and functions": The activity on page 24 of the textbook was carried out in line with the answers received from the students. Then, students were shown the visuals of plant and animal cells and asked about the similarities and differences between the visuals.

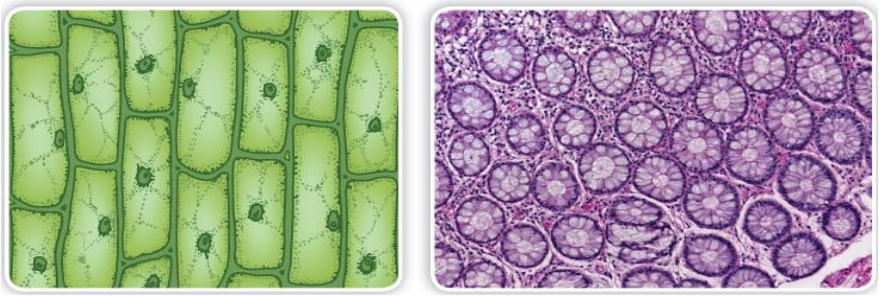


Figure 5. Images of Plant and Animal Cells

Visuals of plant and animal cells were given, the basic parts of the cell and organelles were emphasized and students were asked to make plant and animal cell models.

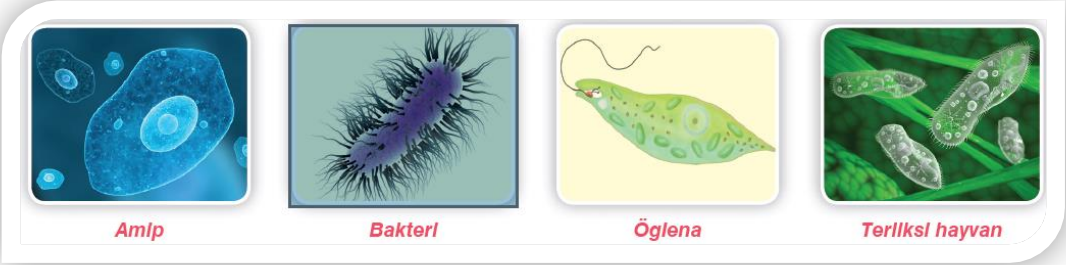
Image 1. *Examples of the activities carried out by the students in the CG during the implementation process*

The cell models made by the students were evaluated and feedback and corrections were given to the students about the organelles and their functions. The students were asked "Which material represents what in the models you made as cell model. What are the similarities and differences between the models you made and the models made by your friends?" and the answers were analyzed and evaluated.

Achievement 2. "Discusses the views on the structure of the cell based on technological developments": It was stated that the human eye can see objects larger than 200-250 micrometers, and that microorganisms cannot be seen with the eye due to their smaller size. It was mentioned that there is a special magnifying device to see these creatures, and opinions about the cell were expressed in chronological order.

Finally, the definition, development and working principle of the microscope were emphasized.

Achievement 3. "Explains the relationship between cell-tissue-organ-system-organism": It was stated that some living things are composed of a single cell and some of them are composed of many cells and the



students were shown the microscope images of single-celled living things in Figure 6.

Figure 6. *Microscope images of some microscopic organisms*

It was stated that some microscopic creatures are disease-causing and some are beneficial, and the benefits and harms of bacteria to humans and the related text on "*www.bilimcocuk.tubitak.gov.tr"* about microscopic creatures were read. Then, examples of multicellular organisms were asked for and the cell-tissue-organ-system-organism relationship was explained. End-of-topic evaluation was made with "Let's apply what we have learned".

Achievement 4. "Explain the importance of mitosis for living things": The learning process started with questions such as how our wounds heal after a while when we fall; how huge trees are formed from tiny saplings; how we grew so big when we were small enough to fit in the mother's womb and the answers from the students were written on the board and discussed. After all feedbacks were provided, the concept of cell division was emphasized and it was stated that there are two types of cell division.

Achievement 5. "Explains that mitosis consists of different successive stages": Visuals of mitosis were shown in the textbook and EBA, and how the stages are realized was expressed. By focusing on the difference seen in plant and animal cells, the stages of mitosis, which are mixed in the curriculum presented interactively in EBA, were made to the students and it was stated that mitosis consists of successive stages. An evaluation was made about the subject with the "Let's apply what we have learned activity".

Achievement 6. "Explains the importance of meiosis for living things": The learning process was initiated with the question of why we are different from our siblings even though we were born from the same parents and the students' answers were discussed. Students' knowledge about the cells undergoing meiosis and the chromosome change in meiosis was tested and the students were helped to reach some inferences with questions. (If the number of chromosomes had not been reduced by half, the number of chromosomes would have doubled in each generation...)

Achievement 7. "Demonstrates on the model how meiosis occurs in reproductive mother cells": With the visuals in the textbook and EBA, the stages of meiosis and the change of chromosomes in each stage were emphasized and students were able to place the mixed stages in the correct order.

Achievement 8. "Compare the differences between meiosis and mitosis": In line with the information they learned, they were made to prepare a table including the characteristics of mitosis and in which organisms it is seen; the characteristics of meiosis and in which organisms it is seen, in which cells of the organism it can be seen, and end-of-unit evaluation questions were made. Then, the learning process was completed by applying post-tests.

In the application of the method supported by Mobile Application and Augmented Reality to the EG, the following steps were followed below.

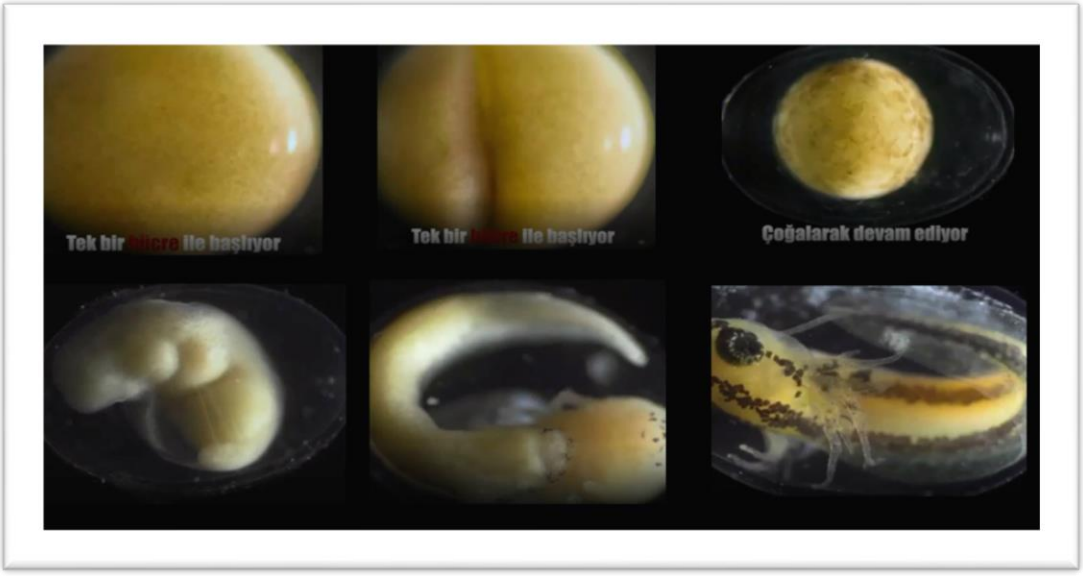
The class was divided into 8 groups of 5 students and tablet computers with AR Science, Hp Reveal and Quiver mobile applications were distributed to each group. First of all, the students were given information about how to use the applications, and then the application was carried out in the EG according to the course program prepared in parallel with the unit achievements.

Achievement 1. "Compares plant and animal cells and cells in terms of their parts and functions": In Grade 5, it was stated that living things are classified as plants, animals, microscopic creatures and fungi and students were asked to give examples of each living group. Based on the characteristics of living things, the cell was defined and then the pictures of plant and animal cells in Figure 3.5 were distributed to the students and they were asked to color the pictures.

Figure 7. *Observation of plant and animal cells with the Quiver app*

Then, the AR science cards in Figure 8, which are about plant and animal cells, were distributed to the students and students' attention was drawn to the subject both visually and aurally.

Figure 8. *Observation of plant and animal cells with AR science cards*



The AR cards on each organelle were presented to the learning environment visually and audibly, and the students in the group were allowed to learn individually at their own pace.

Achievement 2. "Discusses the views on the structure of the cell based on technological developments": Depending on the development of technology, the structure of the cell was examined in more detail and the studies carried out by scientists were given to the students in each group with the video-supported AR cards in Figure 8, and made by the researcher. After the information conveyed on the AR cards, students were asked for their ideas about the structure of the cell and they were asked to make inferences by making connections between their own ideas and scientific information. Students shared their ideas on this subject with their classmates.

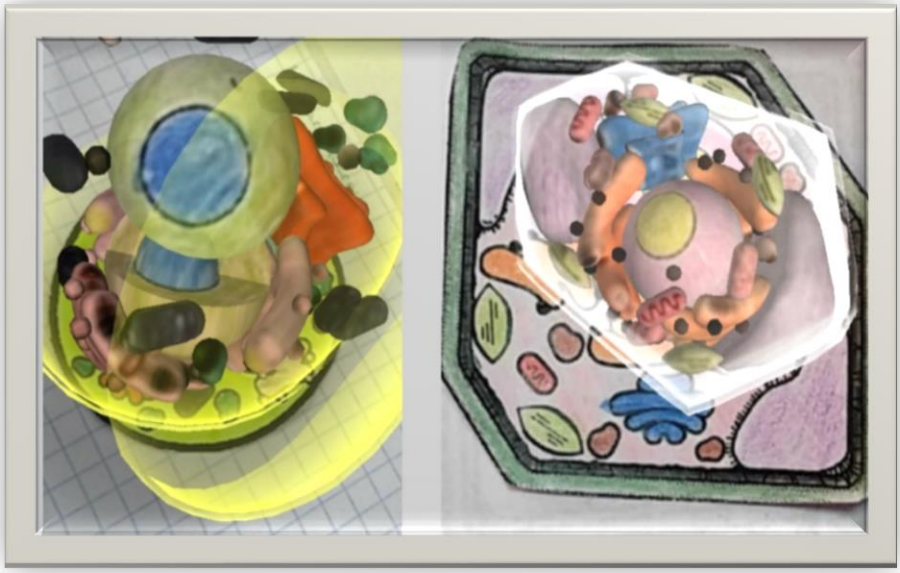


Figure 9. *Image section from the AR cards prepared by the researcher*

Achievement 3. "Explains the relationship between cell-tissue-organ-system-organism": With the video-supported AR card in Figure 9, which was prepared by the researcher, the students were given the card containing the stages of the organism starting from the egg cell to the formation process of the organism and were asked to follow the process carefully. Then, the relationship at each stage was explained to the students by the teacher and finally, end-of-section evaluation questions were asked.

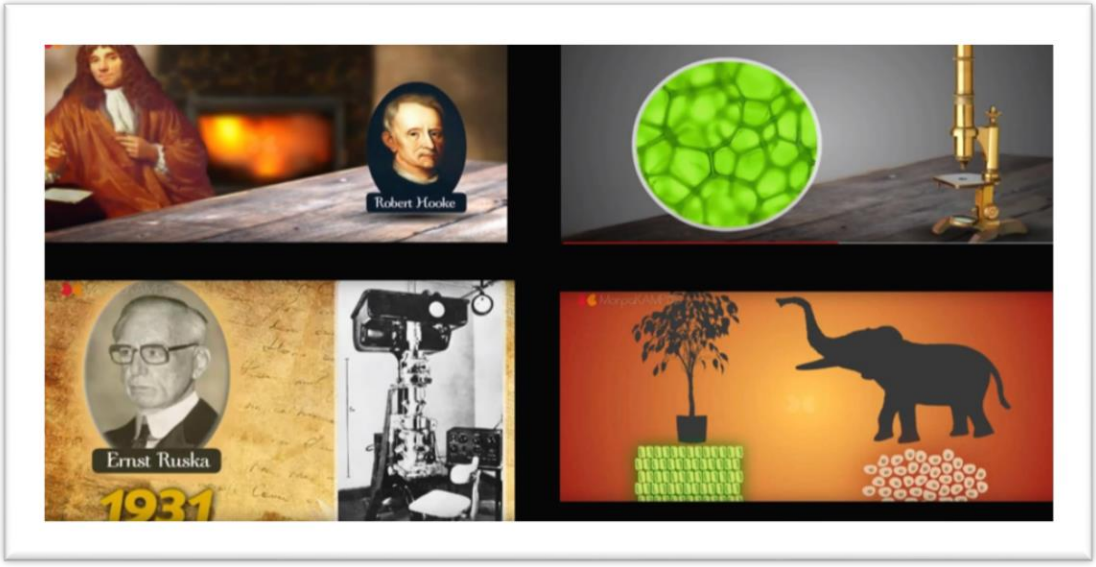


Figure 10. *AR card image showing the cell-tissue-organ-system-organism relationship*

Achievement 4. "Explains the importance of mitosis for living things": The lesson was started with the lesson preparation section in the textbook and it was stated that cell division is divided into two as meiosis and mitosis.

With the AR cards developed by the researcher, learning achievements 5, 6, 7 and 8 were given to the students and posters containing cell divisions in Image 2, were made to apply the information learned. AR applications that address these achievements are given in the appendix.

Image 2. *Posters on cell division made by students*

Students in the EG actively participated in the lesson throughout the teaching process. This application revealed that tablets and phones, one of the technological tools, will contribute to the learning process when used in accordance with the nature of technology. Finally, the application ended with end-of-unit evaluation questions and post-tests.

Data Analysis

SPSS 21.00 package program was used to analyze the data obtained through the research. In order to decide which tests to use in the data analysis step, normality tests were performed, extreme values were determined and it was decided to use dependent and independent t-tests from parametric tests.

FINDINGS / RESULTS

In this section, statistical analyses related to AR supported instruction and the findings obtained from the research questions are presented. In the data analysis process, Kolmogorov-Smirnov test results were used since the sample size was over 29 people in both the experimental and control groups (Kalaycı, 2016). The analysis of the test results is shown in Table 3.

Table 3. *CDAT Kolmogorov-Smirnov test results*

	Statistic	df	p
EG Pretest	,142	40	,040*
CGPretest	,181	39	,002*
EG Posttest	,153	40	,019*
CGPosttest	,246	39	,000*

When Table 3. is examined, it was concluded that the CG pre and post HBBT and the EG pre and post HBBT negatively affected the normal distribution (p<.05), therefore skewness and kurtosis values were examined.

Table 4. *Skewness and kurtosis coefficients pretest-posttest cdat result*

Scale	Group	Skewness	Kurtosis
CDAT Pretest	Experimental	-,102	,205
	Control	-,919	-,467
CDAT Posttest	Experimental	-1,304	-,185
	Control	-2,218	-1,154

According to Kalaycı (2016), if the skewness and kurtosis values are between +3 and -3, the data are considered to be normally distributed. It was observed that the data were within the specified range. Therefore, while analyzing the data in the study, the assumptions of using parametric tests were examined and the research problems were analyzed by using appropriate tests after compliance was ensured.

An independent t-test was conducted to determine whether there was a significant difference between the academic achievement pretest scores of the EG students, in which the lessons were taught with augmented reality and mobile applications, and the CG students, in which the lessons were taught using the methods recommended by the current curriculum. Independent samples t-test results are given in Table 5

Table 5. *Independent samples t-test analysis results of CDAT pretest scores*

Groups	N	$\bar{X}$	SD	t	p
EG	40	10,63	3,176	-1,938	,056
CG	39	11,95	2,883		

When the data in Table 5 are analyzed, the mean score of the EG was 10.63 with a standard deviation of 3.176, while the mean score of the CG was 11.95 with a standard deviation of 2.883. When these scores were analyzed, it was seen that the average of the CG was higher. However, as a result of the statistical analysis between the two groups, there was no statistically significant difference between the CDAT pretests (t= -1,938; p>0,05). According to these findings, it can be said that the achievement levels of the students in the experimental and control groups in the Cell and Divisions unit are similar.

Independent t-test was applied to determine whether there was a statistically significant difference between the CDAT posttest mean scores of the EG students and the CG students. The results of the analysis are given in Table 6.

Table 6. *Independent samples t-test analysis results of CDAT post-test scores*

Groups	N	$\bar{X}$	SD	t	p
EG	40	15,83	4,712	2,957	,004
CG	39	13,31	2,494		

When the data in Table 6 are analyzed, the mean score of the EG was 15.83 with a standard deviation of 4.712, while the mean score of the CG was 13.31 with a standard deviation of 2.494. When these scores were analyzed, it was seen that the average of the EG was higher. When the statistical analysis of the post-tests between the two groups was examined, it was concluded that there was a significant difference in favor of the CDAT EG (t= 2,957; p<0.05). According to these findings, the reason for the increase in the course success of the students in the EG after the application can be shown as the students' continuous active participation in the process and their interest in the applied technology. The effect size was calculated as d=0.665 and η2= 0.996. This indicates a intermediate level effect.

Paired sample t-test was conducted to determine whether there was a statistically significant difference between the CDAT pretest-posttest mean scores of the EG students. The results of the analysis are given in Table 7.

Table 7. *Paired samples t-test analysis results of CDAT EG pretest and posttest scores*

Test Type	N	$\bar{X}$	SD	t	p
Pretest	40	10,63	3,176	-7,278	,000
Posttest	40	15,83	4,712		

When the data of the EG in Table 7 are examined, it is understood that the pre-test score was 10.63 with a standard deviation of 3.176, and the post-test score was 15.83 with a standard deviation of 4.712. When these data are analyzed, it is seen that the average post-test score of the EG is high. In line with the statistical analysis, there was a statistically significant difference in favor of the CDAT posttest (t= -7,278; p<0,05). The effect size was determined as (Cohen' d) d= 3,968. This indicates a large level of impact.

It was decided to conduct a paired samples t-test to determine whether there was a statistically significant difference between the CDAT pretest-posttest mean scores of the CG students. The results of the analysis are given in Table 8.

Table 8. *Paired samples t-test analysis results of CDAT CG pretest and posttest scores*

Test Type	N	$\bar{X}$	SD	t	p
Pretest	39	11,95	2,883	-4,025	,000
Posttest	39	13,31	2,494		

When the data of the CG in Table 8 are examined, it is understood that the pre-test score was 11.95 with a standard deviation of 2.883 and the post-test score was 13.31 with a standard deviation of 2.494. When these data are analyzed, it is seen that the mean post-test score of the CG varied according to the pre-test score. In line with the statistical analysis, it was concluded that there was a statistically significant difference between CDAT pretest and posttest (t= -,4,025; p<0,05). According to these findings, the active participation of the students in the learning process in the CG increased their academic achievement. The effect size was determined as (Cohen' d) d= 3,812. This indicates a large level of impact.

DISCUSSION, CONCLUSION, RECOMMENDATIONS

The achievement test for the "Cell and Divisions" unit was applied to the experimental and control groups before the study and it was seen that there was no significant difference between the two groups (p>.05). Post-tests were conducted after the implementation and the findings obtained were analyzed. When the data were examined, it was concluded that the arithmetic averages of the students in the EG supported with augmented reality were higher than the CG where the current curriculum was applied. This difference was significant in favor of the EG (p<.05). The reason for this may be that augmented reality technology enables students to use the lesson actively. A similar study was conducted by Özeren and Top (2023). Similarly, this study revealed that the success of students supported by AR technology in the "Cells and Divisions" unit increased significantly. According to these findings, it was concluded that the achievement of the EG increased after the AR applications. Previous studies (Yenice, 2003; Vilkoniene, 2009; Güven & Sülün, 2012; Özkaya, 2013; Sarıkaya, 2015; Tezel & Aydost, 2016) have shown that teaching supported by visual materials and enriched technology environment increases academic achievement. In addition to concretizing the concepts, the materials can be used for fun learning, creative support thinking, use in measurement and evaluation, curiosity awakening, improving visual memory, learning by doing and motivation other contributions, such as enhancement (Dere, 2019).

In this study, the curriculum applied by the Ministry of National Education to middle school students at the 7th grade level included the "Cell and Divisions" unit (MEB, 2018). It was observed that the students'

learning level and participation in the lesson on the functions of cells and organelles were high. The reason may be that they had previously seen this topic in the 6th grade curriculum. Students could not show the same success in cell divisions. Some problems and incomprehensibility emerged in both the experimental and control groups. For example, students in both groups had difficulty in deciding which cell division was mitosis and meiosis by looking at the stages of division. This situation also affected the number of correct answers given to the questions in the achievement test. Nevertheless, it was concluded that teaching with AR in the EG positively affected academic achievement. Previously, Abdusselam and Karal (2012), Özarslan (2013), Sin and Zaman (2014) and Coşkun and Koç (2018) used AR technology in learning environments and observed positive changes in academic achievement.

In the light of these findings, the following suggestions can be given for the applications;

- In this study, it was seen that teaching with AR in Cell and Divisions unit positively affected academic achievement. Most of the AR studies in the field of science education were conducted on astronomy subjects. There are few studies on Cell and Divisions. New applications can be developed for teaching AR programs with other science units.
- Turkish language support of the programs can be improved and users can access them more easily.
- Since both 3D and video-supported AR cards have audio narration, there was noise in the classroom and some of the students expressed that they were uncomfortable. Therefore, videos can be associated with the pictures in the textbooks and students can be allowed to repeat at home.
- AR applications that do not require internet connections can be preferred.
- The following suggestions can be given for the researchers;
- It is thought that the use of AR technology in education will increase when information and technology experts add Turkish language packages to AR programs.
- Since it is thought that the technology used in the research will attract the interest of primary and secondary school students, the effectiveness of the technology used can be investigated by applying it at other grade levels.
- The effect of the method applied in the study on students' academic achievement was examined. The effect of teaching supported by AR on the retention of learning can be investigated.
- Qualitative studies can be conducted to obtain the opinions of students and teachers about AR.
- Since AR technology is a new technology, the use and development of AR applications can be included in Ministry of National Education (MEB) in-service training activities so that teachers can use this technology in their lessons.
- The light coming from the phone or tablet and the resolution features of the camera used while using AR technology sometimes negatively affected the teaching.

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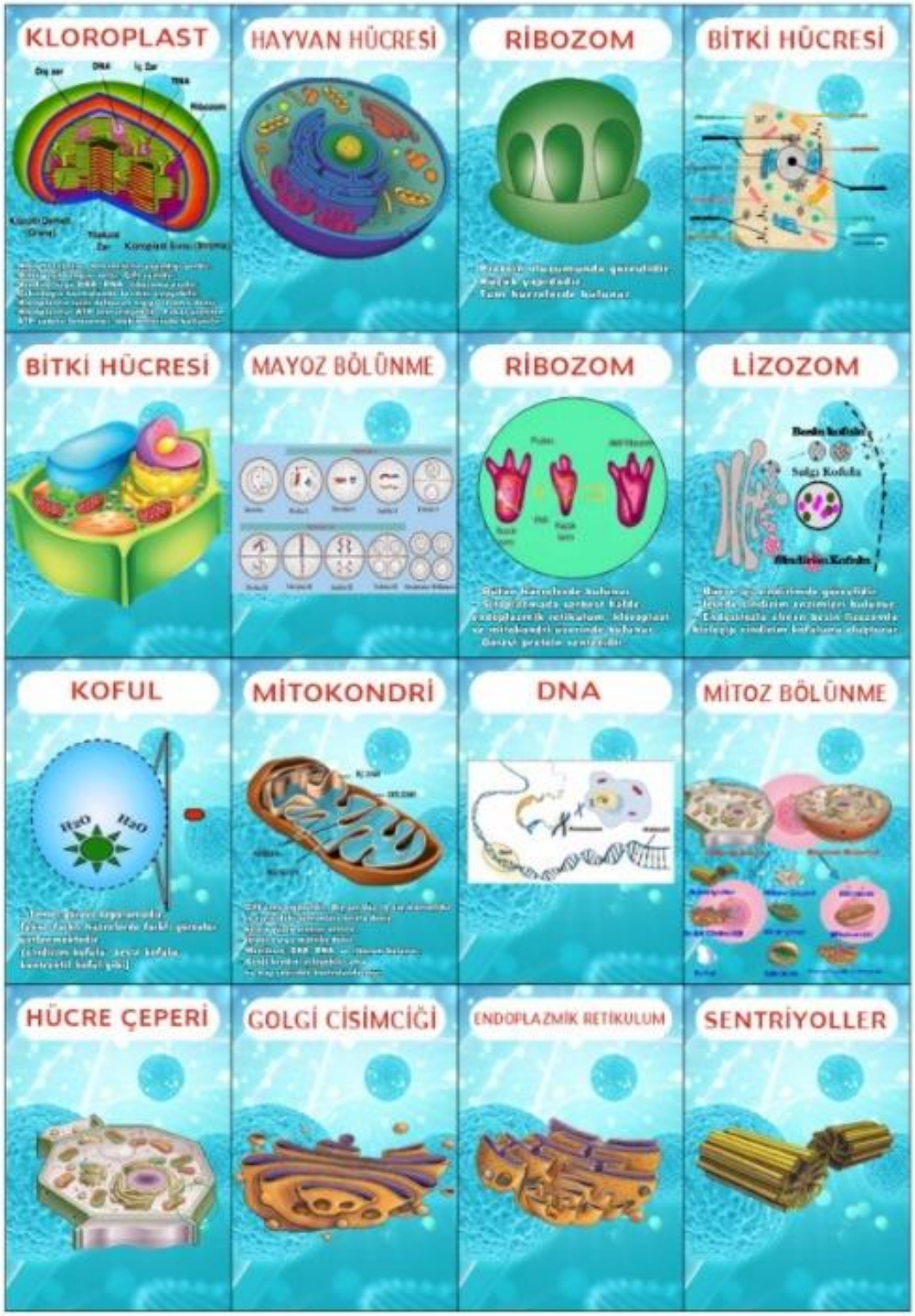
APPENDIX: AR *cards developed by the researchers*



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Higher Education Quality Indicators: A Scale Development Study[1]

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ABSTRACT

The purpose of this research is to develop a Likert-type scale aimed at determining how quality indicators in higher education are perceived by faculty members. A pilot study of the research was conducted with the participation of 390 faculty members. As a result of the factor analysis applied to test the construct validity of the 67-item draft scale, a measurement tool consisting of 9 dimensions and 49 items was developed. The first dimension is named Education and Instruction, the second is Structure of the University, the third is Socio-Cultural Opportunities, the fourth is Internationalization, the fifth is Economic Opportunities, the sixth is Student Requirements, the seventh is Accreditation, the eighth is Preferability, and the ninth is Technological Competence. The overall Cronbach's Alpha reliability coefficient of the scale has been calculated as 0.96. Additionally, as a result of the independent groups t-test for the reliability of the scale, it has been determined that items and factors are distinctive between the lower and upper 27% groups; the item-total and item-remainder correlation values are significant. Correlation coefficients between factors and the test-retest correlation coefficient for the entire scale have been found significant. Based on the conducted analyses, the validity and reliability of the scale have been established. The scale has been named the Higher Education Quality Indicators: Faculty Member Scale (HEQIFMS).

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INTRODUCTION

Quality

The immense shifts and advancements in the domains of globalization, science, technology, and communication, along with the transformations in the political, economic, social, and cultural structures of nations, combined with market expectations and the escalating demand for lifelong education, have influenced all institutions. These changes have compelled them into a competitive environment on both national and international scales, necessitating the enhancement of the quality of their products and services (Karaca, 2008). Furthermore, factors propelling the prominence of the quality concept include the dynamic nature of customer expectations and needs, the rise of global liberalization movements, technological evolutions, and the escalating intensity of global competition (Ağın, 2020). Quality is often utilized as a metric of excellence (Madu and Madu, 2002). The concept of quality possesses a relative definition; its content and the means by which it is measured vary based on the definer (De Weert, 1990; Liu, 2016; Tam, 2001).

Quality is characterized as the extent to which the expectations of those benefiting from a product or service are met, their perceived satisfaction, and the realization of what is desired (Büyükşahin and Şahin, 2017). In Balcı's (1998) study, quality was defined as acting in accordance with the highest criteria, while also highlighting that the relative definition of quality encompasses two dimensions: measurement and transformation. In the scholarly exploration conducted by Garvin, he delineated eight critical dimensions of quality, though these were not subjected to empirical validation. The enumerated dimensions encompass performance, features, reliability, conformance, durability, serviceability, aesthetics, and perceived quality, as subsequently referenced by Brucks, Zeithaml, and Naylor (2000), Karakaya, Kılıç, and Uçar (2016), and Syarhrial et al. (2018). The first dimension, performance, pertains to the effortless and seamless usage of a product's features by customers. Features are the primary components of a product and, for certain products, represent the most vital dimension due to their role in enhancing quality, offering personalization based on customer expectations. Conformance refers to the extent to which a particular product aligns with the predetermined design specifications. When products or processes satisfy the designated criteria, they are considered to have achieved the stipulated specifications. A product's attributes satisfying customer requirements demonstrate that the product conforms to the stated standard. Aesthetics refers to the properties sensed by the customer's five sensory organs during the product's appearance and usage. Perceived quality demonstrates the efficacy of product visuals, advertising, or brand names on customers. These dimensions emphasize that quality can be defined not just with objective criteria but also through subjective evaluations.

Quality in Education

Historically, education has been one of the primary mechanisms for societal advancement, individual self-actualization, and the transmission of knowledge from one generation to the next. However, it's not only the presence of education but also its quality that plays a critical role in this process. The concept of quality in education emerges as a challenging and value-laden term due to its conceptual intricacy (Aksoy, 2001). For researchers, quality in education is multidimensional, influenced by historical context, and signifies the endeavor to achieve better and perfect outcomes in educational activities. When revisiting the relativity of the quality concept, a subjectivity appears both in its ideological interpretation and the definition of educational components. Indicators defining educational quality vary across societies and ideologies, leading to differing interpretations (Aksoy, Kayahan Karakul, Aras, & Çankaya, 2011).

Quality education aims to respond to the needs, ideals, and conditions of the contemporary society (Tan, 1989). Educational quality is the level at which the explicit and implicit expectations of internal and external stakeholders are met. The concept is multifaceted and cannot be evaluated by a single metric. It's often challenging for an educational institution to meet all stakeholder expectations

simultaneously. Thus, educational quality might be perceived as low by some aspects and high by others (Cheng & Tam, 1997). Quality can be defined as the ability of educated individuals to meet societal needs and demands through their acquired knowledge, skills, and behavioral competencies (Kayadibi, 2001). Although quality in education might initially appear quantifiable through metrics such as test scores, graduation rates, or employability, this is just the tip of the iceberg. Quality education entails a holistic approach that encompasses not merely academic accomplishments, but also addresses emotional, social, and ethical growth (Kayadibi, 2001; Gökkaya, 2016). In addition to the dissemination of knowledge and competencies, the cultivation of critical thinking, problem-solving capacities, empathy, and the propensity for lifelong learning are integral components of exemplary educational practices (Kölemen & Erişen, 2017). Quality in education, when considered as a criterion for change, signifies systematic impacts on the student. The magnitude of quality indicates the positive changes an educational institution or program can impart. Through its contributions to an individual's knowledge, values, attitudes, and behaviors, education enhances potential, applicable not only to individuals but also to societal groups and institutions. High-quality education aims to maximize student development and transformation. This evaluation's continuity necessitates consistent data collection from students (Cemaloğlu, 1998).

Quality in Higher Education

Amid the multifaceted social, political, and economic evolutions of the 21st century, both on a global scale and specifically within Turkey, there has been an intensified demand for advanced educational opportunities. In response to this burgeoning need and with the objective of augmenting accessibility to higher education across all age demographics, Turkish national educational policies have facilitated the proliferation of higher education institutions and bolstered their operational capacities. A salient feature of this strategic expansion has been the endeavor to establish a university in each province (Özdemir et al., 2013; Çetinsaya, 2014; Aytar et al., 2018). Increasing capacities in higher education has brought challenges in the delivery, comprehension, and management of academic, social, economic, and daily life support services for students (Audin et al., 2003). These developments in the higher education system have intensified both national and international competition, driving institutions towards a quest for quality.

Özer and colleagues (2010) note that, due to the complexity of education and specifically higher education, there's no consensus on what quality is in both areas or how it can be measured. Securing a universally accepted conceptualization of quality in higher education has proven elusive. Contemporary endeavors to encapsulate the essence of quality within this domain have encountered obstacles, primarily attributable to the heterogeneity in educational systems across nations and the dynamic shifts in individual and societal requisites (Hamalainen, 2003). The inherent multifaceted and context-dependent characteristics of quality within higher education yield divergent interpretations among its stakeholders, inclusive of service providers, beneficiaries such as students, end-users like employers, and the academic personnel (Dicker et al., 2019). When evaluating quality by service quality, criteria like the socio-cultural facilities (food services, sports activities, etc.) offered by the higher education organization, medical-social services, library facilities, housing, and the satisfaction of beneficiaries emerge as determining factors (Çimen, 2012). Quality manifestation is tied to specific standards. The degree to which these standards are met indicates the level of quality. Quality in higher education relates to how effectively an institution can achieve its mission and goals. It is also an ongoing effort to improve within the framework of institutional autonomy (Özer, Gür, & Küçükcan, 2010).

For a higher education institution and its stakeholders to provide a quality education environment, some fundamental attributes they should possess have been outlined by Kanwar and Trumbić (2015). It is posited that the onus of securing and actualizing quality within the realm of higher education predominantly rests upon the shoulders of the educational providers and their faculty. The triad of paramount missions for higher education institutions comprises education, research, and community

outreach. Essential to the preservation and enhancement of educational excellence are rigorous quality assurance protocols, encompassing both internal and external assessments. It is also essential to make clear distinctions between quality assurance, quality improvement, and quality enhancement. Quality assurance is an ongoing process of developing, implementing, and refining criteria and procedures to monitor and enhance educational quality, while quality improvement and enhancement signify targeted, purposeful actions to elevate standards (Özer et al., 2010). The current study aimed to develop A Scale for Quality Issues in Higher Education in Turkey: Views of Faculty Members in State Universities on Quality.

METHOD

In this section, the design of the study, the sample, the scale development stages, and statistical analysis information are presented.

Research Design

The current study aimed to develop A Scale for Quality Issues in Higher Education in Turkey: Views of Faculty Members in State Universities on Quality.

Study Group

For factor analysis, a minimum of 300 is recommended (Çokluk, Şekercioğlu, & Büyüköztürk, 2012), and a number of 5 to 10 times is suggested (MacCalum, Widaman, Zhang, & Hong, 1999). When determining the sample, five times the number of items in the draft scale was considered (67x5 = 325), and it was decided that a sample size consisting of 390 faculty members would be sufficient for the scale development study. Table 1 provides demographic information related to the participating faculty members.

Table 1. *Characteristics of the faculty members participating in the pilot study of the research*

Characteristics		*n*	*%*
Gender	Female	197	50.51
	Male	193	49.49
Academic Title	Professor	58	14.88
	Associate Professor	113	28.97
	Assistant Professor	41	10.51
	Lecturer	19	4.87
	Research Assistant	102	26.15
	Other	57	14.62
Age Group	20 – 30 Years	69	17.69
	31 - 40 Years	186	47.69
	41 – 50 Years	67	17.17
	51 – 60 Years	55	14.10
	61 Years and above	13	3.35
Education Level	Bachelor's	7	1.79
	Master's	78	20.00
	Doctorate	304	77.94
	Not Specified	1	0.27
Field of Study	Natural Sciences	110	28.20
	Social Sciences	134	34.35
	Health Sciences	49	12.56
	Educational Sciences	97	24.89
Tenure	1 – 5 Years	84	21.53
	6 – 10 Years	107	27.43
	11 – 15 Years	47	12.05
	16 – 20 Years	50	12.82
	21 – 25 Years	41	10.51
	26 Years and above	61	15.66
Foundation Year of the University Where the Faculty Members Work	Established Before 1982	190	48.61
	Established Between 1982 – 2000	92	23.83
	Established After 2000	108	27.57

Administrative Duty	Yes	105	26.92
	No	283	72.56
	Not Specified	2	0.52
Faculty/Unit Where the Faculty Members Work	Faculty of Education	109	27.94
	Faculty of Arts and Sciences	70	17.94
	Faculty of Engineering and Architecture	49	12.56
	Faculty of Economics and Administrative Sciences	20	5.12
	Faculty/College of Health Sciences	17	4.35
	Faculty of Medicine	12	3.07
	Faculty of Communication	8	2.05
	Faculty of Law	9	2.30
	Faculty of Fine Arts	19	4.87
	School of Physical Education and Sports	3	0.76
	Faculty of Agriculture	8	2.05
	Vocational College	12	3.07
	Faculty of Dentistry	12	3.07
	Faculty of Theology	9	2.30
	College	14	3.58
	Other	19	4.87

As seen in Table 1, 50.5% (197) of the participating faculty members are female, and 49.5% (193) are male. Of the faculty members, 14.6% (58) are professors, 14.9% (57) are associate professors, 26.2% (102) are research assistants, 4.9% (19) are lecturers, 10.5% (41) are assistant professors, and 29.0% (113) hold other academic titles. In terms of age, 17.7% (69) of the participants are between 20 – 30 years, 47.7% (186) are between 31 – 40 years, 17.2% (67) are between 41 – 50 years, 14.1% (55) are between 51 – 60 years, and 3.1% (12) are aged 60 and above. Regarding their tenure, 21.5% (84) have 1 – 5 years, 27.4% (107) have 6 – 10 years, 12.1% (47) have 11 – 15 years, 12.8% (50) have 16 – 20 years, 10.5% (41) have between 21 and 25 years, and 15.6% (61) have more than 26 years of experience. In relation to their educational qualifications, 1.8% (7) hold bachelor's degrees, 20.0% (78) hold master's degrees, and 77.9% (304) have doctoral degrees. 0.3% (1) of participants did not specify their education level. In terms of their academic disciplines, 28.2% (110) are from natural sciences, 34.4% (134) are from social sciences, 12.6% (49) are from health sciences, and 24.9% (97) are from educational sciences. For institutional affiliation, 48.61% (190) are from universities established before 1982, 23.83% (92) are from those established between 1982 – 2000, and 27.57% (108) are from those established after 2000. Additionally, 27.9% (109) serve in faculties of education, 17.9% (70) in faculties of arts and sciences, 12.6% (49) in faculties of engineering and architecture, 5.1% (20) in faculties of economics and administrative sciences, 4.4% (17) in faculties or colleges of health sciences, 3.1% (12) in faculties of medicine, 2.1% (8) in faculties of communication, 2.3% (9) in faculties of law, 4.9% (19) in faculties of fine arts, 0.8% (3) in schools of physical education and sports, 2.1% (8) in faculties of agriculture, 3.1% (12) in vocational colleges, 3.1% (12) in faculties of dentistry, 2.3% (9) in faculties of theology, 3.6% (14) in colleges, and 4.9% (19) in other units. Regarding administrative duties, 26.9% (105) of participants have administrative roles, 72.6% (283) do not, and 0.3% (1) did not provide information on this aspect.

Stages of Scale Development

To ensure the validity of the scale, the literature regarding indicators of higher education quality was reviewed. These quality indicators were identified, theoretical studies were examined, and relevant scales concerning the topic were analyzed. An item pool was created. Expert opinions were sought to evaluate the items. Descriptive analysis, Exploratory Factor Analysis (EFA), and correlations between the scale's total score and the factors were carried out. During the development process of the 'Higher Education Quality Indicators Faculty Scale', the initial step was to ascertain how faculty members define and perceive the quality indicators that a qualified higher education institution should possess. Literature encompassing quality studies in higher education and related research was reviewed to define

and determine higher education quality indicators.

Theoretical information and related scales were studied, leading to the creation of a draft measuring tool consisting of 74 items. To evaluate the draft scale in terms of its format, content, comprehensibility, and grammar, it was shared with 3 professors, 3 associate professors, 2 assistant professors, 4 PhD holders, and 2 PhD students. Experts were provided with a form and asked to mark one of the options: "appropriate," "needs modification," or "inappropriate" for each item. After incorporating the experts' feedback, 7 items were removed, reducing the item count to 67. All items on the draft scale, prepared in a five-point Likert type, were positively scored. The scale consists of 67 items and 9 sub-dimensions. Scores on the scale range from a minimum of 67 to a maximum of 325, with higher scores indicating higher quality in higher education institutions.

Data Analysis

To present statistical evidence regarding the validity of the scale, both EFA and Confirmatory Factor Analysis (CFA) were conducted. Suitability for EFA was determined first by the Kaiser-Meyer-Olkin (KMO) measure, followed by the Bartlett's test. EFA was performed using principal component analysis and the Varimax orthogonal rotation method. Correlation coefficients between the scale's total score and the total scores of the factors were calculated to ascertain the relationship between the scale and its items. During CFA, the chi-square value and fit indices were scrutinized. For the CFA model to be valid, fit indices need to be at acceptable levels. To test the reliability of the developed scale, the Cronbach's Alpha value was calculated. To provide evidence of the relationship between the scale as a whole and its items, necessary correlation coefficients were determined. The distinctiveness of the items was determined using paired groups t-test analyses. Data analysis was conducted using statistical package programs (SPSS and AMOS).

FINDINGS

In this study, a valid and reliable 'Higher Education Quality Indicator: Faculty Scale', aimed at measuring faculty perceptions regarding the quality of higher education institutions, has been developed.

Findings Related to Validity Studies

To determine whether the data set demonstrates a normal distribution, the Kolmogorov-Smirnov significance value (p), skewness and kurtosis coefficients were examined. For the data to be normally distributed, it is recommended that the Kolmogorov-Smirnov value be greater than 0.05 (p>0.05) or skewness and kurtosis values fall between -1 and +1 (Çokluk, Şekercioğlu, and Büyüköztürk, 2012). For analyzing the data obtained from the scale, scores need to show a normal distribution (Özdamar, 2016). Descriptive values related to the data obtained by applying the draft scale to faculty members working in state universities are presented in Table 2.

Table 2. *Descriptive statistical values for the higher education quality ındicators academic staff scale*

	Values
Frequency	390
Mean	3.08
Standard Deviation	0.62
Minimum Score	1.15
Maximum Score	5.00
Range	3.85
Skewness	-0.14
Kurtosis	0.24
Median	3.07
Kolmogorov Smirnov	0.04
P	0.19
Shapiro-Wilk	0.99

P value	0.50

As seen in Table 2, the values for Kolmogorov-Smirnov (0.04 and p>0.05) and Shapiro-Wilk (0.99 and p>0.05) tests are not significant, and since the kurtosis (0.24) and skewness (-0.14) values are within the ±1 range, the scores are normally distributed (Bayram, 2013; Büyüköztürk, 2012; Çokluk et al., 2012).

To ascertain the construct validity of the instrument, a sequential approach employing both Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA) was adopted. Preceding the execution of EFA, the Kaiser-Meyer-Olkin (KMO) measure, as stated by Kalaycı (2005), was employed to evaluate the appropriateness of the data set, particularly with respect to sample adequacy, and to juxtapose the magnitudes between observed correlation coefficients and their partial counterparts. Additionally, the Bartlett's test of Sphericity was conducted to determine whether the measurement tool can be factorized. The results for the Kaiser-Meyer-Olkin and Bartlett's test are given in Table 3.

Table 3. *Results of the Kaiser-Meyer-Olkin and Bartlett's test for the higher education quality ındicators academic staff scale*

Kaiser-Meyer-Olkin (KMO)		0.953
Barlett(s	χ^2	17020.493
	sd	2211
	p value	0.000

Upon reviewing Table 3, it can be observed that the draft scale's KMO value is 0.953. According to Çokluk and colleagues (2012), a value between 0.50-0.60 is considered "poor"; between 0.60-0.70 is "weak"; between 0.70-0.80 is "moderate"; between 0.80-0.90 is "good", and a value of 0.90 and above is "excellent". When reviewing the results of the Bartlett's Test, the chi-square (χ^2) value is significant at the 0.01 level, suggesting the data structure is suitable for factor analysis (Tabachnick and Fidell, 2017). Additionally, Bartlett's Test helps determine whether the data comes from a normal distribution and is multivariate. A significant result from Bartlett's Test implies the data is multivariate and normally distributed (Otrar and Argın, 2015). Due to the fulfillment of both the Kaiser-Meyer-Olkin and Bartlett's Test criteria, evaluations for the exploratory factor analysis continued.

The eigenvalues and variance explained by the factors were determined through principal components analysis. To determine the most appropriate item distribution, the explained total variance value, and the factors, cutoff points of .32, .33, .40, .45, and .50 were used in the analysis. When evaluating item distributions, the explained total variance value, and the resulting factors for academic staff, the most suitable result was obtained at the .40 level. The eigenvalues and the variance explained by the factors resulting from the analysis of data collected from academic staff are shown in Table 4.

Table 4. *Eigenvalues and explained variance from the ınitial analysis of the higher education quality ındicators academic staff scale.*

Factor	Eigenvalue	Variance	Cumulative Total
1	24.762	36.959	36.959
2	3.231	4.822	41.781
3	2.232	3.331	45.112
4	2.000	2.984	48.096
5	1.709	2.550	50.646
6	1.598	2.385	53.031
7	1.524	2.275	55.306
8	1.383	2.064	57.369

9	1.259	1.879	59.249
10	1.138	1.698	60.947
11	1.066	1.590	62.537
12	1.033	1.542	64.079

The total sum of squares of factor loadings related to items for a factor is termed as the eigenvalue of that factor (Shrestha, 2021). Upon examining Table 4, it can be observed that there are twelve components with eigenvalues greater than 1. The total contribution of these twelve components to the variance is 64.079%. One of the most crucial points to evaluate when deciding on the number of factors is the contribution each factor makes to the variance (Çokluk et al., 2012).

In the subsequent step, items below .40 were removed. Later, the factor loading values and multicollinearity of the items were evaluated to determine if they met the acceptable threshold. For an item to be considered multicollinear, the analyzed item must display high values in more than one factor above the acceptance level (.40) and the difference between the loading values they exhibit with different factors must be less than .1 (Çokluk et al., 2012; Büyüköztürk, 2012). Items exhibiting a discrepancy in factor loadings of less than 0.1 were sequentially eliminated, commencing with the item of the most minimal loading value, with the analysis being reiterated after each exclusion. After this iterative refinement, a total of 18 items were excised from the preliminary scale draft. To crystallize the structure of the emergent scale draft and ascertain its factor constitution, the proportion of variance elucidated was scrutinized. It was subsequently discerned that the extant 49 items were apportioned amongst 9 distinct factors. Table 5 provides the explained total variance of the higher education quality indicators faculty scale.

Table 5. *Explained total variance of the higher education quality indicators faculty scale*

Factor	Eigenvalue	Variance	Cumulative Total
1	18.28	37.32	37.32
2	2.75	5.62	42.95
3	1.86	3.80	46.75
4	1.84	3.76	50.51
5	1.48	3.04	53.55
6	1.40	2.85	56.41
7	1.36	2.79	59.20
8	1.15	2.34	61.54
9	1.07	2.18	63.73

The sum of the squares of the factor loadings of items associated with a factor is termed as the eigenvalue for that factor (Shrestha, 2017). Upon examining Table 5, it can be discerned that there are twelve components with an initial eigenvalue exceeding 1. The contribution of these twelve components to the total variance is 64.079%. However, when deciding on the number of factors, it is crucial to assess the contribution of each factor to the variance (Çokluk et al., 2012).

Reviewing Table 4, it is evident that the explained total variance has decreased compared to the initial value. Nonetheless, it was determined that items are grouped under structures as theoretically defined. Consequently, it was decided that the scale consists of 9 factors. Accordingly, 63.731% of the total variance is explained by these 9 factors; the first factor accounts for 37.322% of the variance, the second factor 5.629%, the third factor 3.802%, the fourth factor 3.761%, the fifth factor 3.040%, the sixth factor 2.857%, the seventh factor 2.792%, the eighth factor 2.346%, and the ninth factor explains 2.183% of the variance.

Following the Varimax rotation procedure, the distribution of the items across the factors was determined, and the factors were named as displayed in Table 21. The first factor is named “education-teaching”, the second “university structure”, the third “socio-cultural opportunities”, the fourth

"internationalization", the fifth "economic opportunities", the sixth "student needs", the seventh "accreditation", the eighth "preferability", and the ninth factor is termed "technological proficiency". The scale has been titled "Higher Education Quality Indicators: Academic Staff Scale".

Table 6. *Higher education quality ındicators academic staff scale - ıtems remaining after exploratory factor analysis*

		1	2	3	4	5	6	7	8	9
S2	The implemented program instills critical thinking skills.	.81								
S3	It fosters abstract thinking and reasoning abilities.	.75								
S4	The education curriculum aligns with societal changes and demands.	.73								
S1	The educational curriculum remains current.	.71								
S7	Intended learning outcomes are achieved.	.69								
S22	It imparts students with professional skills that meet market expectations.	.65								
S25	A process-oriented assessment approach is adopted.	.62								
S24	Student performance is evaluated in line with assessment principles.	.60								
S19	The university provides active learning environments.	.59								
S8	There is a continuous pursuit for quality enhancement.	.58								
S26	It offers ample opportunities for students' individual development.	.58								
S20	Mechanisms to evaluate the success of teaching programs are in place.	.54								
S5	The university encompasses multiple national and international cultures, exemplifying cultural diversity.	.52								
S18	Sufficient opportunities for professional development are presented to students.	.51								
S30	Students are encouraged to undertake scientific research.	.50								
S6	Course options aligning with students' interests are available.	.49								
S66	All stakeholders participate in quality improvement processes.		.80							
S67	Quality is embraced by the university management.		.74							
S64	Administrative rules and norms are transparent.		.74							
S65	Platforms for self-expression are provided.		.72							
S21	University constituents actively partake in decision-making processes.		.59							
S62	Quality is embodied as a culture within the university.		.56							
S61	Quality is explicitly stated in the university's strategic plan.		.52							
S32	Adequate resources are allocated for scientific research and studies.		.44							
S44	Suitable facilities and tools for sports activities are provided.			.85						
S41	The university possesses the necessary infrastructure for sports and cultural events.			.82						
S45	It holds significant recognition in sports and cultural activities.			.70						
S50	Opportunities for recreational and cultural activities are available.			.58						
S36	The accommodation services meet the expectations and needs of students.			.51						

S39	A secure learning environment is provided.	.45						
S13	Opportunities to participate in international exchange programs are offered.		.73					
S14	Collaborations with overseas universities are established.		.70					
S12	Comprehensive facilities for international student admissions are available.		.67					
S16	Education in foreign languages is provided.		.58					
S49	Opportunities for professional experiences and internships are presented to students.			.70				
S48	Job opportunities within the institution are provided for students in need.			.67				
S47	Scholarship opportunities that cater to students' requirements are available.			.58				
S52	The satisfaction levels of students are assessed.				.77			
S53	Efforts are made to determine student needs.				.65			
S57	Students are given the right to provide feedback concerning their education.				.56			
S55	It is certified by the Turkish Standards Institute (ISO 9001, ISO 22000, ISO 18001, ISO 15224, ISO 29990, ISO 31000).					.79		
S54	Possesses an accredited quality management system.					.77		
S43	Teaching programs are accredited by authoritative institutions.					.48		
S58	Holds a top position in student preferences.						.80	
S59	Graduates easily secure employment.						.64	
S60	Given the chance, I would prefer to transfer to another university.						.58	
S10	Adequate print and electronic resources are available for accessing information.							.76
S34	Access to international databases (EBSCOhost, Springer, ProQuest, etc.) is offered.							.65
S9	Teaching staff possess competent skills in technology utilization.							.49

Upon examining Table 6, it is observed that after the final analysis, 49 items remain in the measurement tool. All items of the scale meet the acceptance level of .40, and the varimax rotation analysis indicates no compound items at the .01 level. Factor loadings for the scale are as follows: the first factor ranges between .81 and .489; the second factor between .80 and .44; the third factor between .85 and .45; the fourth factor between .73 and .58; the fifth factor between .70 and .58; the sixth factor between .74 and .539; the seventh factor between .79 and .48; the eighth factor between .80 and .58; and the ninth factor between .76 and .49. Items demonstrating strong inter-relations have converged to form these factors.

To validate the structure revealed by Exploratory Factor Analysis (EFA), Confirmatory Factor Analysis (CFA) was conducted. Confirmatory factor analysis operates as a form of hypothesis testing. It is grounded in the testing of theories associated with latent variables and is utilized in advanced research to confirm or refute a theoretically-developed model or to determine the extent to which an anticipated model aligns with the observed model (Tabachnick & Fidell, 2001; Şencan, 2005). According to Sümer (2000), confirmatory factor analysis provides detailed statistics concerning the degree of congruence between data obtained from a model that describes relationships among latent variables. In other words, through CFA, researchers seek to confirm the validity of the proposed structure.

In evaluating model fit within Confirmatory Factor Analysis, chi-square statistical values and goodness-of-fit indices are the two most popular methods (Hu & Bentler, 1999). In the Confirmatory Factor Analysis, the appropriateness of the scale structure was assessed based on chi-square and goodness-of-fit indices. Figure 1 presents the confirmatory factor analysis for the developed faculty member scale.

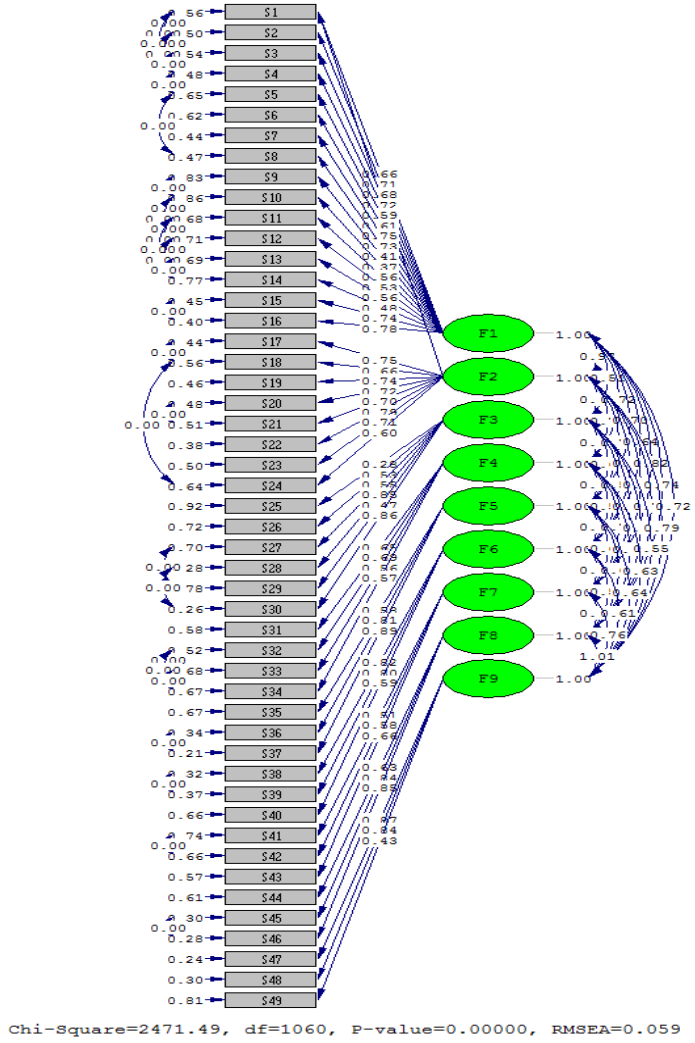

Figure 1. *Faculty member scale confirmatory factor analysis*

In Figure 1, for the decision on whether the model was validated based on the Confirmatory Factor Analysis, the p-value was first examined, followed sequentially by χ^2/df and fit indices. Although a significance level of p-value not being significant at .01 was expected in the Confirmatory Factor Analysis, it turned out to be significant due to the large sample size.

Table 7. *Conformity index values obtained from the conducted DFA analysis*

Fit Indices	Excellent Fit Criteria	Acceptable Fit Criteria	Fit Index Values Obtained from Scale
[1]χ^2/df	$0 \leq \chi^2/df \leq 2$	$2 \leq \chi^2/sd \leq 3$	2.33
[2]RMSEA	.00 ≤ RMSEA ≤ .05	.05 ≤ RMSEA ≤ .08	.059
[2]SRMR	.00 ≤ SRMR ≤ .05	.05 ≤ SRMR ≤ .10	.059
[3]GFI	.95 ≤ GFI ≤ 1.00	.90 ≤ GFI ≤ 95	.79
[4]AGFI	.90 ≤ AGFI ≤ 1.00	.85 ≤ AGFI ≤ .90	.76
[2]NNFI (TLI)	.95 ≤ NNFI (TLI) ≤ 1.00	.90 ≤ NNFI (TLI) ≤ .95	.97
[2]CFI	.95 ≤ CFI ≤ 1.00	.90 ≤ CFI ≤ .95	.98

Source: [1]Kline, 2011, [2]Browne & Cudeck, 1993, [3]Baumgartner & Homburg, 1996; Bentler, 1980; Bentler & Bonett, 1980; Marsh, Hau, Artelt, Baumert & Peschar, 2006, [4]Schermelleh-Engel & Moosbrugger, 2003

When Table 7 is examined, the chi-square value (χ^2= 2471.49; p= .00) relative to its degrees of freedom (df= 1060) gave a ratio (χ^2/df= 2.33) indicating excellent fit; the RMSEA fit value (.059)

showed good fit, as did the RMR value (.064) and Standardized RMR (.059). The GFI fit value (.79) and AGFI fit value (.76) showed poor fit, whereas the NNFI fit value (.97) and the CFI fit value (.98) indicated excellent fit.

During the Confirmatory Factor Analysis (CFA) process, we implemented a series of modifications to enhance the fit of our model. Taking into consideration the modification indices and theoretical rationalization, we reevaluated the factor loadings and covariances of specific item pairs. In this context, the covariances between s1-s4, s2-s4, and s3-s4 were examined, strengthening the relationships among these items. Similarly, the relationships between item pairs s4-s5, s5-s8, and s9-s10 were restructured. Furthermore, item pairs beginning with s11-s14, s12-s14, and s13-s14 were reviewed to achieve more consistent and theoretically meaningful outcomes. The relationships between s15-s16, s17-s18, s18-s24, s20-s21, s27-s29, s28-s30, s36-s37, s38-s39, s41-s42, and s45-s49 were reassessed based on modification indices and theoretical foundations to augment the overall fit and predictability of our model.

When examining the fit indices related to the model, it's noteworthy that χ^2 and the degrees of freedom ratio, as well as NNFI and CFI values, show excellent fit. Meanwhile, the RMSEA, RMR, and Standardized RMR values exhibit good fit, but GFI and AGFI values are not as high as expected. Within this framework, it can be stated that the modeled factor structure has been confirmed and the scale is valid.

Higher Education Quality Indicators Faculty Member Scale Reliability Study

The findings obtained as a result of the reliability study of the developed measurement tool are presented below.

Table 8. *Higher education quality indicators faculty member scale reliability study*

	Cronbach's Alpha Internal Consistency Coefficient (α)
1. Education-Training	0.94
2. University Structure	0.90
3. Socio-Cultural Facilities	0.84
4. Internationalization	0.79
5. Economic Opportunities	0.72
6. Student Requirements	0.83
7. Accreditation	0.79
8. Preferability	0.68
9. Technology Proficiency	0.58
Overall	0.96

As can be seen in Table 8, the reliability coefficients of the scale dimensions are: "education-training" at 0.94, "university structure" at 0.90, "socio-cultural facilities" at 0.84, "internationalization" at 0.79, "economic opportunities" at 0.72, "student requirements" at 0.83, "accreditation" at 0.79, "preferability" at 0.69, "technology proficiency" at 0.58, and the overall reliability coefficient at 0.96. The "technology proficiency" dimension of the scale has low reliability ($0.40 \leq a<0.60$), the dimensions of socio-cultural facilities, internationalization, economic opportunities, student requirements, accreditation, and preferability are moderately reliable ($0.60 \leq a<0.90$), and education-training, university structure, and overall reliability are highly reliable ($0.90 \leq a<1.00$) (Özdamar, 2016).

In Table 9, the results of the item-total score correlation analysis of the higher education quality indicators faculty member scale are provided.

Table 9. *Higher education quality indicators faculty member scale item-total score correlation analysis results*

Item	*r*	*p value*	*n*	Madde	*r*	*p value*	*n*
1	.61*	.00	390	26	.56*	.00	390
2	.63*	.00	390	27	.54*	.00	390
3	.62*	.00	390	28	.52*	.00	390
4	.66*	.00	390	29	.53*	.00	390
5	.56*	.00	390	30	.58*	.00	390
6	.59*	.00	390	31	.59*	.00	390
7	.69*	.00	390	32	.58*	.00	390
8	.69*	.00	390	33	.61*	.00	390
9	.74*	.00	390	34	.49*	.00	390
10	.71*	.00	390	35	.60*	.00	390
11	.72*	.00	390	36	.49*	.00	390
12	.70*	.00	390	37	.53*	.00	390
13	.70*	.00	390	38	.65*	.00	390
14	.76*	.00	390	39	.70*	.00	390
15	.66*	.00	390	40	.64*	.00	390
16	.70*	.00	390	41	.61*	.00	390
17	.67*	.00	390	42	.59*	.00	390
18	.64*	.00	390	43	.52*	.00	390
19	.64*	.00	390	44	.45*	.00	390
20	.59*	.00	390	45	.51*	.00	390
21	.70*	.00	390	46	.46*	.00	390
22	.70*	.00	390	47	.43*	.00	390
23	.70*	.00	390	48	.44*	.00	390
24	.72*	.00	390	49	.37*	.00	390
25	.44*	.00	390				

* r > ,2. p < ,00

Upon examining Table 8 the item-total score correlation coefficients range from r= .37 to r= .76, and a significant relationship is observed at p< .01 level. Based on this result, it can be stated that the relationship between the items and the total score is positive and significant.

Table 9 provides the results of the independent samples t-test conducted between the lower and upper 27% groups of the Higher Education Quality Indicators Faculty Member Scale.

Table 10. *Results of the independent samples t-test between the lower and upper 27% groups of the higher education quality indicators faculty member scale*

Item	Group	*n*	$\bar{X}$	*ss*	*T*	*sd*	*p value*	Item	Group	*n*	$\bar{X}$	*ss*	*t*	*sd*	*p value*
1	Lower	105	4.22	.59	11.984	208	.00	26	Lower	105	4.24	.75	10.49	208	.00
	Upper	105	2.76	1.10					Upper	105	2.95	1.00			
2	Lower	105	3.81	.73	12.501	208	.00	27	Lower	105	3.76	.91	10.85	208	.00
	Upper	105	2.36	.93					Upper	105	2.34	.97			
3	Lower	105	3.84	.80	12.299	208	.00	28	Lower	105	3.68	.94	9.62	208	.00
	Upper	105	2.40	.89					Upper	105	2.40	.97			
4	Lower	105	3.85	.68	15.078	208	.00	29	Lower	105	3.24	.82	9.96	208	.00
	Upper	105	2.23	.86					Upper	105	2.01	.95			
5	Lower	105	3.62	.90	11.839	208	.00	30	Lower	105	3.40	.91	11.14	208	.00
	Upper	105	2.17	.88					Upper	105	2.04	.85			
6	Lower	105	3.95	.83	13.497	208	.00	31	Lower	105	3.97	.86	12.55	208	.00
	Upper	105	2.29	.93					Upper	105	2.37	.98			
7	Lower	105	4.02	.56	16.506	208	.00	32	Lower	105	4.27	.73	11.52	208	.00
	Upper	105	2.45	.79					Upper	105	2.81	1.06			
8	Lower	105	4.09	.74	14.853	208	.00	33	Lower	105	4.08	.82	12.72	208	.00

	Upper	105	2.40	.90					Upper	105	2.43	1.03			
9	Lower	105	4.00	.72	16.102	208	.00	34	Lower	105	3.26	1.13	9.66	208	.00
	Upper	105	2.26	.83					Upper	105	1.87	.94			
10	Lower	105	3.94	.75	16.329	208	.00	35	Lower	105	3.55	.84	11.31	208	.00
	Upper	105	2.21	.78					Upper	105	2.19	.89			
11	Lower	105	3.81	.80	15.725	208	.00	36	Lower	105	3.49	.88	9.62	208	.00
	Upper	105	2.05	.80					Upper	105	2.29	.91			
12	Lower	105	3.97	.56	15.455	208	.00	37	Lower	105	3.87	.80	10.02	208	.00
	Upper	105	2.31	.94					Upper	105	2.58	1.03			
13	Lower	105	4.25	.57	14.476	208	.00	38	Lower	105	4.06	.83	13.25	208	.00
	Upper	105	2.68	.95					Upper	105	2.39	.98			
14	Lower	105	3.95	.75	15.287	208	.00	39	Lower	105	3.92	.81	15.55	208	.00
	Upper	105	2.31	.80					Upper	105	2.20	.78			
15	Lower	105	3.98	.63	19.833	208	.00	40	Lower	105	4.02	.77	13.32	208	.00
	Upper	105	2.11	.72					Upper	105	2.42	.95			
16	Lower	105	4.095	.68	16.60	208	.00	41	Lower	105	3.81	.80	12.55	208	.00
	Upper	105	2.31	.85					Upper	105	2.31	.91			
17	Lower	105	3.48	.94	14.18	208	.00	42	Lower	105	4.06	.99	11.31	208	.00
	Upper	105	1.81	.76					Upper	105	2.49	1.02			
18	Lower	105	3.44	.89	13.42	208	.00	43	Lower	105	4.15	.94	10.43	208	.00
	Upper	105	1.82	.84					Upper	105	2.67	1.09			
19	Lower	105	4.17	.62	13.50	208	.00	44	Lower	105	3.77	1.01	7.33	208	.00
	Upper	105	2.77	.85					Upper	105	2.74	1.01			
20	Lower	105	3.74	.87	11.05	208	.00	45	Lower	105	3.66	.87	9.48	208	.00
	Upper	105	2.33	.96					Upper	105	2.43	.99			
21	Lower	105	3.75	.76	15.03	208	.00	46	Lower	105	4.03	.96	9.44	208	.00
	Upper	105	2.04	.87					Upper	105	2.63	1.17			
22	Lower	105	3.83	.81	16.08	208	.00	47	Lower	105	3.61	1.12	9.29	208	.00
	Upper	105	1.97	.87					Upper	105	2.25	.99			
23	Lower	105	3.61	.84	14.75	208	.00	48	Lower	105	4.22	.81	9.11	208	.00
	Upper	105	1.92	.81					Upper	105	3.04	1.05			
24	Lower	105	4.05	.70	17.11	208	.00	49	Lower	105	4.47	.63	7.54	208	.00
	Upper	105	2.19	.86					Upper	105	3,60	1.00			
25	Lower	105	3.54	.92	8.46	208	.00								
	Upper	105	2.43	.97											

p< .05

Upon examination of Table 10, a significant difference at the level of p< 0.05 is observed between the 27% lower and 27% upper groups in terms of items and the total score. This difference is determined to be in favor of the lower 27% group. It can be inferred that the reliability of the items in the scale is high, and the individuals scoring the scale are differentiated in terms of the intended characteristics.

DISCUSSION, CONCLUSION, RECOMMENDATIONS

The primary objective of this study was the formulation of a Likert-scale instrument intended to gauge the quality of higher education, premised upon the perspectives of academic faculty members. Likert scales, as stated by Tezbaşaran (2008), are measurement apparatuses developed to measure specific attributes. To validate the structural integrity of this instrument, an Exploratory Factor Analysis (EFA) was embraced, underpinning the assessment of structural hypotheses (Baykul, 2015). Preliminary to this factor analysis, the instrument met the prerequisites for EFA, as established by the KMO and Barlett's test outcomes. After the EFA, a scale comprising 49 items and partitioned into 9 sub-dimensions emerged. Drawing from extant literature, these sub-dimensions were named as: Education-Instruction, University Structure, Socio-Cultural Opportunities, Internationalization, Economic Opportunities, Student Requirements, Accreditation, Preferability, and Technological Competence. To assess the internal homogeneity of the instrument and its items, the Cronbach's Alpha coefficient was computed, a metric advocated by Tezbaşaran (2008) to determine scale consistency. Based on the obtained reliability coefficients for both the individual sub-dimensions and the scale in its entirety, the instrument displayed commendable internal cohesion and reliability.

In the quest to elucidate the alignment of the scale items with the targeted attribute, item-total and item-remainder correlation metrics were derived (DeVellis, trans. 2014; Tavşancıl, 2002). A salient positive and significant association was discerned from these coefficients, suggesting a substantive linkage between the scale items and the overall score, inherently reflecting the essence of the teaching profession. To further substantiate the reliability of this measurement tool, a test-retest methodology, as endorsed by Tezbaşaran (2008), was deployed. Results from this methodology manifested a positive and notable correlation between the overall score and the factors. Nevertheless, the t-test for dependent groups yielded no consequential disparities. In light of these observations, it can be posited with confidence that the crafted measurement instrument commendable reliability. The results presented above can be shown as evidence that the Higher Education Quality Indicators: Faculty Member Scale is valid and reliable. Following the validity and reliability studies and analyses, it was named "Higher Education Quality Indicators: Faculty Member Scale (HEQIFMS)". The final distribution of dimensions and items on the scale is as follows:

- Education and Instruction – 1, 2, 3, 4, 5, 6, 7, 8, 18, 19, 20, 22, 24, 25, 26, 30
- Structure of the University – 21, 32, 61, 62, 64, 65, 66, 67
- Socio-Cultural Opportunities – 36, 39, 41, 44, 45, 50
- Internationalization – 12, 13, 14, 16
- Economic Opportunities – 47, 48, 49
- Student Requirements – 52, 53, 57
- Accreditation – 43, 54, 55
- Preferability – 58, 59, 60
- Technological Competence – 9, 10, 34
- The developed Higher Education Quality Indicators: Faculty Member Scale is located in Appendix 1. Using the scale in future studies will both contribute to the validity and reliability of the scale and contribute to the field.

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APPENDIX 1.

QUALITY ISSUES IN HIGHER EDUCATION IN TURKEY: VIEWS OF FACULTY MEMBERS IN STATE UNIVERSITIES ON QUALITY

In the literature, indicators of higher education quality have been grouped under five main headings. These are instructional activities, scientific/research activities, physical facilities, socio-cultural opportunities, and administrative activities. For each item in the data collection tool, you are asked to indicate your level of agreement by marking the corresponding option next to the item.

	At the University/Institution I serve;	Your Level of Agreement				
		Strongly Disagree	Disagree	Neutral	Agree	trongly Agree
	Education and Instruction:					
1	The implemented curriculum is up-to-date.					
2	The program cultivates critical thinking skills.					
3	It promotes abstract thinking and reasoning abilities.					
4	The educational curriculum responds to societal changes and needs.					
5	It encompasses a variety of national and international cultures, reflecting cultural diversity.					
6	Offers courses that students can select based on their interests.					
7	The targeted learning outcomes are achieved.					
8	There is a constant pursuit to improve quality.					
9	Provides students with ample opportunities for professional development.					
10	The university offers active learning environments.					
11	Has mechanisms to evaluate the success of the educational programs.					
12	Equips students with professional skills that meet market demands.					
13	Student performance is evaluated in accordance with assessment principles.					
14	Process-based evaluation is incorporated.					
15	Offers adequate opportunities for individual student development.					
16	Students are encouraged to undertake scientific research.					
	University Structure:					
17	University constituents actively participate in decision-making.					
18	Sufficient resources are allocated for scientific research and studies.					
19	Quality is explicitly outlined in the university's strategic plan.					
20	Quality is ingrained in the university culture.					
21	Administrative rules and norms are transparent.					
22	Offers opportunities for self-expression.					
23	All stakeholders participate in quality improvement processes.					
24	Quality is embraced by the university management.					
	Socio-Cultural Facilities:					
25	Accommodation services offered to students meet expectations and needs.					
26	Offers a secure learning environment.					
27	Has the necessary infrastructure for sports and cultural activities.					
28	Provides suitable environments and tools for sports activities.					
29	Is renowned for its sports and cultural events.					
30	Offers social and cultural opportunities for leisure time.					

	Internationalization:					
31	Provides all facilities for international student admissions.					
32	Opportunities are offered for participation in international exchange programs.					
33	Collaborates with foreign universities.					
34	Offers education in foreign languages.					
	Economic Facilities:					
35	Offers scholarship opportunities that meet student needs.					
36	Provides employment opportunities for students in need within the institution.					
37	Offers students professional experience and internship opportunities.					
	Student Needs:					
38	Student satisfaction levels are evaluated.					
39	Efforts are made to determine student needs.					
40	Students are given the right to provide feedback on their education.					
	Accreditation:					
41	Educational programs are accredited by authorized institutions.					
42	Has an accredited quality management system.					
43	Certified by the Turkish Standards Institution (e.g., ISO 9001, ISO 22000, ISO 18001, ISO 15224, ISO 29990, ISO 31000).					
	Preferability:					
44	Ranked highly in student preferences.					
45	Graduates easily find employment.					
46	If given the opportunity, I would want to transfer to another university.					
	Technology/Academic Competence:					
47	Academic staff have competent skills in using technology.					
48	Adequate printed and electronic resources are available for accessing information.					
49	Provides access to international databases (e.g., EBSCOhost, Springer, ProQuest, etc.).					

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Can Youtube Videos Be Instructive for Self-Injection of Enoxaparin Subcutaneously in Patients?[1]

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ABSTRACT

The aim of this study is to examine the most watched videos about the application of enoxaparine on Youtube in terms of quality, reliability, usefulness and comprehensiveness. The reason for examining the videos of the broadcasts on Youtube in the study is that Youtube is a digital information source that people can access easily. In the evaluation of the videos, the video power index was calculated based on both views and likes. The quality of the videos was evaluated according to the Global Quality Score-GQS score, and the reliability was evaluated according to the DISCERN scale scores. A total of 400 videos were watched in the study and analyzes were carried out with the remaining 34 videos after the exclusion criteria. 16 of these videos were uploaded by patients, 13 by healthcare professionals, and 5 by other individuals/ institutions. 25 (73.5%) of the videos contain useful information and 9 (26.5%) misleading information. According to the quality scores of the videos calculated by GQS scoring, 15 were low, 6 were medium, and 13 were high quality videos. It was determined that the reliability and comprehensiveness scores of the videos were moderate. The results of the research revealed that Youtube videos are not an adequate instructional resource regarding the quality, safety and comprehensiveness of teaching self-injection of enoxaparine.

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INTRODUCTION

Enoxaparine is a low molecular weight heparin widely used in the prevention and treatment of various thromboembolic disorders (Noble, Peters, & Goa, 1995). There are areas of use such as prophylactic in patients with high thromboembolism risk after surgery, traumatic brain injuries and intensive care units, and for therapeutic purposes in deep vein thrombosis (Bıyık, 2020; Taylor et al., 2022; Vaughns et al., 2020). The drug is administered as intravenous and subcutaneous injection (Igbal & Cohen, 2011). It is important that patients who use enoxaparine regularly learn to self-medicate subcutaneously in order to facilitate the administration of the drug whenever and wherever they want without consulting a health center. When the use of the drug is started, patients are trained by healthcare professionals about self-administration (Pamukçu & İzci-Duran, 2021). However, patients may experience uneasiness and confusion during self-administration at home, especially during the first use. In such cases, patients seek information about subcutaneous administration of the drug (Rittberg, Dissanayake, & Katz, 2016). Within the scope of lifelong learning, it is among the important educational goals that patients, such as individuals of many different age groups and living conditions (Şaşmazören & Şahin, 2023), receive training on certain subjects during their illness. patients actively use internet-based resources as information sources. Pew Research Center reports that 59% of American adults have used the Internet to obtain health-related information in the past year (Fox & Duggan, 2013). While individuals use e-health resources, they also use videos as a source of information as they provide both visual and verbal information transfer. Youtube videos are also frequently preferred by all people as an educational material and source of information (Camm, Sunderland, & Camm, 2012). In the literature, there are studies that use Youtube as an educational resource for the acquisition of some therapeutic skills by healthcare professionals (Duncan, Yarwood-Ross, & Haigh, 2013; Logan, 2012; Sharoff, 2011). However, a problem brought about by the use of digital content from an educational point of view is that not all of these video contents are of the desired educational quality and content (Osman et al., 2022). Therefore, it is considered important to evaluate the content of videos on health-related topics on Youtube.

From this point of view, in this study, it is aimed to examine the most watched videos about self-administration of enoxaparine on Youtube in terms of popularity, viewing rate, power indexes, usefulness, quality, reliability and comprehensiveness. Within the scope of the study, the quality, reliability and comprehensiveness of the videos will be compared according to the uploaded source. Examining the videos on Youtube in the study is due to the widespread use and high preference rate of internet-based browsing related to health (Li et al., 2020). In addition, despite its widespread use, there is limited research on the educational use of Youtube on health-related issues. This study is expected to contribute to the literature in this respect.

METHOD

In this study, the document analysis method, one of the qualitative research methods, was used. Searching on YouTube (https://www.youtube.com) on August 20, 2023 with the words “how to make a self-blood thinner”, “how to make an enoxaparin injection”, “how to make an oxapar injection”, “how to make a Cleksan injection” done. Since it was shown in similar studies in the literature that viewers watched the first videos the most, only the first 5 pages of the videos related to each keyword were analyzed (Azer et al., 2013; Murugiah et al., 2011; Tutar et al., 2023). Thus, a total of 400 videos, 100 of each keyword, were evaluated within the scope of the study. The videos were evaluated independent of each other by two anaesthesiologists. In cases where there was a disagreement between these two anesthesiologists, a decision was made by obtaining expert opinion from a third anesthesiologist. Among these videos, videos (366 videos) that are irrelevant, contain advertisements, do not contain medical content, are repeated, have content in a language other than Turkish, although the name is in Turkish, and contain images but not sound. Analyzes were conducted with the remaining 34 videos after the exclusion criteria. As of the research type, it is a

document analysis and is out of the scope of ethics committee approval.

Usefulness

The usefulness of the videos was evaluated by using the four-category system that Pamukçu and Izci-Duran (2021) used in their studies. The four-fold categorization in this system is presented below.

1. Useful information (Group 1): Videos that contain useful and accurate information. Videos showing how to use the enoxaparin syringe and useful for learning self-injection,

2. Misleading information (Group 2): Videos that contain false information or do not contain information on how to use and self-administer enoxaparin injection,

3. Useful patient opinion (Group 3): These videos contain the patient's current or past personal experiences and/or feelings about enoxaparin syringe use. Self-injection videos showing how to use an enoxaparin syringe,

4. Misleading patient opinion (Group 4): Videos that contain false information from a patient or do not contain information on how to use and self-administer an enoxaparin injection.

Video quality

The Global Quality Scale (GQS) was used for the quality analysis of the videos. It is a five-point (1-5) scale that measures the quality, flow, and usefulness of a video. Accordingly, four or five points indicate high quality, three points indicate medium quality, and one or two points indicate low quality (Bernard et al., 2007; Pamukçu & İzci-Duran, 2021). The quality evaluation standards of videos according to GQS are presented below.

1 point=Video is low quality, poorly streamed, contains incomplete information and is therefore not helpful for patients,

2 points=The video is generally of poor quality and although some information is given, it contains limited information for patients to use.

3 points=The video is of medium quality. The videos contain both correct and incorrect information,

4 points=Video quality and fluent. The video contains the most relevant, useful information for patients and presents largely accurate information, but contains minor shortcomings,

5 points=The video is of excellent quality and flowing perfectly and contains very useful and completely accurate information for patients.

Reliability

It was determined by the DISCERN scale. Each video is evaluated with 5 questions on the DISCERN scale and scored between 0-5. It is evaluated by giving 1 point for each item that is answered yes. The questions in the scale are as follows.

1. Are the explanations given in the video clear, concise and understandable?
2. Are valid sources given? (Publication cited, current guidelines)
3. Is the information provided balanced and unbiased?
4. Can the audience benefit from the additional information sources listed?
5. Does the video consider controversial/ambiguous areas? (Pamukçu & İzci-Duran, 2021).

Comprehensiveness

The comprehensiveness of the video was also evaluated on a 5-point scale to evaluate the instructions for enoxaparine agent injections. It was evaluated by giving 1 point for each item that was answered yes in the video (Tolu et al., 2018). Depending on the comprehensiveness of the video, 0-5 points can be obtained from the scale. A high score indicates high comprehensiveness.

1. Preparation of pen/syringe and consumables (alcohol swab, cotton or gauze, cutting tool container)
2. Selecting an injection site and cleaning with an alcohol swab
3. Demonstration of injection application
4. Throwing the pen/syringe into the cutting toolbox
5. Pressing a cotton ball or gauze pad on the injection.

Data Analysis

The analysis of the obtained data was made using the SPSS 22.0 statistical package program. Numerical variables are presented as minimum, maximum, arithmetic mean and standard deviation values. Frequency, percentage, number (n), percentage (%) values of the data are presented. The Kruskal Wallis-H test was used for statistical comparisons. Bonferroni-corrected Mann Whitney U Test was used in paired comparisons to determine between which groups there was variation in cases where there was variation between groups. A p value of <0.05 was considered statistically significant in the analyses.

FINDINGS

The keywords determined within the scope of the study were written in the search section of the Youtube site, and a total of 400 videos were evaluated, 100 videos on the first 5 pages related to each word. 366 of the videos were excluded according to the exclusion criteria. Of these, 157 were irrelevant, 6 had images but no sound, 6 had Turkish titles but were in a different language, and 197 were repeated videos. A total of 34 videos were included in the study. The ratio of the videos included in the study to the total videos is 8.5%. 24 of them are related to the keyword group “how to make self blood thinner”, 8 are related to the keyword group “how to make an enoxaparin injection”, 1 is related to the keyword group “how to make an oxapar injection” and 1' i were videos about the keyword group “how to make a cleksan needle”. When the videos were examined in terms of the uploader, 16 (Group 3) were uploaded by patients, 13 (Group 1) by healthcare professionals, and 5 (Group 2) by other people/institutions. The view rate, popularity and power index of the videos were calculated with the formulas presented in the method section based on the number of views, the number of likes, the number of dislikes, and the loading time parameters. Descriptive information about the videos is presented in the table below.

Table 1. *Descriptive statistics of the videos included in the study*

	Min	**Max.**	**Mean**	**Standard deviation**
Loading time (days)	16.00	2973.00	1046.11	620.12
Length (sec)	42.00	963.00	237.35	218.19
Views	82.00	1150255.00	138140.26	24462.74
Number of shares	.00	.00	.00	.00
Number of comments	.00	564.00	63.85	120.57

Number of likes	.00	4800.00	583.64	1174.48
Number of dislikes	.00	.00	.00	.00
Video view rate	.15	829.91	140.30	123.82
Video popularity	100.00	100.00	100.00	.00
Video power index	.15	829.91	140.30	123.82

When Table 1 is examined, the upload times of YouTube videos about self-subcutaneous injection of enoxaparin vary between 16 days and 2973 days, the length of the videos is between 42 seconds and 963 seconds, the average number of views is 138140.26, the videos do not receive any shares, the average number of likes is 583.64, dislikes It is seen that the number is zero for all videos. Since the number of dislikes was zero, the viewing rates and video power indexes of the videos were calculated equally (x=140.30). The popularity of the video was also calculated as 100 depending on the number of dislikes being zero.

Findings on the Usefulness, Quality, Reliability, and Comprehensiveness of Videos

According to the four-fold categorization of the usefulness of the videos, 17 videos were evaluated in the useful information category, 2 in the misleading information category, 8 in the useful patient opinion category, and 7 in the misleading patient opinion category. In total, 25 (73.5%) of the videos contain useful information and 9 (26.5%) misleading information. Information on the quality, reliability and comprehensiveness of the videos is presented in table 2.

Table 2. *Results of the quality, reliability and comprehensiveness analysis of the videos*

	Min	**Max.**	**Mean**	**Standard deviation**
Quality (GQS)	.00	5.00	2.85	1.78
Reliability (DISCERN)	.00	5.00	2.23	1.41
Comprehensiveness	1.00	5.00	2.67	1.55

When Table 2 is examined, the average quality of the videos calculated by GQS scoring is 2.85, the mean of reliability calculated by DISCERN tool is 2.23, and the mean of comprehensiveness is 2.67. In addition, according to the GQS low, medium, high categorization, 15 of the videos were low, 6 were medium, and 13 were high quality videos.

Comparisons of the quality, reliability and comprehensiveness of the videos according to the uploading source are presented in table 3.

Table 3. *Comparison of videos by uploader source*

		Mean	**Sd**	**Test statistics**	**P (Significance)**
Quality (GQS)	Group 1	4.00	1.08	14.027	0.001**
	Group 2	2.60	1.67		(Group 1- Group 2;
	Group 3	2.06	1.12		Group 1-Group 3)
Reliability	Group 1	3.23	1.23	11.766	0.003**
(DISCERN)	Group 2	1.34	0.61		(Group 1- Group 2;
	Group 3	1.31	1.05		Group 1-Group 3)
Comprehensiveness	Group 1	3.69	1.60	11.857	0.003**
	Group 2	2.40	1.14		(Group 1- Group 2;

Group 3	2.50	1.46	Group 1-Group 3)

*Note: **p<0.005; Sd=Standard Deviation; Group 1=Healthcare workers; Group 2= Other persons; Group 3=Patients*

When Table 3 is examined, it is seen that the quality (p=0.001), reliability (p=0.003) and comprehensiveness (p=0.003) of YouTube videos about self-injection of enoxaparin differ according to the uploading source. Post hoc analysis results for determining the source of differentiation revealed that the videos uploaded by healthcare professionals obtained statistically significantly higher results than the videos uploaded by other people/institutions and patients in terms of quality, reliability and comprehensiveness.

DISCUSSION

In this study, it is aimed to examine the most watched videos about self-administration of enoxaparine on Youtube in terms of popularity, view rate, power indices, usefulness, quality, reliability and comprehensiveness. In recent years, videos are used as a source of information on many health-related topics (symptoms of diseases, treatment, drug applications, etc.) due to the advances in digital technologies and the widespread use of internet access (Li et al., 2020). However, the fact that the videos shared on the YouTube video platform do not have a certain standard in terms of content, videos can be easily uploaded to the platform without requiring any control, and misleading / deceptive information about the subject in some videos cause the video content to be questioned (Nason, Donnelly, & Duncan, 2016, Tutar et al., 2020). In this study, the ratio of the videos (n=34) included in the study to the total videos (n=400) is 8.5%. The low rate of videos that meet the inclusion criteria in the study can be interpreted as the existing videos do not meet the expectations in terms of title-content compatibility. The results of the research were calculated as 140.30, since the viewing rates and video power indexes of the videos were zero, since the number of dislikes was zero. The popularity of the video was also calculated as 100 depending on the number of dislikes being zero. It is noteworthy that the number of dislikes in all videos reviewed here is zero. However, similarly, in studies examining youtube videos in the field of health, it is seen that the number of dislikes is either absent or very low (Öztürk & Gümüş, 2021; Tutar et al., 2020). This has been interpreted as people living in our country prefer not to express their opinions contrary to the situations they like when they encounter a content they do not like on the internet.

The analysis results on the usefulness of the videos revealed that 73.5% of the videos contain useful information and 26.5% contain misleading information. Online platforms are effective in spreading false information as well as correct information. Especially in recent years, the spread of misleading information about health from online and offline sources is an issue that attracts the attention of the scientific world and is brought to the agenda by health-related organizations (Bilişli, 2022). When the subject is health, the misleading content of the information presented can reveal vital consequences (Gonsalves & Staley, 2014). For this reason, the fact that 26.5% of the videos examined in the study contain misleading information has been interpreted as the videos should be carefully examined in terms of content.

The results of the study revealed that the mean reliability of the videos calculated with the DISCERN tool was 2.23 and the mean of comprehensiveness was 2.67. Considering that the minimum score that can be obtained from the measurement tools used in the assessment of reliability and comprehensiveness is 0 and the maximum score is five, it is seen that the reliability and comprehensiveness scores of the videos are moderate.

According to the analysis results of the quality of the videos, according to the categorization of low, medium, high based on the GQS score (Bernard et al. 2007; Pamukçu and Izci-Duran, 2021) 15 (44.2%) of the videos were low, 6 (17.6%) were medium, 13' (38.2%) are high-quality videos. In the literature, there are conflicting results regarding low-medium-high quality in studies based on youtube video analysis on health issues (Duran & Kızılkan, 2021; Koçyiğit & Akaltun, 2019;

Pamukçu & İzci-Duran, 2021). However, when evaluated from the perspective of the vital importance of the issue and the conclusion that Pamukçu and Izci-Duran (2021) obtained in his study that the patients could not distinguish high-quality videos from low-quality videos, the results of the current study regarding the video quality of the videos related to self-administration of enoxaparine should be reviewed and supervised. and interpreted as needing improvement.

Within the scope of the study, the quality, reliability and comprehensiveness of the videos were compared according to the uploaded source. It has been determined that the videos uploaded by healthcare professionals have statistically significantly higher results than the videos uploaded by other people/institutions and patients in terms of quality, reliability and comprehensiveness. In the study of Pamukçu and Izci Duran (2021), similar to the results of this study, it was determined that the videos uploaded by healthcare professionals had significantly higher results than others in terms of GQS and DISCERN scores. The result of the study is an expected result due to the education of healthcare professionals, their routine practice of enoxaparin and similar subcutaneous injections in their professional lives. In parallel with similar studies, it has been demonstrated again that the most appropriate source of information in the videos published on health is health workers.

CONCLUSION AND RECOMMENDATIONS

Research results revealed that Youtube videos are not an adequate resource for quality, safety and comprehensiveness in teaching self-injection of enoxaparine. In terms of social benefit, it is recommended that the videos on the subject be broadcast on Youtube after a certain inspection in terms of content, scope, quality and reliability. In addition, while using any health-related video as a source of information, awareness raising studies should be carried out to take into account some criteria (such as uploaders) in order to reach accurate and useful information.

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The Impact of ChatGPT on Language Learners' Motivation

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ABSTRACT

As digital technology advances, its tools and applications are being used both inside and outside the classroom to increase student participation and motivation. One encouraging technology that has freshly seized acceptance is the adoption of artificial intelligence (AI) in language learning (i.e. ChatGPT). As it can engender human-like chat in return to user guidance and based on the gap in the literature regarding the effects and implications of using such a tool as an instructional material, the goal of this study is to explore the effect of integrating ChatGPT-generated dialogues into language teaching materials to determine its effect on the motivation of language learners. The participants were second-year university students from different departments. Within the scope of a study consisting of a total of 10 sessions and 15 min. for each one, in the experimental group, post-lesson activities were implemented with the assistance of ChatGPT, whereas in the control group, assignments were given as specified by the curriculum program. The quasi-experimental design was employed for the research. The students' motivational strategies were measured using the 'Motivational Strategies for Learning Questionnaire' (Pintrinch & De Groot, 1990) and pre- & post-tests were carried out to show the difference, if any. The data was analysed with SPSS. The outcomes showed that there were statistically differences between majors on the motivation test subcategories (self-regulation, intrinsic values, and test anxiety). Also, ChatGPT's role as providing feedback, personalized support, guidance independent of time and place, and increasing motivation is an influential factor that leads to improvement for language learners.

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INTRODUCTION

Language learning has always been a challenging task for many students, especially when it comes to engaging with language teaching materials. Learners often feel bored or uninterested in traditional language learning resources, such as textbooks and lectures, which can negatively affect their motivation to learn (Gürbüz, et al. 2017). As a result, language teachers are constantly seeking innovative ways to enhance learners' motivation and engagement. One promising approach is the use of technology in language teaching. In recent decades, there has been an increasing curiosity towards the utilization of diverse forms of technology such as Computer-Assisted Language Learning (CALL), learning through mobile devices, and education through gaming to enhance language learning outcomes (Palomo-Duarte et al., 2016). These advancements present learners with chances to engage with the language in different settings, obtain instant responses, and partake in self-motivated education.

The technology that has recently gained popularity is the use of artificial intelligence (AI) in language learning. AI systems can generate and deliver personalized learning materials that are tailored to learners' needs and preferences (Raj & Renumol, 2022). One such AI system is ChatGPT, a language model developed by OpenAI that can generate human-like dialogues in response to user input. Among a small number of studies, Zileli's study (2023) covers a wide range of topics, including having conversations, word meanings, sentence meanings, and word meanings within sentences; translating English texts into Turkish; getting feedback; pronunciation; reading texts; giving feedback on written texts; outlining topics with examples; and creating exercises supported by ChatGPT. According to the study, ChatGPT encourages language acquisition and assimilation by offering feedback from a variety of angles to learners who are interested in learning Turkish as a foreign language. Also, by engaging them and presenting them to other languages in a fun way using voicebots and augmented reality, young children's cognitive development can be improved (Topsakal & Topsakal, 2022). In the study of Şenyaman (2023), vocabulary, pronunciation, grammar tests at various levels, translation activities, writing papers on certain subjects, and supplying equivalents for idiomatic idioms have all been requested from ChatGPT. According to the findings of the study, ChatGPT is advantageous in that it offers feedback, individualized help, guidance that is not dependent on location or time, and motivation, the elements that are most important for assisting an individual learn a language.

While there has been limited research on the use of ChatGPT in language teaching, little is known about its impact on learners' motivation to engage with only vocabulary acquisition. Furthermore, motivation is a crucial factor in language learning, as it affects learners' willingness to engage in language learning activities and their persistence in pursuing their language learning goals (Dörnyei & Ushioda, 2013). Therefore, the purpose of this study is to investigate the impact of incorporating ChatGPT-generated dialogues in language teaching materials (specifically vocabulary acquisition) on language learners' motivation to engage with these materials. The research questions are:

1. What is the impact of ChatGPT-generated dialogues on language learners' motivation to engage with language teaching materials?

2. What are the factors that contribute to the effectiveness of ChatGPT-generated dialogues in promoting language learners' motivation?

3. Is there any difference between the students' pre- & post-test results?

This study aims to contribute to the existing literature on technology-mediated language learning and motivation by exploring the potential of ChatGPT-generated dialogues as a means of enhancing learners' motivation to engage with language teaching materials. The findings of this study can provide valuable insights for language teachers and curriculum designers on how to effectively integrate AI-generated materials into their language teaching practices.

Technology-Mediated Language Learning

The concept of technology-mediated language learning entails utilizing diverse technological approaches to boost and improve the results of language education. In recent decades, there has been a mounting attraction towards integrating technology into language learning, with several instructors and scholars (such as Blake, 2013; Brandl, 2002; Chapelle, 2003; Garrett, 1991) examining how it can furnish learners with fresh avenues for practicing and communicating in a language. Diverse technology categories have been implemented in language education, which encompasses CALL, mobile learning, game-based learning, and recently, artificial intelligence-driven approaches, such as language learning applications and chatbots. Technology-mediated language learning has the potential to provide learners with increased access to language materials, opportunities for interaction and feedback, and personalized learning experiences. However, it is important to carefully consider the pedagogical implications of using technology in language learning and to ensure that it is being used in ways that are effective, engaging, and inclusive for all learners. CALL, in particular, has been widely used in language teaching since the 1960s (Warschauer & Healey, 1998). It empowers learners to participate with language learning resources in an interactive and self-guided approach which can enhance their motivation and engagement (Chapelle, 2001). Mobile learning, on the other hand, refers to the use of mobile devices, such as smartphones and tablets, to support language learning (Kukulska-Hulme, 2012). Mobile learning offers learners opportunities to engage with the language in various contexts and settings, such as on the go or in real-life situations. Moreover, mobile learning can enhance learners' motivation and engagement, as it allows them to access learning materials anytime and anywhere (Kukulska-Hulme, 2012).

Game-based learning, meanwhile, refers to the use of games or gamification elements in language teaching (Gee, 2005). Games offer learners a fun and engaging way to learn the language, as they can learn and practice the language in a playful and interactive manner. Moreover, games can enhance learners' motivation and engagement, as they recommend learners immediate feedback and rewards for their progress (Gee, 2005). Incorporating game-based learning into language teaching not only fosters effective language acquisition but also cultivates a dynamic and motivating learning environment for the learners.

The Impact of the Materials on Learners' Motivation

Motivation is a crucial factor in language learning, as it affects learners' willingness to engage in language learning activities and their persistence in pursuing their language learning goals (Ushioda & Dörnyei, 2017). Motivation can be divided into two types: intrinsic motivation, which refers to the learner's internal drive to learn the language, and extrinsic motivation, which refers to external factors that motivate the learner, such as rewards or grades (Dörnyei, 2001).

Internal motivation that stems from a person's identity and sense of fulfillment is known as intrinsic motivation. When learning is a primary objective, learners are naturally motivated. On the other hand, extrinsic motivation originates from sources other than the person. When learning is carried out for rewards like marks or praise that are not intrinsically linked to the learning itself, namely, when learning becomes vital for receiving those benefits, learners are extrinsically motivated (Ng & Ng, 2015). Intrinsic motivation is considered to be more desirable than extrinsic motivation, as it leads to deeper and more long-lasting learning outcomes (Ryan & Deci, 2000). Therefore, language teachers should aim to foster learners' intrinsic motivation to learn the language, as an illustration, by furnishing prospects for independence, proficiency, and connection (Deci & Ryan, 2008).

Research has demonstrated that integrating technology into language instruction can improve learners' drive and involvement (De Souza et al., 2021). Technology-mediated language learning offers learners opportunities to interact with the language in various contexts and receive immediate feedback, which can enhance their intrinsic motivation to learn the language (Chapelle, 2001).

Language teaching materials are designed to facilitate the language learning process by providing

learners with resources that expose them to different aspects of the language. These materials come in various forms, including textbooks, workbooks, audio and video materials, and online resources (Harwood, 2010; Tomlinson, 2023) However, the impact of language teaching materials on learners' motivation to engage with them is still a topic of debate in the field of language education (Sun, 2010). For example, according to Mohseni and Ahmadi (2017), allowing students to choose their own learning materials according to their preferences and needs has been reported to increase motivation for learning. It was aimed to provide an overview of the existing literature on language teaching materials and their impact on learners' motivation in this part Also, language teaching materials play a pivotal role in language learning, given that they offer learners a methodical and organized approach to acquire the language. Materials that are well-designed can enhance learners' motivation and engagement by providing them with interesting and relevant content, opportunities for interaction and practice, and feedback on their progress. Moreover, language teaching materials that are aligned with learners' goals, interests, and proficiency levels can help to increase their sense of autonomy and self-efficacy (Gardner, 1985). However, traditional language teaching materials, such as textbooks and workbooks, have been used in language classrooms for many years. These materials provide with a structured approach to learning the language, which can be helpful for some learners. Nonetheless, they are often criticized for being too dry and boring, which can lead to decreased motivation and engagement (Ellis, 2003). Furthermore, traditional materials may not be relevant or interesting to all learners, and lack motivation and engagement (Peacock, 1997).

The learner's drive constitutes a fundamental factor in the Second Language Acquisition (SLA) procedure, and language instruction resources serve a crucial function in language education and teaching undertakings. Various determinants that could impact learners' enthusiasm towards teaching materials were recognized, including the theme's appeal, complexity, correlation with their current knowledge, and perceived utility (Sun, 2010). Different factors impact students' motivation towards teaching materials, including their interest in the subject, the difficulty level, relevance to their prior knowledge, and perceived usefulness (Dornyei, 1994). Additionally, the study of Stracke (2007) sheds light on the psychological and cognitive factors influencing the decision of three students to drop out of blended language classes. The situations may fluctuate concerning learners' psychological and cognitive attitudes, cultural, social, and academic circumstances, and the extent of technology adoption in the learning environment. However, there are challenges concerning teachers, students, learning environments, and teaching evaluation and management in using multimedia technology. As Chen and Li (2011) stated, one of the significant issues is the inadequate incorporation of multimedia technology in classroom instruction which results in a gap between its potential and the teachers' and students' proficiency and comprehension. The teachers are suggested to have more training and development sessions of technology, ability to inspire students' curiosity and encouraging their initiatives, to perfect the fusion of multimedia teaching and conventional classroom instruction, and to establish a workable and efficient system of teaching evaluation and management. And also, another issue is students' inadequate awareness and ability to learn autonomously, coupled with the obsolete framework for evaluating and managing instruction (Mao, 2010).

The impact of technology on language education is often exaggerated, as novel technologies are occasionally presumed to be more efficient than current ones, without considering disparities in connected teaching approaches (Bax, 2003). Even though technology can provide opportunities for enthusiastic learners, it is improbable to result in drive or self-regulating conduct without fitting pedagogical methods that capitalize on the technologies and include adequate training in their use for language instruction (Reinders, 2018a). In addition, teacher attitudes and classroom pressures may also impact the implementation of technology (Mercer & Kostoulas, 2018).

In language learning, engagement and motivation are widely acknowledged as crucial factors for success. Increased motivation can mobilize students' personal, cognitive, emotional, and behavioural resources, leading to better learning outcomes. With the advancement of digital technology, its tools and

applications are being utilized both inside and outside the classroom to boost student motivation. The role of technology as a motivational factor in foreign language learning was explored (Panagiotidis et al , 2018), examining various tools, methods, or strategies that increase motivation. Extensive research has studied the relationship between technology use, as internet utilities, electronic games, smartphone applications, or communication platforms, and drive in language education environments (Lamy & Hampel, 2007; Mukundan et al., 2014; Son, 2011). Although technology is frequently deemed intrinsically stimulating for pupils and intertwined with independence enhancement, its impact on drive is proving to be more intricate than initially perceived by language instructors and learners (Stockwell, 2013).

In the last three decades, studies on language learning have mostly concentrated on conventional classroom environments (such as; Campbell et al, 2013; Janda, 1990; Lyke & Frank, 2012). Nevertheless, with the incorporation of computer technology, language learning has turned more environmental and the application of technology has become routine in classrooms. This routine integration of technology has swiftly transformed the language learning scene, with the ubiquitous utilization of mobile gadgets and online resources. Therefore, learners of digital languages must comprehend and employ suitable learning strategies for efficient language acquisition, and their instructors must have the capacity and readiness to teach these strategies. What is crucial in every circumstance is forbearance, and both educators and pupils should possess a receptive attitude towards novel methodologies and routines that may favourably transform the aspect of the learning milieu (Zhou & Wei, 2018). At this point, since it will facilitate understanding the purpose and scope of this study, there is a brief mention of the topics of self-regulation and cognition.

Self-regulation is a notion that encompasses cognitive, behavioral, and affective elements of learning, providing considerable potential for examining the learning process in its entirety (Perry et al., 2008). According to Zimmerman (1989), students are self-regulated to the extent that they are metacognitively, intrinsically motivated, and behaviorally engaged participants in their own learning process. The "will" and "skill" of learners are essential for effective learning, and both relate to motivation and the adoption of efficient techniques that are part of self-regulation (Pintrich & De Groot, 1990). So, in addition to cognitive abilities, self-regulation also requires motivational elements like self-efficacy, goal orientations, anxiety, etc. Planning and time management, participation and attention to teaching, organization, recoding, and rehearsal of the material, structuring the study environment, and effective use of social resources are all aspects of academic self-regulated processes (Zimmerman, 1990).

Accordingly, the ability to change the meaning structure of language by recognizing and recognizing differences in word structure that are connected to verb tense, grammatical gender, or plural formation is known as morphological awareness (Cheung et al., 2010). In addition, Robinson (2001) claimed the “Cognition Hypothesis of L2 Development” and offers a ratio-nale for sequencing tasks in language programs. It accomplishes this by utilizing a methodical framework for comprehending task requirements, which is primarily divided into three factors: complexity, conditions, and difficulty.

METHOD

The Participants

The participants of this study were second-year university students in 2022-23 academic year, aged from 18 to 22. They had 56 English lessons in the first year at the intermediate level and they were successful. Totally, 25 females and 35 males participated from different departments such as graphic design, martime and information technologies.

In this study, a pre- & post-test experimental-control group quasi-experimental design has been employed. Experimental designs are used to examine the effect of a variable in two different groups (Büyüköztürk et al, 2012.

The participants were grouped homogenously according to their proficiency level. The control

group consisting of 30 students applied traditional learning methods and the experimental group consisting of 30 applied ChatGPT based learning. The students were majoring in Maritime and Management, Graphic Design and Information Technology Departments.

Instruments & Procedure

Both groups were administered the Oxford English Proficiency Test, ensuring the homogeneity of the groups before overall. According to the results, 3 of the students were subtracted from the study since they were seen to be very successful at advanced level on contrary to the rest of the students who were intermediate level. After that, a demographic information form was provided. One of the main instrument of the study is ChatGPT.

As a large language model, ChatGPT assisted to the students in the experimental group in several ways to integrate language learning into the classes. ChatGPT was utilized according to the following items:

(1) It was used as a language practice tool: to practice writing or listening in English, to give information about how to ask questions or have a conversation in the target language to improve vocabulary learning skills.

(2) It was used to generate language exercises: to generate language exercises that the students can complete to practice. For example, to create vocabulary lists, or reading comprehension passages including the targeted word list.

(3) To provide feedback on writing assignments: feedback on the students' writing assignments with the word list that have been taught in the previous lesson, to check for vocabulary errors, provide suggestions for improvement, and give feedback on the overall quality of their vocabulary usage.

(4) It was used to provide language input: to provide the students with language input in the target language with the word list. For example, to recommend reading aloud exercise websites, to read aloud passages or stories, or to provide audio or video clips in English for the students to listen or to watch.

It is essential to note, here that it only provides assistance and support for language learning, but it cannot replace human interaction and feedback that is essential for language acquisition. So, it is important to use it as a supplement to the students' learning and not a replacement for it. Thus, the instructor took the role of teaching and ChatGPT was profited as a practise or exercise partner.

10 sessions, the subjects for each sessions and the ChatGT assistance can be seen in Table 1.

Table 1. *The ChatGPT role for each subject*

Sessions	Subjects of words	ChatGPT assistance
1. session	Conversation (greeting, introduction etc.)	gives clues about conversations (such as how to start or finish a conversation, how to introduce yourself properly, hobbies, how to take turns etc.)
2. session	The terms and definitions of materials (different materials encountered in the students' professional life, i.e. computer devices, information technology terms for Information Technology Department, or design terms for Graphic Department, or Ship and Port Management terms for Maritime and Management Department)	Language exercises, word lists, translating, word-chunks, how to use a word in a sentence, giving examples for formal and informal usage of the words etc.

3.session	The terms and definitions of materials (different materials encountered in the students' professional life, i.e. computer devices, information technology terms for Information Technology Department, or design terms for Graphic Department, or Ship and Port Management terms for Maritime and Management Department)	Language exercises, word lists, translating, word-chunks, how to use a word in a sentence, giving examples for formal and informal usage of the words etc.
4. session	The terms and definitions of materials (different materials encountered in the students' professional life, i.e. computer devices, information technology terms for Information Technology Department, or design terms for Graphic Department, or Ship and Port Management terms for Maritime and Management Department)	Language exercises, word lists, translating, word-chunks, how to use a word in a sentence, giving examples for formal and informal usage of the words etc.
5. session	The terms and definitions of materials (different materials encountered in the students' professional life, i.e. computer devices, information technology terms for Information Technology Department, or design terms for Graphic Department, or Ship and Port Management terms for Maritime and Management Department)	Gives links on websites in order to make the students see the words in real life usage.
6. session	Filing and writing for each department	Gives assignments (i.e. writing a paragraph or conversation with using the words previously learned)
7. session	Filing and writing for each department	Feedback on the assignments
8. session	Reading and comprehension of the formal letters	Gives examples of the letters or files that can be useful for the professional life of students)
9. session	Media support	Gives audio-visual video clip links in order to provide pronounciation and listening learning materials.
10. session	Media support & Suggestions	Gives more links and suggestions to make sudents continue their vocabulary learning.

After the online English lessons included in the second-grade curriculum, the experimental group was provided with support from ChatGPT, as mentioned in the above points, in addition to the traditional course materials. These activities lasted for 15 minutes as post-lesson activities and were implemented in a total of 10 sessions for the vocabularies to be learned each week. Students were free to ask questions to ChatGPT in order to learn the words and all sessions were conducted online under the supervision of a teacher.

In this study, the students' motivational strategies were measured using the 'Motivational Strategies for Learning Questionnaire' adapted into Turkish by Uredi (2005), which covers 44 items, and was originally developed by Pintrinch and De Groot (1990). The measurement tool was a 3-point Likert-type scale, scored based on the range from 'completely fits me' to 'does not fit me at all'. Additionally, 10 fill-in-the-blank questions with a total score of 10 were designed. To evaluate the students' proficiency in the target vocabulary, a pre-test was administered before the lesson, and a post-

test was conducted afterwards to measure their knowledge acquisition and mastery.

Table 2. *Structural model of motivational strategies for learning questionnaire*

Self-Regulated Learning Strategies			Motivational Beliefs		
The sub-scales	Cognitive Strategy Use	Self-Regulation	Self-Efficacy	Intrinsic Value	Test Anxiety
The sub-dimensions	Rehearsal Elaboration Organization	Planning Monitoring Evaluation	Perceived Competence and Confidence in Classroom Performance	Intrinsic Interest Perceived Importance of Schoolwork Intrinsic Goal Orientation	Level of Test Anxiety

Table 2 shows that the items 33, 32, 27, 43, 35, 25, 38, 37, and 40 are used to measure the self-regulation dimension, while items 39, 44, 28, 24, 36, 41, 23, 31, 26, 34, 30, 42, 29, and 11 measure the cognitive strategy dimension. Items 11, 16, 18, 9, 8, 13, 2, 19, and 6 are used to measure self-efficacy, items 1, 5, 4, 7, 10, 14, 15, 17, and 21 measure intrinsic value, and items 3, 12, 20, and 22 measure test anxiety. Additionally, items 26, 27, 37, and 38 are reverse-scored. According to Üredi's (2005) study, the internal consistency of each sub-scale was measured using Cronbach's alpha values, which were found to be 0.84 for self-regulation, 0.92 for self-efficacy, 0.88 for intrinsic value, and 0.81 for test anxiety. Cronbach's alpha is a measure of internal consistency, indicating the reliability of the items within each sub-scale. These values suggest that the Turkish adaptation of the measurement tool has good internal consistency, indicating that the items are measuring the same construct reliably.

Ethic

It has been found to comply with the Ethical Rules by Zonguldak Bülent Ecevit University Human Research Ethics Committee, as documented in the file with the Institution Registration Date and Number: 10.05.2023-302058.

RESULTS

According to the analysis results used to determine whether the data was normally distributed or not, it can be said that all test results show a normal distribution (pre-achievement test skewness=-.001, kurtosis=-1.185, post-achievement test skewness=-.67, kurtosis=-.44, pre-motivation test skewnesss=-.07, kurtosis=-.401, and post-motivation test skewness=1.46, kurtosis=1.43). The results of the normality tests (Skewness and Kurtosis) being between -1.5 and +1.5 are evidence that the data is normally distributed (Tabachnick & Fidell, 2013).

Table 3. *The mean scores of the control group*

		Mean	N	Std. Deviation	Std. Error Mean	t	p	df
Pair 1	pre-achievement	.1167	30	.10199	.01862	-6.372	.000	29
	post-achievement	.3500	30	.22089	.04033			
Pair 2	Pre-selfregulation	1.9333	30	.28079	.05126	1.856	.074	29
	Post-selfregulation	1.8519	30	.22286	.04069			
Pair 3	Pre-cognitive	1.8357	30	.25662	.04685	4.273	.000	29
	Post-cognitive	1.6905	30	.23678	.04323			
Pair 4	Pre-selfeficacy	1.7708	30	.25656	.04684	6.257	.000	29

	Post-selfeficacy	1.5500	30	.25129	.04588			
Pair 5	Pre-intrinsic value	1.7370	30	.26177	.04779	4.289	.000	29
	Post-intrinsic value	1.6667	30	.28590	.05220			
Pair 6	Pre-test anxiety	1.6083	30	.40302	.07358	-4.350	.000	29
	Post-test anxiety	2.1667	30	.78601	.14351			

Looking at the means in Table 3, it was found that there was a significant difference (t(29)=-6.37, p<.05) between the control group's pre-achievement test (M=.11, SE=.01) and post-achievement test (M=.35, SE=.04). Additionally, there was not any significant difference (t(29)=1.85, p>.05) between the subcategories of the pre-selfregulation (M=1.93, SE=.05) and post-selfregulation (M=1.85, SE=.04) sections of the motivation questionnaire, which were divided into 5 different categories. However, significant differences were found in all other subcategories, such as the pre-cognitive test (M=1.83, SE=.046) and post-cognitive test (M=1.69, SE=.04), t(29)=4.27, p<.05; between the pre-selfefficacy test (M=1.77, SE=.25) and post-selfefficacy test (M=1.55, SE=.046), t(29)=6.25, p<.05; between the pre-intrinsic value test (M=1.73, SE=.26) and post-intrinsic value test (M=1.66, SE=.28), t(29)=4.28, p<.05; and between the pre-test anxiety (M=1.60, SE=.40) and post-test anxiety (M=2.16, SE=.14), t(29)=-4.35, p<.05.

Table 4. T*he mean scores of the experimental group*

		Mean	N	Std. Deviation	Std. Error Mean	t	p	df
Pair 1	Pre-achievement	.1667	30	.10283	.01877			
	Post-achievement	.7067	30	.13374	.02442	-18.616	.000	29
Pair 2	Pre-selfregulation	1.8037	30	.21774	.03975			
	Post-selfregulation	1.5333	30	.22489	.04106	6.992	.000	29
Pair 3	Pre-cognitive	1.7262	30	.18291	.03339			
	Post-cognitive	1.5976	30	.21753	.03972	5.699	.000	29
Pair 4	Pre-selfeficacy	1.8417	30	.30430	.05556			
	Post-selfeficacy	1.4667	30	.31645	.05778	6.268	.000	29
Pair 5	Pre-intrinsic value	1.7963	30	.25284	.04616			
	Post-intrinsic value	1.4963	30	.28550	.05212	7.874	.000	29
Pair 6	Pre-test anxiety	1.6583	30	.35039	.06397			
	Post-test anxiety	2.5417	30	.41044	.07494	-9.699	.000	29

According to Table 4, there was a significant difference between the experimental group's pre-achievement test (M=0.11, SE=0.01) and post-achievement test (M=0.76, SE=0.02) scores, with t(29)=-18.61, p<0.05. Additionally, significant differences were found in all five subcategories of the motivation questionnaire; pre-selfregulation (M=1.83, SE=0.03) and post-selfregulation (M=1.53, SE=0.04) with t(29)=6.99, p<0.05, pre-cognitive test (M=1.72, SE=0.03) and post-cognitive test (M=1.59, SE=0.03) with t(29)=5.69, p<0.05, pre-selfefficacy test (M=1.84, SE=0.55) and post-selfefficacy test (M=1.46, SE=0.05) with t(29)=6.26, p<0.05, pre-intrinsic value test (M=1.79, SE=0.04) and post-intrinsic value test (M=1.49, SE=0.05) with t(29)=7.87, p<0.05, and pre-test anxiety (M=1.65, SE=0.06) and post-test anxiety (M=2.54,

SE=0.07) with t(29)=-9.69, p<0.05.

Table 5. *The results of pre- and post-achievement tests between groups*

	groups	N	Mean	Std. Deviation	Std. Error Mean	t	df	p
Pre-achievement test	control	30	.1167	.10199	.01862	-1.891	58	.064
	experiment	30	.1667	.10283	.01877			
Post-achievement test	control	30	.3500	.22089	.04033	-7.565	47.742	.000
	experiment	30	.7067	.13374	.02442			

When examining Table 5, a significant difference was not observed between the control and experimental groups in terms of pre-test results, t(58)= -1.89, p> .05, however, a significant difference was found in the post-test results, t(58)= -7.56, p< .05.

Table 6. *Pre-Post motivation test results*

	groups	N	Mean	Std. Deviation	Std. Error Mean	t	df	p
Pre-motivation	control	30	1.7771	.18161	.03316			
	experiment	30	1.7652	.15410	.02814	.272	58	.787
Post-motivation	control	30	1.7851	.21286	.03886			
	experiment	30	1.7271	.11901	.02173	1.303	58	.198

As can be understood from Table 6, there was not any significant difference between overall scores of pre-motivation and post-motivation tests. However, the motivation scale consists of 5 subcategories, which means that it is more reliable to present the findings of each sub-cetagories. After examining and analyzing each of these 5 categories individually, it was determined that there may be significant differences. The necessary analysis results are shown in the Table 7 below.

Table 7. *The results of the pre-motivation subcategory tests*

	groups	N	Mean	Std. Deviation	Std. Error Mean	t	df	p
Pre-selfregulation	control	30	1.9333	.28079	.05126			
	experiment	30	1.8037	.21774	.03975	1.998	58	.050
Pre-cognitive	control	30	1.8357	.25662	.04685			
	experiment	30	1.7262	.18291	.03339	1.904	58	.062
Pre-selfeficacy	control	30	1.7708	.25656	.04684			
	experiment	30	1.8417	.30430	.05556	1.998	58	.050
Pre-intrinsic value	control	30	1.7370	.26177	.04779			
	experiment	30	1.7963	.25284	.04616	-.892	58	.376
Pre-test anxiety	control	30	1.6083	.40302	.07358			
	experiment	30	1.6583	.35039	.06397	-.513	58	.610

Results before administering the motivation test are as follows: self-regulation (control group M=1.93, SE=0.051, experimental group M=1.80, SE=0.03), cognitive test (control group M=1.83, SE=0.04,

experimental group M=1.72, SE=0.03), self-efficacy test (control group M=1.77, SE=0.04, experimental group M=1.84, SE=0.055), intrinsic value test (control group M=1.73, SE=0.04, experimental group M=1.79, SE=0.04), and test anxiety test (control group M=1.60, SE=0.07, experimental group M=1.6583, SE=0.06), did not show any significant difference between the control and experimental groups. The t-scores and p-values for self-regulation ($t(58)=1.99$, $p>0.05$), cognitive test ($t(58)=1.90$, $p>0.05$), self-efficacy test ($t(58)=1.99$, $p>0.05$), intrinsic value test ($t(58)=-0.89$, $p>0.05$), and test anxiety test ($t(58)=-0.51$, $p>0.05$) all indicated non-significant differences between the groups.

Table 8. *The results of the post-motivation subcategory tests*

	groups	N	Mean	Std. Deviation	Std. Error Mean	t	df	p
Post-selfregulation	control	30	1.8519	.22286	.04069			
	experiment	30	1.5333	.22489	.04106	5.510	58	.000
Post-cognitive	control	30	1.6905	.23678	.04323			
	experiment	30	1.5976	.21753	.03972	1.582	58	.119
Post-selfeficacy	control	30	1.5500	.25129	.04588			
	experiment	30	1.4667	.31645	.05778	1.130	58	.263
Post-intrinsic value	control	30	1.6667	.28590	.05220			
	experiment	30	1.4963	.28550	.05212	2.310	58	.024
Post-test anxiety	control	30	2.1667	.78601	.14351			
	experiment	30	2.5417	.41044	.07494	-2.316	58	.024

The distribution of the results after the application of the motivation test and according to the groups (i.e. Table 8) can be summarized as follows: for self-regulation (control group M=1.85, SE=0.04, experimental group M=1.53, SE=0.04), there was a significant difference between the groups with $t(58)=5.51$, $p<0.05$; for cognitive test (control group M=1.69, SE=0.04, experimental group M=1.59, SE=0.03), there was no significant difference between the groups with $t(58)=1.58$, $p>0.05$; for self-efficacy test (control group M=1.55, SE=0.04, experimental group M=1.46, SE=0.05), there was no significant difference between the groups with $t(58)=1.13$, $p>0.05$; for intrinsic value test (control group M=1.66, SE=0.05, experimental group M=1.49, SE=0.05), there was a significant difference between the groups with $t(58)=-2.31$, $p<0.05$; for test anxiety test (control group M=2.16, SE=0.14, experimental group M=2.54, SE=0.07), there was a significant difference between the groups with $t(58)=-2.31$, $p<0.05$. To sum up, the results showed that there was no notable discrepancy between the groups regarding cognitive and self-efficacy assessments. However, there was a significant distinction between the groups concerning the self-regulation, intrinsic value, and test anxiety dimensions.

DISCUSSION AND CONCLUSION

The objective of this research was to assess the motivation of participants towards ChatGPT, which was designed based on the online vocabulary sessions of the online language lessons, and to establish a correlation between academic achievement and motivation level towards this material. The study included two different participant groups.

The results of the analysis indicate that all test results, including the pre- & post-achievement, pre- & post-motivation tests, showed normal distribution. According to the findings of the pre-achievement test, there was not any difference between control and experimental groups, but post-achievement test scores

indicated difference that the experimental group rated more accurate responses. Like pre-achievement test results, the findings of the pre-motivation test were almost similar. Nevertheless, post-motivation test subcategories revealed that experimental group was more motivated after the ChatGPT integration to the post-lesson activies (especially from the perspective of self-regulation, intrinsic value, and test anxiety). The perceived AI integration has a substantial association with intrinsic motivation (Martín-Núñez et al., 2023; Rajeswari & Madhusudan, 2022). Moreover, the employing of chatbots powered by AI could enhance students' academic achievement, self-efficacy and motivation (Lee et al. 2022) as shown in the current study.

ChatGPT (openAI) was found out to be positively effective in vocabulary learning in language learning. From this perspective, it is clearly evident that it supports previous studies. For instance, it is evident that using technological materials in language learning environments has positive effect on learners' process (Ahmed et al., 2022; Jianfeng et al., 2018; Lai & Tai, 2021; Liu et al., 2018; Woodrow, 2017) It is also known that technological learning tools have positive effects on learners' motivation (Cai et al., 2020; Lai & Gu, 2011; Lewis, 2010; Alamer & Al Khateeb, 2023). Ibanez et al, (2011) has the similar results that using technological materials such as AI in language learning raised students' motivation and learning outcomes. Providing more inspiring environment for learners promotes motivation (Mahadzir & Phung, 2013). The findings, also, support the studies which exhibited the factors that motivated satisfaction and attention were evaluated higher by participants with the latest technological tools (Di Serio et al. 2013). The study provides valuable insights as exhibiting into the effectiveness of ChatGPT as probably one of the newest vocabulary teaching material and offers practical implications for educators and instructional designers looking to implement AI in their learning environments as integrating ChatGPT into vocabulary learning besides the other Web2.0 and digital tools into the curriculum as discussed below.

There are some concerns about the negative impact of technology in learners' motivation. The results of this study demonstrated that the experimental group for whom ChatGPT supported vocabulary sessions were designed, were more motivated than the control group as they informed the instructor after the sessions while having chat that they were having fun and never wanted to continue in traditional way. While technology can present opportunities for enthusiastic learners, it is improbable to result in self-motivated or autonomous behaviour in a majority of learners unless suitable teaching practices take advantage of the benefits of technology and incorporate adequate instruction on the utilization of technology for language learning objectives (Reinders, 2018). This post-lesson plan can incorporate technologically assisted learning activities and use a leading and encouraging style to promote students' independent conduct. Thus, one of the major implications of this study is that it is strongly recommended for teachers to have a view by; a) enhancing the education and professional development of teachers, b) stimulating the learning potential and initiative of students, c) refining the incorporation of multimedia teaching with traditional classroom instruction, d) devising practical solutions (Chen & Li, 2011). Since it is not adapted in any LL curriculum yet, the teachers, individually, should take part in designing the post-lesson exercises with ChatGPT in a more comprehensive and suitable manner in order to promote students' self-motivated and autonomous behaviour and make vocabulary learning process more effective as shown in the current study.

Overall, the findings suggest that the experimental group which had post-lesson activities with the assistance of ChatGPT, showed significant improvement in their achievement test scores and motivation. Thus, the outcomes demonstrated that the tool is equally beneficial in terms terms of knowledge gain as a generally established method of learning, and that students considerably favor employing the tools over conventional modes of instruction (Amershi et al., 2005). Hence, these results indicate that the use of an AI such as ChatGPT in language learning environment positively impacts students' academic performance and motivation, as in the same line with the studies of Şenyaman (2023), Topsakal and Topsakal (2022), and Zileli (2022). Furthermore, the findings support that there is a notable correlation between academic success and the motivation to use technology in the language classroom (Munoz et al., 2023; Solak & Cakır, 2015).

SUGGESTIONS

For forther studies it is recommended to investigate different relations such as ChatGPT and anxiety

by adating it in different skills of the language (i.e. listening and writing). Moreover, teachers' view can be examined through the use of ChatGPT in LL environment from different aspects whether it has positive effect on the teachers' role or classroom management, and whether it is an advantage to adapt ChatGPT into lesson plans or not.

LIMITATIONS

The study includes 10 sessions of online vocabulary learning designed with using ChatGPT as a supporter. It can be more objective if the teacher observes the students' interaction with ChatGPT in offline lessons with more than 10 sessions.

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An Analysis of Turkish EFL Students' Writing Errors

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ABSTRACT

Various errors come out during writing as it is a highly complicated skill and requires higher-order thinking skills to activate the cognitive processes. Determining these errors is crucial for eliminating them. Mostly preferred way for determining them is performing an Error Analysis (EA). Hence, employing a screening model, the study aimed to reveal types, categories, and sources of errors in Turkish English as a Foreign Language (EFL) students' writings as well as to explore potential differences in error frequencies based on their departments and genders by performing an EA. The data obtained from the research were analyzed through document analysis. The sample of the study included 42 students studying at English Language Teaching (ELT) and English Language and Literature (ELL) departments of a state university in Türkiye. All of them were in English preparatory classes and at B2 level. They were asked to write an essay in 150-250 words about one of the given topics. The error analysis revealed a total of 962 errors in Turkish EFL students' writings. The errors were gathered under three types: grammatical, semantical, and mechanical errors. Among these, grammatical errors were the most prevalent, encompassing a wide range of categories including verb/tense errors, article errors, preposition errors, and others. Semantical errors, involving word choice, coherence, and ambiguity, followed next in frequency. Mechanical errors namely spelling, capitalization, punctuation, and contractions, were also prominent. The current study sought to explore whether there were statistically significant differences in error frequencies between students studying in the departments of ELT and ELL, as well as between female and male students. The analysis revealed no significant differences between the error frequencies of ELT and ELL students. On the other hand, a statistically significant difference was observed between error frequencies of female and male students. Female students produced less errors compared to the male ones.

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INTRODUCTION

Essentially, across all languages, there exist four fundamental language skills, namely, writing, speaking, listening, and reading. These are the core competencies for healthy communication. Writing is very important for several reasons such as improving vocabulary and grammar, giving students the opportunity to develop their learning about the language, and elaborating communication (Ahamed, 2016). In this digital era, recent technological developments have made writing more important in many areas such as informatics, distant learning, and digital learning. However, this essential skill may be regarded as challenging. It is challenging for not only native but also non-native writers of a language (Nuruzzaman et al., 2018) because it is not just writing symbols. Writing requires higher-order thinking skills to activate cognitive processes. According to Yılmaz and Kadan (2019), writing feelings and thoughts in an explicit way necessitates cognitive ability. Several definitions have been proposed for this difficult skill by different researchers. For instance, Byrne (1996) defines it as ciphering a prompt written through a series of statements sequenced in some ways, which necessitates a few steps, while Galbraith et al. (2005) describes it as an active process including three main cognitive activities which are planning, producing a text, and reviewing.

Writing is a highly complicated skill consisting of several processes. According to Marchisan and Alber (2013), it is a complex competency including some steps such as pre-writing, writing, revising, and publishing (as cited by Cahyaningtyas et al., 2018). Alsamadani (2010) also defines it as a "*complex, challenging and difficult process*" consisting of several phases such as identifying thesis statement, creating supporting details, revising and editing.

Writing in mother tongue or in a foreign language are both crucial. However, writing in a foreign language is more complicated than writing in mother tongue (Borsuk et al., 2009; Gile, 2011; Manik et al., 2017; Muresan & Bardi, 2012; Roig, 2013; Wang, 2012). For foreign language learners, there are some competence levels taken as a reference. These levels are defined as the competence levels of the Common European Framework of Reference for Languages (CEFR) (Council of Europe, 2020). The levels for all language skills including writing are separately identified. The study highlights the writing errors of the students at B2 level, and the type of text is essay. Davies (2004) reports that essays are regarded as a mechanism for evaluating a student's subjective competencies. Therefore, in this study, essay type was employed for revealing the students' competencies in writing by evaluating their errors, and B2 level was taken as a reference. According to CEFR, the students writing an essay or a report at B2 level can:

- create an essay or report with significant points and supporting details,
- describe a complex process thoroughly,
- analyze different thoughts or solutions suggested for a problem,
- create an essay or a report that stimulates an argument by giving information about advantages and disadvantages of something,
- gather information from various sources. (Council of Europe, 2020).

Undoubtedly, many writers do not follow the above-mentioned steps while writing (Alsamadani, 2010; Galbraith et al., 2005; Marchisan & Alber, 2013). This may be the reason why they have difficulty in writing. However, Nuruzzaman et al. (2018) claims that there are some factors such as extensive grammar knowledge, sufficient vocabulary, organizational skills, writing mechanics, and style, which make writing more difficult. Regardless of the reasons, it is a notable fact that writing is not an easy process. That is why various errors come out. Especially learners of a new language are liable to make errors while writing in a target language.

Errors are mostly confused with mistakes. Therefore, it would be better to clarify the main difference between these two terms. According to Corder (1967), errors are important in the process of

learning, not mistakes. Errors are significant as they help us learn about linguistic knowledge of an individual regarding the target language. For writing in a foreign language, errors stem from inadequate knowledge of the learner about the target language while mistakes result from his/her deficiency in writing performance. Errors about a foreign language may be related to comprehension or production. Comprehension is about how a receiver understands the message; whereas, production is about the way a sender generates it.

According to Ellis (1997), in processing notions, a primary difference between production and comprehension exists. Individuals from different ages can make errors both in their native and target languages. These errors may differ for foreign language learners. Particularly, if there are enormous semantic or syntactic differences between the native and target languages of the speaker, the number of errors can be higher. It should be remembered that making errors is necessary for improving one's learning (Hendrickson, 1978; Garcia et al., 2011). On the other hand, identifying types of errors is crucial for a foreign language teacher to eliminate these errors, too. It is like diagnosing an illness. Unless an illness is diagnosed, it is impossible to heal it. This is the same for writing. A teacher who teaches writing should identify what kind of errors the students make and what their causes are to eliminate these errors so as to improve their writing.

Different types of errors have been discussed in the literature. Wu and Garza (2014) reports that there are two basic error types regarding individual's oral and written performance. They are intralingual/developmental and interlingual/transfer errors. The former is about errors which are caused mostly by overgeneralizations in the target language, while the latter is related to negative interference of the native language. In addition, Smith and Stewart- McKoy (2017) categorize types of errors as lexical, grammatical, discourse, and ambiguous errors. Apart from types of errors, their sources are also important to be explored for finding suitable strategies to cope with them. Hence, Brown (1980) identifies sources of errors namely intralingual transfer, interlingual transfer, context of learning, and communication strategies. Contextual learning errors pertain to the adverse impact stemming from elements within the learning environment, encompassing factors like the classroom setting, instructional delivery, and curriculum design (Dehham, 2015). Communication strategies are employed by language learners to surmount communication obstacles stemming from an insufficiency or incapacity to access their second language (L2) proficiency (Ellis, 2003). Both contextual learning and communication strategies may also be involved in interlingual and intralingual transfer, and it is really difficult to determine whether an error stems from these two sources. Thus, just interlingual transfer and intralingual transfer were handled as the sources of errors in the current study. By determining the sources of errors, we can better understand the processes prompted in language learning.

The most preferred way of determining writing errors is performing an Error Analysis (EA). According to Gass and Selinker (2008), error analysis focuses on the errors learners produce. The study of errors is conducted via EA, and EA became familiar in applied linguistics only after the 1970s thanks to Corder (Ellis, 1997). Performing an EA is considered one of the best methods to define and describe errors, including writing errors, made by foreign language learners. According to Fang and Xue-mei (2007), teachers can obtain a general knowledge about students' errors through EA. It can also reveal error sources and reasons of these errors (Sompong, 2013). From this viewpoint, it can be suggested that conducting an EA is crucial for determining writing errors and their causes.

There have been several studies about writing errors in the literature. For instance, Watcharapunyawong and Usaha (2013) analyzed 40 EFL students' writings in three different genres and categorized the first language interference writing errors under 16 categories. Errors in different genres were also different. Nuruzzaman et al. (2018) investigated writing errors of 90 students and suggested four error categories which were grammar, lexis, semantics, and mechanics. Wu and Garza (2014) found in their study in which they analyzed writings of EFL learners and followed a taxonomy including error types of grammatical, lexical, semantics, mechanics and word order that the learners

made more interlingual/transfer errors than intralingual/developmental errors. Kırkgöz (2010), in another study, examined errors in 120 essays written by 86 Turkish students and concluded that a vast majority of the errors stemmed from the interlingual transfer of the native language. Sürüç Şen and Şimşek (2020) also carried out a study on writing errors with 17 English preparatory students and found that the students made grammatical errors more than lexical and mechanical errors while writing. In another study conducted with ELT students, Taşçı and Aksu Ataç (2018) reported that errors of preposition were the most frequent grammatical errors among the students, and others were errors of verb, article, word class, pronoun and others.

On the other hand, writing accuracy rate by gender is still a controversial issue. Some studies investigating gender differences on writing errors have been carried out, but they have pointed out different results. For instance, Almusharraf and Alotaibi (2021) found no statistically significant difference between the total number of writing errors detected for the male and female students. Boroomand and Rostami Abusaeedi (2013); however, reported that female EFL students made more writing errors than the male students did. Lahuerta (2017) asserted that the number of errors made by the male students in the non-CLIL (content and language integrated learning) group was higher than the female students did, yet there was not a significant difference by gender in the CLIL group.

Related studies have shown that writing is an important and complicated skill to be gained by foreign language learners (Kadan & Arı, 2021; Rattanadilok Na Phuket & Othman, 2015; Shahhoseiny, 2015; Watcharapunyawong & Usaha, 2013). This is also true for students studying English Language and Literature (ELL) or English Language Teaching (ELT). In Türkiye, ELT and ELL major students have to pass an English exam conducted by the university they are enrolled in before starting their tertiary education, and they have to take one year of English preparatory education if they are not able to pass it. They are generally expected to create proper and excellent essays by their teachers, and their writing errors are mostly regarded as problematic. This case is the same for all learners of a language as a foreign language. However, it should be considered that writing errors are important elements for teachers and researchers in that they give clues about writing progress and current knowledge of the learners. They give teachers a great opportunity to track improvement in their students' writings and to make changes where necessary. This study is regarded as significant since it provides teachers with comprehensive information about errors, writing errors, types of errors, and sources of errors. It also shows how to conduct an EA and to reveal error types as well as suggesting some treatment ways for eliminating recurrent errors. Moreover, it is significant as it questions whether department, and gender have an impact on students' writing errors. In this respect, it seems to pioneer in the field.

The main purpose of the research was to reveal types, categories, and sources of errors in Turkish EFL students' writings as well as to explore potential differences in error frequencies based on their departments and genders. Accordingly, the following research questions were posed:

1. What types and categories of errors are found in Turkish EFL students' writings?
2. What is the frequency of errors?
3. What are the sources of errors in their writings?
4. Is there a statistically significant difference between the frequency of errors made by the students in ELT and in ELL?
5. Is there a statistically significant difference between the frequency of errors made by the female and male students?

METHOD

This research employed a document analysis, one of the qualitative research methods. Document analysis is a systematic process employed to examine or assess documents, which include both

physically and digitally printed materials (Bowen, 2009). Following the document analysis, the data were transferred into numerical data for quantitative analysis. The research design, study group, data collection and analysis were presented below.

Research Design

The survey method was employed in the current study. This method aims to identify the existing situation as it is (Büyüköztürk et al., 2016). The data were analyzed through document analysis. Written materials covering information about the facts to be probed are analyzed via document analysis (Yıldırım & Şimşek, 2013). The data of the study were obtained through essays written by ELT and ELL students. Through document analysis, the errors in the essays were identified, classified, quantified, and their sources were revealed.

Participants

42 students studying at a state university in Türkiye, 21 of whom were in the department of English Language and Literature and 21 of whom were in the department of English Language Teaching, were included in the study. All of them were in English preparatory classes and at B2 level according to CEFR. The data regarding gender of the students are displayed in Table 1.

Table 1. *Number of students in the departments of ELT and ELL by gender*

ELT		**ELL**		**Total**	
Female	*Male*	*Female*	*Male*	*Female*	*Male*
8	13	14	7	22	20

As shown in Table 1, almost half of the students are male, and the number of female and male students is very close (f=22; f=20, respectively).

Data Collection and Analysis

For obtaining the necessary data, the participants were asked to write an essay in 150-250 words in one hour about one of the topics below:

- one of your best summer holidays,
- causes of laziness,
- living alone and living with a family,
- positive or negative effects of playing with tablets.

Almost half of the students preferred to write about one of their best holidays (f=19). Some of them wrote about positive or negative effects of playing with tablets (f=11), and living alone and living with a family (f=7). On the other hand, a few of them wrote about causes of laziness (f=5). The researcher followed several steps of error analysis identified by Gass and Selinker (2008) as follows: first, data were collected through students' essays. Second, the errors were detected by scrutinizing the erroneous sentences. Then, these errors were classified and sorted into several types. Finally, results were deduced from the data analyzed. The process of error analysis is illustrated in Figure 1.

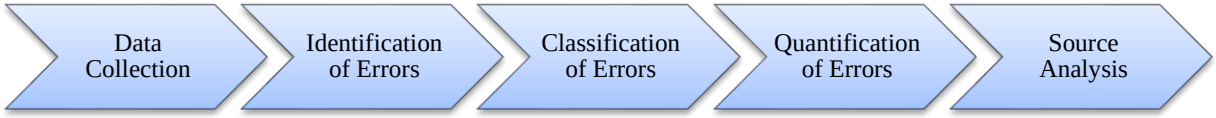

Figure 1. *The process of error analysis*

The data source consisted of 42 essays written about four separate topics. The essays were written in 150-250 words. Data were collected in writing classes given by the researcher in 2021-2022 academic year, and all of the students voluntarily took part in the study. The data collection started in the middle of March 2022 and ended at the end of the same month. Thus, it lasted for two weeks. The

classification of the errors was also checked by a different language expert giving writing classes. Then, the rate of agreement was checked by using Miles and Huberman's (1994) formula, and it was found to be 91%. In qualitative research studies, the agreement rate between the researcher and the expert should be 90% and over for enhancing reliability (Saban, 2009). Hence, the current study was considered to be reliable.

Ethic

It is ensured that scientific ethical principles and rules were followed at all stages of the study. All data and information about the sources were included in references. In addition, it is ensured that all the terms and conditions of the Publication Ethics Committee (COPE) were obeyed and ethical duties and responsibilities were carried out.

FINDINGS

The results deduced from the data through quantitative analyses were presented in tables and graphics. The findings with regards to the first research question are presented in Table 2.

Table 2. *The types and categories of errors found in Turkish EFL students' writings*

Types of Errors	*Categories of Errors*	*Frequency*	*Mean**	*Percentage (%)*
Grammatical	Verb / tense	84	2	8.73
	Sentence structure	3	0.07	0.31
	Article	72	1.71	7.48
	Preposition	60	1.43	6.24
	Singular – plural form	71	1.69	7.38
	Fragment	27	0.64	2.81
	Infinitive / Gerund	43	1.02	4.47
	Subject-verb agreement	25	0.60	2.60
	Comparison structure	2	0.05	0.21
	Word order	20	0.48	2.08
	Word form	32	0.76	3.33
	Pronoun	27	0.64	2.81
	Subtotal	**466**	**11.09**	**48.45**
Semantical	Word choice	91	2.17	9.46
	Run-on sentence	33	0.79	3.43
	Transition	13	0.31	1.35
	Unnecessary word	59	1.40	6.13
	Coherence	14	0.33	1.46
	Ambiguity	26	0.62	2.70
	Subtotal	**236**	**5.62**	**24.53**
Mechanical	Spelling	49	1.17	5.09
	Capitalization	62	1.48	6.44
	Punctuation	117	2.79	12.16
	Contraction	32	0.76	3.33
	Subtotal	**260**	**6.2**	**27.02**
Total	**22**	**962**	**22.90**	**100**

* To calculate means, total number of errors under each error category was divided by total number of students/essays (42).

As shown in Table 2, total number of errors made by Turkish EFL students was 962. Grammatical errors (f=466) seemed to be the most common type of error. It was followed by mechanical errors (f=260) and semantical errors (f=236). Punctuation (f=117) was the most common error category, while comparison structure was the least one (f=2). Word choice errors (91), verb/tense errors (f=84), article errors (f=72), singular-plural form (f=71), capitalization (f=62), preposition (f=60), unnecessary word (f=59) followed them. The other categories of errors were spelling (f=49), infinitive/gerund (f=43), run-on sentence (f=33), word form (f=32), contraction (f=32), fragment (f=27), pronoun (f=27),

ambiguity (f=26), subject-verb agreement (f=25), word order (f=20), coherence (f=14), transition (f=13), and sentence structure (f=3). The error sources revealed from the EFL students' writings are quantified in Table 3.

Table 3. *The sources of errors found in Turkish EFL students' writings*

Source of Errors	Frequency	Percentage (%)
Interlingual Transfer	316	32.85
Intralingual Transfer	646	67.15

It can be revealed from Table 3 that most of the errors made by the students (f=646) stemmed from intralingual transfer. The rest of the errors (f=316) resulted from L1 interference. To provide a better understanding, the sources of errors are also illustrated in Figure 2:

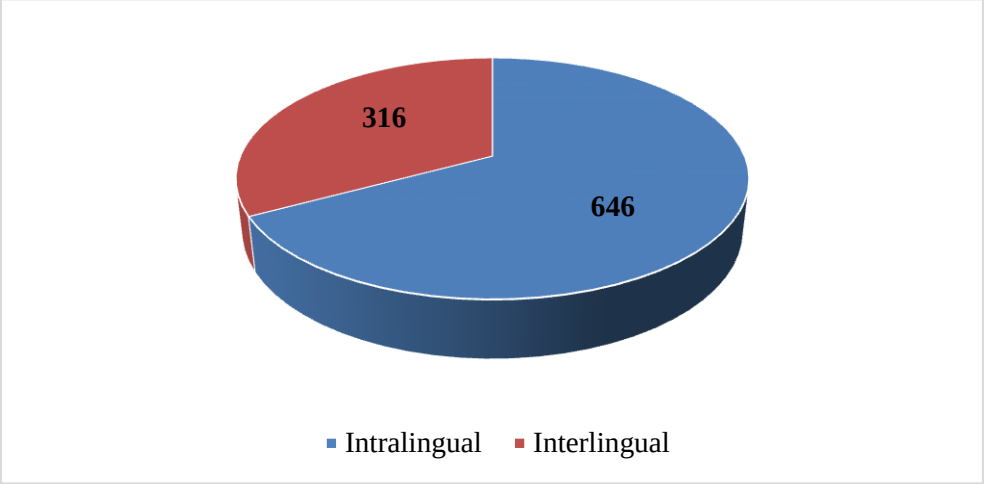

Figure 2. *The sources of errors found in Turkish EFL students' writings*

Independent samples t-test results of the analysis conducted to determine whether there was a statistically significant difference between the frequency of errors made by ELT and ELL students are quantified in Table 4.

Table 4. *Independent samples t-test results for department*

Department	N	$\bar{X}$	SD	df	t	p
ELT	21	21.09	12.13	40	-.846	.403
ELL	21	24.71	15.40			

It was concluded from the results shown in Table 4 that there were not any statistically significant differences between the frequency of errors performed by ELT students and the frequency of errors made by ELL students [$t_{(42)}$ =-.846; p>.05].

In addition, independent samples t-test was conducted to determine whether there was a statistically significant difference between the frequency of errors made by female and male students (see Table 5).

Table 5. *Independent samples t-test results for gender*

Gender	N	$\bar{X}$	SD	df	t	p
Female	22	17.27	11.04	40	-3.035	.004
Male	20	29.10	14.14			

As shown in Table 5, a statistically significant difference emerged between the number of errors made by the female students and the male students [t(42) =-3.035; p<.05]. It was in favor of the former group. The mean of the errors made by the male students ($\bar{x}$=29.10) was higher than of the errors produced by the female ones ($\bar{x}$=17.27), and this means that the female students were more successful in writing.

DISCUSSION

The study had the aim of investigating the types, categories, and sources of errors in Turkish EFL students' essays, as well as exploring potential differences in error frequencies based on their departments and genders. For this purpose, error analysis was performed. The error analysis revealed a total of 962 errors in Turkish EFL students' writings. The errors were gathered under three types: grammatical errors, semantical errors, and mechanical errors. Among these, grammatical errors were the most prevalent, encompassing a wide range of categories including article errors, preposition errors, verb/tense errors, and others. Semantical errors, involving word choice, coherence, and ambiguity, followed next in frequency. Mechanical errors namely spelling, capitalization, punctuation, and contractions, were also prominent.

When the relevant literature was searched, similar findings were reported in some other studies. For instance, Sürüç Şen and Şimşek (2020) pointed out that the most frequent type of error observed in the English preparatory students' essays was grammatical. They also claimed that the students' lexical and mechanical errors were less. Similarly, Nuruzzaman, Islam and Shuchi (2018) revealed that grammatical error was the most common error type in non-English major students' English paragraphs. Olsen (1999), in another study, emphasized that more incompetent pupils made more grammatical errors. Grammatical error was highlighted as the most frequent type of error in some other studies, too (Altameemy & Daradkeh, 2019; Marzoughi & Ghanbari, 2015; Wu & Garza, 2014).

On the other hand, among grammatical errors, the least frequent errors were comparison structure errors. The same result was obtained in a previous study (Watcharapunyawong and Usaha, 2013). Whereas, verb/tense errors, article errors, and singular – plural form errors were the main errors in students' writings. Watcharapunyawong and Usaha (2013) revealed in their study that verb/tense errors were at the highest in students' narrative writings. Similarly, Khatter (2019) stated that article errors and verb-tense errors were prevalent in students' writings. According to Kırkgöz (2010), the students made verb/tense errors more than other types of errors. Furthermore, Bensen Bostancı (2019) claimed that the students primarily made tense errors under the category of syntactic errors. Michaeldes (1990) also sorted errors into eight categories and expressed that wrong tense, and wrong use of articles were among these categories (as cited by Sompong, 2014). It was also concluded by Patarapongsanti et al. (2022) that Thai EFL undergraduates made more errors of article, punctuation and plurality than other types of errors. Another study conducted by Taşçı and Aksu Ataç (2018) indicated that, among Turkish EFL learners' grammatical errors, preposition errors were the most common followed by other types of errors (verb, article, word class, pronoun, etc.). Wu and Garza's (2014) finding that subject-verb agreement error was the most frequent error type under the category of grammatical errors varied from the finding obtained in the present study. Likewise, Sürüç Şen and Şimşek (2020) expressed that the most common errors under the heading of grammatical were errors preposition errors.

For semantical errors, word choice had more frequencies. The results obtained by Rattanadilok Na Phuket and Othman (2015) was compatible with this result. They found that verb/tense, word choice, comma, and preposition were the most prevalent error types. In addition, Watcharapunyawong and Usaha (2013) suggested that word choice errors were very common in students' writings in separate genres (comparison-contrast, narrative, descriptive).

For mechanical errors, the most frequent category of error was punctuation. This result is compatible with the result of AlTameemy and Daradkeh (2019). They also revealed that the most prevalent type of error was punctuation followed by spelling. Furthermore, Wu and Garza (2014) asserted that the most common error category under the error type of mechanics was punctuation.

The current study investigated the sources of errors which were intralingual transfer and

interlingual transfer. The findings indicated that a substantial proportion of errors stemmed from intralingual transfer, suggesting that many errors were likely due to language-specific developmental patterns within the target language (L2). This result aligns with previous studies (Abdelmohsen, 2022; Bensen Bostancı, 2019; Hourani, 2008; Nayernia, 2011). Nevertheless, results of some studies contradict this finding (Kırkgöz, 2010; Malmir, 2014; Rattanadilok Na Phuket & Othman, 2015; Shiva & Navidinia, 2021; Wu & Garza, 2014). In addition, a study revealed that majority of students whose language proficiency levels were high made more intralingual errors than interlingual errors while the ones whose language proficiency levels were low produced more interlingual errors because of the L1 interference (Nuruzzaman et al., 2018).

The present study sought to explore whether there was a statistically significant difference in error frequencies between the students in English Language and Literature (ELL), and the ones in English Language Teaching (ELT), as well as between male and female students. According to the analysis, no statistically significant differences between the error frequencies of ELL and ELT students were found. This suggests that students' departments did not play a substantial role in the frequency of errors committed in their writing. No studies examining the difference between error frequencies of ELT and ELL departments have been found in the related literature. Thus, it can be claimed that the present study contributes to the literature in this respect. However, a statistically significant difference was found between error frequencies of female and male students. Female students produced less errors compared to the male ones. Since Ellis (1997) describes errors as spaces in a student's knowledge, the Turkish female EFL students may be interpreted as more successful than the male students in writing. Likewise, in a study done by Pouladian et al. (2017) to examine writing errors made by Iranian EFL learners, it was asserted that the male students made more speaking and writing errors than the female ones. Contrarily, in another study (Almusharraf & Alotaibi, 2021), no statistically significant difference was found between the total number of writing errors detected for the male and female students.

IMPLICATIONS

The results carry several implications for writing in a target language. The predominance of grammatical errors highlights the importance of targeted instruction in grammar and syntax. Knowing students' incapability in grammar may help teachers overcome this by employing necessary instructional methods, techniques, and materials. Moreover, the prevalence of semantical errors underscores the need for enhancing students' vocabulary and semantic awareness. It may contribute to students' vocabulary if teachers show them how to improve it and provide them authentic situations. The observed gender-related differences suggest the value of investigating teaching strategies that could benefit male students in particular, promoting a more balanced distribution of writing skills across genders.

LIMITATIONS AND FUTURE RESEARCH

It is important to acknowledge certain limitations of this study. The research was conducted in a specific educational context and focused solely on Turkish EFL students. Therefore, generalizability to other contexts and populations should be approached with caution. Future research could consider incorporating qualitative analyses to gain deeper insights into the underlying factors contributing to error production. Additionally, exploring other variables such as language proficiency levels and cultural influences could provide a more comprehensive understanding of error patterns.

CONCLUSION

In conclusion, the analysis of errors in Turkish EFL students' writings provided valuable insights into the prevalent types of errors, their sources, and potential differences based on department and gender. The findings highlight the multifaceted nature of error production in foreign language writing and underscore the importance of tailored instructional strategies to address these challenges effectively. Teachers should never forget that errors are normal while learning a new language, and they

should benefit from them by eliminating problematic areas they realize. They should be trained for performing an error analysis to detect and eliminate the common errors made by their students. Further research is encouraged to expand on these findings and delve into additional dimensions of error analysis in diverse linguistic and educational contexts.

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Exploring Language Assessment Knowledge of In-Service English Language Teachers in K-12 Context[1]

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ABSTRACT

Language Assessment Literacy (LAL) is recognized as a crucial literacy skill that English language teachers should continually enhance. More research is needed to investigate the levels of LAL and Language Assessment Knowledge (LAK) of language teachers in a variety of different contexts. Notably, there is a scarcity of studies within the K-12 contexts in the existing literature. In response to this gap, the present study delves into the LAL levels of in-service English teachers within the K-12 educational context in Türkiye. The data were collected with the Language Assessment Knowledge Scale (LAKS) from 202 in-service English teachers working at primary, middle, and high school levels. The results of the analyses revealed that the teachers' LAK in general was notably high. The teachers' knowledge level in assessing reading and speaking was significantly high while they had significantly lower levels of knowledge in assessing writing and listening. Regarding the effect of the demographic factors on LAK, no significant difference was found. Based on the results, pedagogical implications are made for the teachers and policy makers.

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INTRODUCTION

Language Assessment Literacy (LAL) is related to a mastery of essential components, which might comprise of knowledge about language, assessment, the context, and the ability to facilitate assessment-related procedures such as designing, collecting, administering, or interpreting assessment information, all crucial for making informed and ethical decisions (Inbar-Lourie, 2013). Despite the expanding body of research on LAL, there is a need for further studies to enhance our understanding of LAL across diverse language teaching contexts. Since the knowledge base of LAL is a dynamic facet, recent research findings can be utilized for the enhancement of teachers' language assessment knowledge (Coombe et al., 2020). Besides, the role of the context regarding LAL is undeniable. However, in some studies, it is assumed that the conceptualization of LAL applies to all educational levels, such as primary, secondary, and tertiary, neglecting the specific needs and aims of that context (Tsagari, 2020). Thus, a distinctive discussion of LAL in various educational levels is required to offer a contribution to LAL literature, which was also aimed at with this study.

Lam (2014) highlights that existing LAL research predominantly focuses on language instructors at the tertiary level or language testers. Consequently, there's a pressing need for future studies to explore the classroom-based assessment of in-service language teachers at primary and secondary levels and its impact on LAL development in K-12 contexts as well. To fill this gap, this study aims to contribute to the field by examining the EFL teachers' LAK level in assessing four skills (reading, writing, speaking, and listening) and the relationship with demographic features of the teachers, in the context of K-12 education in Türkiye. With these objectives in mind, this study aims to address the following research questions:

1. What is the overall and skill-based language assessment knowledge (LAK) level of EFL teachers in the K-12 context in Türkiye?
2. Does EFL teachers' level of LAK change in terms of gender, years of experience, the BA program being graduated, educational background, educational level of the workplace, taking a separate testing and assessment course in BA, attendance to additional training in testing and assessment?
3. Does EFL teachers' perceived self-competency in assessing each language skill have an effect on their LAK level?

LITERATURE REVIEW

Language Assessment Literacy

LAL is described as "the level of knowledge, skills, and understanding of assessment principles and practice that is increasingly required by other test stakeholder groups, depending on their needs and context" (Taylor, 2009, p. 24). Teachers hold the dual role of teaching and assessing (Inbar-Lourie, 2008; Rea-Dickins, 2004). Therefore, this role requires teachers to be more knowledgeable of assessment-related concerns, which helps them not only pursue more effective assessment procedures, but also evaluate their own instruction and construct appropriate assessments that motivate learners in their learning process (Rogier, 2014). High levels of LAL indicate a mutual benefit for both teachers and learners in that it provides feedback about both teaching and learning (Popham, 2009). To improve instructional quality and learner achievement in addition to determining appropriate methods and techniques of assessment for a particular purpose, teachers need to develop their LAL (Coombe et al., 2012).

In a similar vein, Herrera and Macías (2015) suggest that teachers should possess the capacity to correlate their assessment practices to approaches to language teaching, construct proper assessments,

choose the best assessments that suit the purpose, and be aware of the impact of large-scale examination if they have high LAL competence. Moreover, LAL will contribute to higher test validity and more transparent procedures (Coombe et al., 2012). Even though the significance of LAL for teachers is established in the literature, they are not believed to be qualified in assessment-related procedures (Plake, 1993; Popham, 2009; Stiggins, 1991). Thus, it is highly important for teachers to receive trainings about testing and assessment procedures for improving their knowledge of assessment and developing their LAL (Popham, 2011). However, Herrera and Macías (2015) discuss that pre-service trainings on assessment are not enough since they may be highly dependent on textbooks. Therefore, they advise that continuous professional development programs for both pre- and in-service teachers should embrace alternative approaches to enhance LAL of teachers.

Many researchers sought to identify the EFL teachers' needs regarding their LAL. First, focusing on LAK, Tavassoli and Farhady (2018) proposed that most of the teachers needed to enhance their LAK although they were aware of the essential components of assessment and had an average degree of perceived self-competency. Farhady and Tavassoli (2018) developed a knowledge test based on the needs analysis that they conducted (Tavassoli & Farhady, 2018) to reveal EFL teachers' actual LAK level as opposed to their perceptions about their knowledge of language assessment. The results demonstrated that LAK level of EFL teachers was insufficient despite their perceptions about their knowledge. Demographic factors of gender and type of their undergraduate degree, whether English language teaching, English literature, or others, had a possible impact on teachers' LAK level. However, the teaching context (state/private) and experience level influenced EFL teachers' LAK level in favor of the more experienced teachers and state institutions.

Fulcher (2012) found that the teachers were highly aware of their needs which are the skills, knowledge, and principles based on a procedural approach that balances the classroom and normative assessment within a wider social, historical, and ethical perspective. Additionally, Muhammad and Bardakçı (2019) aimed to demonstrate Iraqi EFL teachers' self-perceived LAL, their opinions about their pre-service education, and strengths and weaknesses in their knowledge regarding assessment. EFL teachers believed that their pre-service education trained them as good assessors and felt competent, contrary to their assessment literacy, which was found to be notably low. With a similar aim, Vogt and Tsagari (2014) identified the needs of EFL teachers in language testing and assessment. The teachers' LAL level was not satisfactory since no/limited training was received in this field. Besides, teachers needed trainings mostly for assessment purposes such as grading, placement of the students, and awarding certificates. Furthermore, they did not feel competent to review the quality of the assessment tools according to reliability and validity and to employ portfolio assessment, self- and peer-assessment in their practices.

The contextual and experiential aspects that contribute to the language assessment literacy have been emphasized by Yan et al. (2018). Their analysis regarding the needs and practices showed that the context of assessment, teachers' training experiences, assessment practices, and needs in knowledge and training contributed to EFL teachers' LAL development. Xu and Brown (2017) investigated Chinese EFL teachers' assessment literacy and its relationship with their experience, trainings, educational background, and gender. Thus, Chinese EFL teachers' assessment literacy was poor because of inadequate trainings in pre- and in-service education, not bearing a grounded criterion for assessment literacy, and lack of quality standards for assessment practices.

It is also seen that research on LAL in Türkiye has lately become a subject of interest since most of the studies have been conducted in recent years. In the studies, knowledge (Genç et al., 2020; Ölmezer-Öztürk & Aydın, 2019), perceptions and practices (Arslan & Üçok-Atasoy, 2020; Büyükkarcı, 2014; Işık, 2021; Kırkgöz et al., 2017; Önalan & Gürsoy, 2020; Öz & Atay, 2017; Tanyer & Susoy, 2018), training needs (Ballıdağ & İnan-Karagül, 2021; Mede & Atay, 2017), and problems (Büyükkarcı, 2014; Tuzcu-Eken, 2016) as well as the impact of demographic and contextual factors

(Büyükkarcı, 2016; İnan-Karagül et al., 2017) on language assessment have been analyzed. Higher educational context was mainly preferred by the researchers in Türkiye whereas the research regarding K-12 context is limited. Focusing on perceptions and practices in primary education context, Kırkgöz et al. (2017) revealed that EFL teachers considered reading and speaking as important skills to be assessed. Also, they believed that listening can be ignored in the assessment process while writing is considered somewhat more important. In a similar context, Tanyer and Susoy (2018) explored pre-service and in-service EFL teachers' perceptions and practices regarding the assessment of young learners. It was demonstrated that both pre- and in-service teachers had insufficient knowledge and skills in parallel with their perceptions since they did not feel competent and believed that assessing young learners is a challenging procedure to sustain. On the contrary, in another study with a wider context including primary, secondary, and higher educational context, Işık (2021) found that EFL teachers were confident with their current status even though they indicated low levels of LAL based on data obtained from a questionnaire, interviews, classroom observations, and sample exam evaluations. Concerned with the K-12 context, Ballıdağ and İnan-Karagül (2021) put forth that teachers needed further training due to their insufficient LAL. Finally, aiming to determine EFL teachers' knowledge level in assessing writing and speaking in the K-12 context, the findings of a study by Genç et al. (2020) showed that teachers had significantly lower scores in assessing writing while they had higher knowledge level when it comes to assessment of speaking skills. Additionally, no impact was observed on their LAK in terms of their level of experience, type of the BA program and taking additional trainings. As listed, previous studies mainly focused on self-reported perceptions of EFL teachers with a limited focus on language skills. Thus, the significance of the current study is that LAK levels were analyzed with knowledged-based investigation instead of self-reported perceptions. Additionally, the current study focused on skill-based LAK by including the participants from a variety of K-12 levels (primary, secondary, and high school contexts).

METHOD

Research Design

The aim of the study is to investigate in-service EFL teachers' overall and skill-based LAK level and whether their LAK changes based on their demographic characteristics. Accordingly, a correlational research design has been employed as a quantitative approach to identify potential relationships among two or more variables without any manipulation. (Fraenkel et al., 2012).

Participants and Research Context

In Türkiye, English is instructed as a foreign language. Within the K-12 educational framework, a primary focus of this study, English teachers employed in these institutions bear the responsibility for testing and assessment procedures. However, students in both lower and upper-secondary levels are required to undertake a standardized test, administered by the Ministry of National Education (MoNE), at the conclusion of each educational stage.

The teachers who work at the primary, middle, and high schools in Türkiye, whether private or state, in the 2021-2022 educational year constitute the universe of this research. After obtaining the necessary permissions from the MoNE and ethical committee approval from a state university in Türkiye, the scale is sent to EFL teachers all over the country via MoNE's electronic document management system. Among the whole population of EFL teachers, 202 participants took part in the scale on a voluntary basis. Demographic information of the participants is presented in Table 1 below.

Table 1. *Demographic Features of the Participants in the LAKS*

Demographic Features		Number	Percentage
Gender	Male	48	23.8

	Female	154	76.2
Years of experience	1-5 years	91	45.0
	6-10 years	34	16.8
	11-15 years	23	11.4
	16-20 years	27	13.4
	More than 20 years	27	13.4
BA program	ELT	181	89.6
	Non-ELT	21	10.4
Educational background	BA degree	161	79.7
	MA degree	37	18.3
	PhD Degree	4	20
Educational level of the institution	Primary school	35	17.3
	Secondary school	103	51.0
	High school	64	31.7
Type of the institution	State/Public	187	92.6
	Private	15	7.4
Having testing/assessment course in pre-service	Yes	113	55.9
	No	89	44.1
Attending professional development programs/courses on testing/assessment	Yes	105	52.0
	No	97	48.0

Table 1 shows that 75% of the participants consist of female teachers. Teachers with 1-5 years of experience constitute half of the participants, while the others have an approximately equal distribution. 90% of the participants graduated from the Department of English Language Teaching. Among 202 participants, only 4 of them had a PhD degree, while the number of participants with an MA degree is 37, and with BA degree is 161, which is 80% of the whole participants in the study. While almost all the teachers work at a state school, nearly half of the teachers work at the middle schools followed by high school with 30% and primary schools with 17%. Finally, teachers' pre- and in-service trainings regarding language assessment are analyzed. It is seen that more than half of the teachers have received a sort of assessment course in pre-service education. However, it can be deducted from the table that half of the participants did not attend any in-service training for their professional development.

Research Instrument and Processes

The data were collected with the Language Assessment Knowledge Scale (LAKS), developed by Ölmezer-Öztürk and Aydın (2018). The scale consists of two parts, and the first part involves questions about the demographic features of the participants. In the second part, there are four factors that aim to measure EFL teachers' language assessment knowledge level in assessing reading, listening, writing, and speaking. In the scale, consisting of 15 items in each factor and 60 items in total, the participants are asked to read the statements and select the most appropriate option for each statement among True/False/Don't Know options. The scale was found valid and reliable by Ölmezer-Öztürk and Aydın (2018). The validity was provided by 11 expert opinions and 18 practitioners. The scale has been developed after a thorough literature review process and consists of elements required for fundamental knowledge of language assessment (Ölmezer-Öztürk and Aydın, 2018). The reliability analysis of the scale has been completed by the researchers who developed the scale, and the reliability of the scale has been measured as .91 for the Cronbach Alpha coefficient. LAKS is prepared in an online format and sent to every EFL teacher throughout the country via the electronic document management system of MoNE. Ethics committee approval was obtained before the data collection from a state university ethics committee (16.02.2021, 2021-207). Additionally, necessary permissions were taken from the Ministry

of Education of Türkiye.

Data Analysis

The data collected with the LAKS were analyzed with descriptive and inferential statistics of IBM SPSS Statistics 22 program. The participants' answer to each statement was scored "1" point if their answer was correct, and "0" point if they selected the wrong answer or "Don't know" option. Consequently, the highest score that can be obtained from the scale is "60", consisting of "15" points for each factor, and the lowest score is "0". Firstly, the normality test was carried out, and the results indicated that the data were normally distributed. Therefore, parametric tests were conducted. To estimate reliability of the quantitative data, Cronbach alpha coefficient was determined as 0.58. Reliability rate between 0.50 and 0.70 indicates moderate reliability (Hinton et al., 2014). The participants' LAK level in general and skill-based was analyzed with one-sample t-tests. The impact of the demographic characteristics of the participants on their LAK level was analyzed with independent samples t-tests and one-way ANOVA and presented with inferential statistics. For the third research question of the study, which aims to find out whether there is a difference between the participants' perceived- self-competency in assessing language skills and their actual LAK level, Pearson Correlation and one-way ANOVA analyses were employed.

Table 2. *Reliability Analysis of the Scale and Sub-constructs*

Constructs	Cronbach Alpha
Reading	0.22
Listening	0.33
Writing	0.33
Speaking	0.43
LAKS	0.58

FINDINGS

EFL Teachers' General and Skill-based Language Assessment Knowledge Level

The findings in Table 3 (See Appendix) show that they had a mean score of 32.099 over 60, indicating that their general LAK level is higher than half of the total score. The highest score that can be obtained from the scale is "60" while the lowest is "0". Therefore, to decide whether the participants have low or high LAK level, the point of reference for the study is determined as the half of the total score, which is "30". The same reference point was utilized in line with the research which developed the scale (Ölmezer-Öztürk & Aydın, 2018). To explore whether the participants have significantly high level of LAK, one sample t-test is conducted. When the point of reference (30) is compared to the participants' mean scores, a difference of 2.099 is observed between the participants' mean scores and the point of reference. The results indicate that the teachers' general LAK level is significantly high in K-12 context.

Table 4. *One Sample T-test Results for General LAK Level*

	N	$\bar{X}$	Mean diff.	df	t	P
General LAK	202	32.099	2.099	201	5.485	.000*

*p<.05; Test value=30

To analyze EFL teachers' mean scores in each language skill, one sample t-test is applied. On the

scale, the total score that can be obtained from each language skill is "15" while the lowest is "0". Thus, the test value is determined as half of the total score, which is "7.5". The participants' mean scores in each skill are $\bar{X}$=9.5693 (reading), $\bar{X}$=6.8317 (listening), $\bar{X}$=7.0594 (writing), and $\bar{X}$=8.6386 (speaking). It is observed that in assessing reading and speaking skills, the participants' mean scores are higher than the reference point (7.5), whereas in assessing listening and writing skills, their mean score seems to be lower than 7.5. To determine whether the difference between the participants' mean scores and test value (7.5) is significantly higher or lower, one sample t-test results are shown in the table below.

Table 5. *One Sample T-test Results for Skill-based LAK Level*

	N	$\bar{X}$	Mean diff.	df.	t	P
Reading	202	9.5693	2.0693	201	14.821	.000*
Listening	202	6.8317	-.6683	201	-4.444	.000*
Writing	202	7.0594	-.4405	201	-2.900	.004*
Speaking	202	8.6386	1.1386	201	7.154	.000*

*p<.05; Test value=7.5

The results reveal that the participants' skill-based LAK level in assessing reading, the language skill that the participants displayed the highest knowledge, was significantly higher than the test value (7.5). However, the participants demonstrated the lowest knowledge level in assessing listening, and the mean difference between the test value (7.5) and the participants' mean scores ($\bar{X}$=6.8317) is found to be statistically significant. As a result, it is concluded that the participants' LAK in assessing listening is insufficient. Another skill that has received a low mean score is assessing writing. Even though there was not a significant difference between the participants' mean scores ($\bar{X}$=7.0594) and the test value (7.5), the one sample t-test results indicate that the participants' knowledge level in assessing writing is significantly low. The final skill, assessing speaking, has received a high knowledge level. Based on the table above, it is shown that the participants' mean scores in assessing speaking ($\bar{X}$=8.6386) are significantly high when compared to the test value (7.5). When the correlation between the language skills is analyzed, the results indicate both based on the Pearson correlation analysis.

Table 6. *The Correlation Among the Skill-based LAK*

	LAK	Reading	Listening	Writing	Speaking
LAK	1	.594**	.673**	.712**	.568**
Reading		1	.246**	.241**	.089
Listening			1	.369**	.106
Writing				1	.197**
Speaking					1

** Correlation is significant at the 0.01 level (2-tailed); N=202

The findings revealed that EFL teachers have high LAK in general, in assessing reading and speaking, whereas low LAK is indicated for assessing writing and listening. To be able to make an in-depth discussion of these findings, the participants' correct and incorrect answers to each item on the scale are investigated and discussed. The table that presents the descriptive statistics of the LAK level of EFL teachers in the K-12 context in Türkiye is provided in the appendix.

Regarding assessing reading, among the items between 1 to 15, the highest scored item is 13, "Reading texts in a reading exam include various genres (essay, article, etc.)". Eighty seven percent of the participants answered this item correctly. The item which is the one that the teachers had the lowest mean score on the reading assessment is "When asking several questions about a reading text, all questions are independent of each other". Only 59 teachers (29%), by selecting the true option, have

answered this item correctly, which is quite low. When the number of the false (n=136) and do not know (n=7) options are compared, it is observed that nearly all the teachers had an idea about the characteristics of the questions about a reading exam regarding their relevance to each other. It is observed that 70% of the teachers have low level of knowledge about preparing sound reading questions.

The findings display that participants were mostly knowledgeable in these areas: utilizing various types of genres, summarization and top-down approach, the use of true/false items and cloze tests, the characteristics of multiple-choice questions as in grammatical correctness, not including the same word in the correct option, simplifying the language of the texts and questions, using more items and texts to gather more samples, hence increasing reliability. On the other hand, they were not informed about spelling in the scoring criteria and using a text that students have seen before. Teachers were mostly not aware of the fact that the questions in a reading exam should be independent of each other. In conclusion, it can be uttered that EFL teachers have high knowledge level in assessing reading considering that they have high mean scores in 12 among 15 items on the scale.

The findings related to assessing listening show that the highest mean score belongs to the item "In selective listening, learners are expected to look for certain information". Unlike extensive listening, acquiring a global understanding of the text is not the main concern. In total, 178 teachers (88%) provided a correct answer to this item. When the numbers of the participants with incorrect answers (n=12) and the participants who did not have an idea about the item (n=12) are examined, it is seen that they are the same. The mean scores of the teachers indicate that they were quite informed about the purposes of selective listening tasks. The item with the lowest mean score among the 15 items in this part, "Dictation is a kind of discrete-point testing". The number of the participants who gave a correct answer for this item is 36 (18%), while 31 (15%) did not have an idea about whether the item was true or false. Besides, 135 of the teachers (67%) have chosen the true option, giving a wrong answer. It is clearly observable that teachers have a significantly low level of knowledge in discrete-point testing techniques regarding dictation. Thus, EFL teachers in the K-12 context were mostly knowledgeable in selective listening, using listening cloze-tests for selective listening, characteristics of the listening text in terms of background knowledge, redundancy and authenticity involved. On the other hand, the teachers' knowledge level in assessing listening remained low regarding discrete-point testing, scoring, and purposes of discrete-point testing, intensive and integrative assessment approaches, scoring criteria whether to include spelling and grammar, and selection of listening text.

Furthermore, the participants' mean scores ($\bar{X}$=7,0594) related to assessing writing demonstrate that EFL teachers' knowledge level is lower than half of the total score, which puts assessing writing in third place. The mean scores obtained from the items, based on the participants' answers, are individually revealed, and discussed in this part from the highest to lowest. The item "Analytic scoring is used to see the strengths and weaknesses of learners" have the highest mean score in assessing writing part of the scale. The lowest mean score in this part is on the item "When there is a disagreement between the scores of the two raters, they score the written work again". The participants' answers to this item were interesting in that the number of teachers who gave a correct answer (n=32) was the same as those who do not know whether this item was true or false (n=31). Besides, 139 teachers (69%) believed that the raters should score the writings. It is highly clear that teachers are not knowledgeable in the scoring procedures of writing assessment when a discrepancy occurs.

All in all, the EFL teachers in the K-12 context were mostly aware of the analytic and holistic scoring in terms of their advantages and reliability, prompts that can be used such as visuals or a reading text, when to focus on mechanical errors, whether to adjust the scales based on the learners' needs or not. However, they were not knowledgeable enough in controlled writing, when to deal with irrelevant ideas, the number of writing tasks involved, using opinion-based prompts, giving options to learners, and scoring procedures when two raters are involved.

Lastly, it is observed that compared to reading, listening, and writing, speaking is the second highest regarding the participants' mean scores ($\bar{X}$=8.6386), which is higher than half of the total score that can be obtained in this part. The highest mean score in assessing speaking part belongs to "Discussion among learners is a way of assessing speaking skills". The last item, which also got the lowest mean score, is "In peer interaction, random matching is avoided". Thus, EFL teachers in the K-12 context in Türkiye generally have sufficient knowledge in using role-plays to assess discourse and discussion tasks for speaking, gathering more samples of learners' performances by using more than one task, using checklists for grading, speaking constructs in terms of assessing comprehension and production together, and the role of the interlocutor concerning adapting the interview questions and showing interest during the interview. On the other hand, their knowledge level remained below the average on these issues: using repetition and reading aloud as a speaking task, the role of the interlocutor in terms of when to score, when to end the interview, and whether to express if they do not understand the learner or not, how many learners to involve and how to match them in interactive tasks, and finally, the advantages of using holistic and analytic scales together.

Effects of Demographic Features on EFL Teachers' LAK Level

The relationship of the demographic characteristics on EFL teachers' LAK level is also investigated. Independent samples t-test results, given in Table 7 below, show that there is no statistically significant difference in the LAK level of teachers in terms of gender, the BA program being graduated (ELT, non-ELT), the type of institution that the participants work(state/private), the testing course taken in BA or additional trainings on testing.

Table 7. *Independent Samples T-test Results According to Gender, BA Program, Type of Institution, Testing Course in BA, Additional Trainings and LAK*

	Categories	N	$\bar{X}$	S	Sd	t	P
Gender	Female	154	32.06	5.01	200	-.159	.874
	Male	48	32.20	6.66			
BA Program	ELT	181	32.07	5.60	200	-.208	.835
	Non-ELT	21	32.33	3.77			
Type of Institution	Public/State	187	32.23	5.35	200	1.259	.209
	Private	15	30.40	6.29			
Testing Course in BA	Yes	113	32.41	4.90	200	.933	.352
	No	89	31.69	6.05			
Additional Trainings	Yes	105	32.77	5.73	200	1.839	.067
	No	97	31.37	5.02			

Furthermore, regarding the participants' level of experience, the educational background, and the educational level of the workplace, one-way ANOVA is conducted, and no significant difference is found between the participant groups. The findings are presented in Table 8 below.

Table 8. *One-way ANOVA Results According to the Years of Experience, Educational Background, Educational Level of the Workplace and LAK*

	Categories	N	$\bar{X}$	S	Source of Variance	Sum of Squares	df	Mean Square	F	p
Years of	1-5 years	91	32.50	6.14	Between	138.673	4	34.668	1.176	.323

experience					Groups					
	6-10 years	34	31.52	5.24	Within Groups	5807.347	197	29.479		
	11-15 years	23	30.30	4.97	Total	5946.020	201			
	16-20 years	27	31.81	3.92						
	More than 20 years	27	33.25	4.62						
Educational Background	BA degree	161	32.15	5.56	Between Groups	8.152	2	4.076	.137	.872
	MA degree	37	32.00	5.16	Within Groups	5937.868	199	29.839		
	PhD degree	4	30.75	2.21	Total	5946.020	201			
Educational level of the workplace	Primary	35	31.45	4.17	Between Groups	23.971	2	11.986	.403	.669
	Secondary	103	32.07	5.45	Within Groups	5922.049	199	29.759		
	High	64	32.48	6.03	Total	5946.02	201			

EFL Teachers' Perceived Self-competency and Actual LAK Level

To investigate whether the teachers' LAK level changed according to their perceived self-competency, the teachers were asked to select their level of competency in the scale for each language skills consisting of "very competent", "competent", "not very competent", and "not competent" options. Therefore, teachers' perceptions of their knowledge in assessing each skill have been investigated with Pearson Correlation and one-way ANOVA analyses, as shown in Table 9 below.

Table 9. *Pearson Correlation Results of the Relationship Between Perceived Self-competency and LAK*

Variable		LAK of Reading	LAK of Listening	LAK of Writing	LAK of Speaking
Perceived Self-competency of Reading	r	-0,65			
	p	,357			
	N	202			
Perceived Self-competency of Listening	r		-0,39		
	p		,585		
	N		202		
Perceived Self-competency of Writing	r			-,136	
	p			0,53	
	N			202	
Perceived Self-competency of Speaking	r				-.199
	P				,004*
	N				202

p<.05

From Table 9, it is evident that while teachers' perceptions of their knowledge negatively correlate with their actual LAK levels in assessing language skills, this correlation is only statistically

significant for speaking. A closer examination reveals a moderate negative correlation with a value of r=-.199. One-way ANOVA analysis is used to determine whether there is a significant difference among the perceived self-competency groups (very competent, competent, not very competent, not competent) regarding their LAK level in each skill.

Table 10. *One-way ANOVA Results of Perceived Self-competency and LAK in each Language Skill*

		N	X̄	S	Source of Variance	Sum of Squares	Df	Mean Square	F	P
Reading	Very competent	110	9.74	1.88	Between Groups	12.639	2	6.320	1.615	.202
	Competent	84	9.28	2.03	Within Groups	778.891	199	3.914		
	Not very competent	8	10.12	2.64	Total	791.530	201			
Listening	Very competent	55	7.00	2.49	Between Groups	5.748	3	1.914	.416	.742
	Competent	112	6.75	1.79	Within Groups	912.529	198	4.609		
	Not very competent	34	6.88	2.57	Total	918.277	201			
	Not competent	1	5.00							
Writing	Very competent	70	7.40	2.10	Between Groups	21.211	3	7.070	1.528	.208
	Competent	108	6.99	2.15	Within Groups	916.076	198	4.627		
	Not very competent	21	6.28	2.32	Total	937.287	201			
	Not competent	3	7.00	1.00						
Speaking	Very competent	49	9.40	2.32	Between Groups	73.453	3	24.484	5.075	0.002*
	Competent	122	8.54	2.09	Within Groups	955.166	198	4.824		
	Not very competent	29	7.58	2.41	Total	1028.618	201			
	Not competent	2	11.00	0						

p<.05

As shown in Table 10, teachers reported that they are competent in their knowledge of reading assessment. However, teachers who are not very competent in assessing reading performed the highest in the scale. When the participants' mean scores in assessing reading (X̄=9.5693) is considered, which is significantly high, it is possible to say that their perceptions and actual LAK level are in line with each other since assessing reading has received the highest mean score among all language skills. Besides, there is no significant difference between the competency levels of the teachers regarding their LAK mean scores. Thus, it can be suggested that the teachers are generally aware of their knowledge level in assessing reading.

In terms of assessing listening, it is seen that most of the teachers felt competent (N=112) and very competent (N=55) regarding their knowledge in assessing listening, who also have the highest mean scores compared to the teachers who selected the options not very competent (N=34) and not competent (N=1). Nevertheless, the mean scores that the participants had in assessing listening part on the scale (X̄=6.8317) was significantly lower than the half of the total score (7.5) in addition to being the lowest among other skills. Additionally, the difference between the participants' LAK mean scores based on their level of competency is not statistically significant. Therefore, it can be inferred that the

participants' perceptions about their knowledge may coincide with their actual knowledge level in assessing listening.

Pertaining to assessing writing, it is demonstrated that the teachers have a high level of self-competency since 88% of the teachers stated that they are either competent (N=108) or very competent (N=70). Besides, the participants who are very competent received the highest mean score in assessing writing, while the mean score of the participants in assessing writing ($\bar{X}$=7,0594) is found to be significantly low. Consequently, it might be suggested that their perceptions of their knowledge mirror their actual LAK in writing assessment since no significant difference is observed between the participants' level of competence and their LAK mean scores.

As for assessing speaking, the teachers' competency level is found to be considerably high as the number of the participants who selected the option very competent (N=49) and competent (N=122) constitutes 84% of the total participants. Even though their mean scores in assessing speaking in the scale ($\bar{X}$=8.6386) is significantly high, a significant difference is observed between the competency groups regarding their actual LAK and perceived self-competency. To investigate more into the differences between all competency groups, Tukeys' Test is conducted as a post hoc test. Even though the not competent group has the highest score compared to others ($\bar{X}$=11.00), the results indicate a significant difference between the groups of not very competent ($\bar{X}$=7.58) and very competent ($\bar{X}$=9.40) in favor of the very competent group. The reason behind this can be explained by the small number of the participants in the not competent group (N=2).

DISCUSSION, CONCLUSION, RECOMMENDATIONS

This study investigated the LAL of the EFL teachers in their knowledge base in the K-12 context of Türkiye. The results indicated that EFL teachers had sufficient knowledge in language assessment supporting the findings of other studies in the higher education context (Hakim, 2015; Jannati, 2015). Related to each language skill, the findings illustrated that the teachers had sufficient knowledge respectively in assessing reading and speaking, reading being the highest, and insufficient knowledge in assessing writing and listening, listening being the lowest. These results are in line with Ölmezer-Öztürk and Aydın (2019). Similarly, Genç et al. (2020) investigated the LAK level of high school EFL teachers in assessing writing and speaking and found that teachers were knowledgeable in assessing speaking, whereas their knowledge in assessing writing was significantly low. Thus, it can be interpreted that the EFL teachers in the primary, middle, and high schools in Türkiye are more knowledgeable in reading and speaking assessment, while their knowledge is in writing and listening assessment even though they demonstrated a higher degree of LAK in general. A plausible explanation might be the teachers' perceived emphasis on certain skills during the assessment process. Kırkgöz et al. (2017) highlight that while teachers prioritize speaking and reading skills, they often deemphasize listening in their evaluations. In addition, only a minority reported that writing is a highly important skill. Consequently, it is possible to state that there is a relation between the teachers' perceptions of assessment and their LAK. However, the direction of this relation needs to be analyzed with further investigation.

When the impact of the teachers' demographic characteristics is examined, it is revealed that no significant effect is found on the teachers' LAK according to their gender, level of experience, the BA program being graduated, whether having a BA, MA, and PhD degree, working at a private or a state school, the educational level of the workplace whether primary, middle, or high school, taking a language assessment course in pre-service education, and attending professional development programs. These findings support the results of other studies regarding gender, years of experience, educational

background in different educational contexts (Büyükkarcı, 2016; Jannati, 2015; Öz & Atay, 2017; Xu & Brown, 2017). On the other hand, a contradiction is displayed in a study in terms of the effect of the type of the institution being private or state and experience level by Farhady and Tavassoli (2018). It was found that teachers with more experience and work at a state institution had higher levels of knowledge in language assessment. The reason behind this difference in findings can be related to the number of the participants in this study, in which only a minority of the teachers worked at a private institution. Consequently, it can be stated that the EFL teachers' LAK is possibly affected by the type of their institution. In conclusion, the contextual and experiential factors are not influential in shaping the EFL teachers' LAK in the K-12 context of Türkiye.

In the literature, a discrepancy is observed between the teachers' perceptions and their LAL-LAK (Farhady & Tavassoli, 2018; Işık, 2021). Regarding the competency level of the teachers as they perceive themselves to be in assessing each language skill and their actual LAK, the results indicated that, in general, teachers' perceptions are reflected in their knowledge in that they generally felt competent and indicated high LAK level. However, when the language skills are focused individually, it is shown that the teachers' perceived self-competency in assessing reading, writing, and listening is in accordance with their actual knowledge level, while a discrepancy is observed between their self-competency and their actual knowledge level in that the teachers with lower self-competency level received higher LAK levels in assessing speaking.

LAL typically comprises both theory and practice. In other words, teachers need to have a degree of knowledge regarding language assessment and the skills to reflect their knowledge in their assessment practices (Inbar-Lourie, 2008). Besides, the knowledge base of LAL is considered a prerequisite for teachers to mirror their knowledge of theoretical considerations into their classroom practices appropriately to be able to make proper judgements about the learners (Fulcher, 2012; Xu & Brown, 2016). In line with these considerations and the abovementioned conclusions, teachers should improve their knowledge about assessing listening and writing since lower levels of knowledge may result in inappropriate assessment practices hence shadowing the quality of foreign language education. A possible suggestion that can be made in this regard is that in-service trainings can be provided for the teachers on assessing language skills individually, namely writing and particularly listening, rather than broadly touching upon general language assessment theory with a focus on specific areas of assessing language skills such as scoring procedures, the use of scoring scales, alternative methods of assessment.

Based upon the results, pedagogical implications are drawn upon the problematic areas in teachers' LAL based on their knowledge. Due to inadequate teaching hours and large class sizes, it may be interpreted that reading, grammar, and vocabulary skills are typically assessed with written exams as a formal procedure while speaking, writing, and listening are assessed informally based on the classroom observations without incorporating a scoring scale, which may lead to inappropriate judgements about the learners' performances and questioning of the reliability of the assessment without scoring criteria. Therefore, in order to make sound interpretations of the learners' performances, teachers need to adopt more reliable procedures by utilizing checklists and rubrics. Additionally, a further suggestion on assessing speaking skill is that the institutions can support the use of technological applications and tools where learners' speaking performances are assessed, so that more practical applications in terms of time can be included in the assessment process. Thus, in-service trainings can be implemented in technology integrated assessment and the use of proper technological tools using automated feedback tools or artificial intelligence tools. Besides, MoNE can provide these technological applications for teachers to utilize in their classrooms so that speaking skills are incorporated into classroom activities more systematically to collect assessment data on learners' speaking skills.

Another implication can be made upon the listening skills, in which teachers' knowledge and practices was insufficient though indicated high perceptions of their knowledge and practices. Therefore, teachers need to develop their theoretical knowledge in assessing listening and their practices

accordingly. As a result, it is crucial that in-service trainings are provided for the teachers with a focus on listening assessment. It can be suggested that the content of the trainings should focus on a specific area of language assessment rather than in general such as giving feedback, scoring procedures and use of scoring scales, alternative assessment methods, technology-integrated assessment, and self- and peer-assessment that incorporates more applicable and practical concerns.

The study has some limitations. Data collection tools for LAL are limited to EFL teachers' knowledge base and classroom practices. Since the number of the participants in the scale is limited to 202 EFL teachers, the results may not be generalized to the larger population. Thus, further research can be performed with more participants to obtain more reliable results regarding EFL teachers' LAK. Also, to be able to make more in-depth discussion of the teachers' assessment practices, further research can incorporate classroom observations as another data collection tool.

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APPENDIX

Table 3. *Descriptive Statistics of Language Assessment Knowledge Level of EFL Teachers in the K-12 Context*

Items	N	True	False	Don't Know	X̄	S
Assessing Reading						
1. Asking learners to summarize the reading text is a way of assessing their reading skills.	202	170*	17	15	,8416	,36604
2. When asking several questions about a reading text, all the questions are independent of each other.	202	59*	136	7	,2921	,45585
3. Cloze test is used for assessing the main idea of the text.	202	77	106*	19	,5248	,50063
4. In a reading exam, using a text learners have encountered before is not a problem.	202	78	96*	28	,4752	,50063
5. One reading text is enough to be included in a reading exam.	202	70	113*	19	,5594	,49769
6. The language of the questions is simpler than the text itself.	202	140*	43	19	,6931	,46237
7. Errors of spelling are penalized while scoring.	202	78	97*	27	,4802	,50085
8. Taking vocabulary difficulty into consideration is necessary in assessing reading skills.	202	160*	36	6	,7921	,40683
9. Including not stated/doesn't say along with true/false items has advantages over true/false items.	202	144*	25	33	,7129	,45355
10. The more items a reading text is followed, the more reliable it becomes.	202	140*	41	21	,6931	,46237
11. Using the same words in the correct option as in the text is not a problem.	202	61	123*	18	,6089	,48921
12. Simplification of reading texts is avoided.	202	60	111*	31	,5495	,49878
13. Reading texts in a reading exam include various genres (essay, article, etc.).	202	176*	15	11	,8713	,33571
14. In top-down approach, assessment is on overall comprehension of the reading text.	202	151*	21	30	,7475	,43551
15. Using ungrammatical distractors in multiple choice questions in a reading exam is a problem.	202	147*	40	15	,7277	,44624
Reading-Total	202				9,5693	1,98443
Assessing Listening						
16. Using reading texts for listening purposes poses a problem.	202	74*	102	26	,3663	,48300
17. Including redundancy (e.g., what I mean to say is that ….) in a listening text poses a problem.	202	56	129*	17	,6386	,48160
18. Any type of listening text is used for note-taking.	202	98	76*	28	,3762	,48564
19. Spelling errors are ignored in scoring the dictation.	202	95*	96	11	,4703	,50036
20. Errors of grammar or spelling are penalized while scoring.	202	98	83*	21	,4109	,49322
21. A listening cloze test is a way of selective listening.	202	159*	20	23	,7871	,41035
22. Phonemic discrimination tasks (e.g., minimal pairs such as sheep-ship) are examples of integrative testing.	202	120	39*	43	,1931	,39569

23. Scoring in note-taking is straightforward.	202	107	41*	54	,2030	,40321
24. In discrete-point testing, comprehension is at the literal/of local level.	202	100*	26	76	,4950	,50122
25. Using dictation diagnostically in assessing listening skills does not pose a problem.	202	90*	78	34	,4455	,49826
26. Giving learners a transcript of the listening text is a valid way of assessing listening skills.	202	75	115*	12	,5693	,49640
27. Dictation is a kind of discrete-point testing.	202	135	36*	31	,1782	,38365
28. Inference questions based on intelligence are avoided in listening tests.	202	111*	59	32	,5495	,49878
29. Asking learners to listen to names or numbers is called intensive listening.	202	112	54*	36	,2673	,44366
30. In selective listening, learners are expected to look for certain information.	202	178*	12	12	,8812	,32437
Listening-Total	202				6,8317	2,13742
Assessing Writing						
31. Giving two options to learners and asking them to write about one ensure reliable and valid scoring.	202	147	35*	20	,1733	,37942
32. Analytic scoring is used to see the strengths and weaknesses of learners.	202	162*	17	23	,8020	,39950
33. The parts of a scoring scale and the scores in each part do not change for different levels of learners.	202	61	123*	18	,6089	,48921
34. When there is a disagreement between the scores of the two raters, they score the written work again.	202	139	32*	31	,1584	,36604
35. Learners are required to write about at least two tasks in the exam rather than one task.	202	93*	89	20	,4604	,49967
36. Giving restrictive prompts/guidelines to learners for the writing task is avoided.	202	72	100*	30	,4950	,50122
37. Giving learners an opinion and asking them to discuss it is a valid way of assessing their writing skills.	202	150	34*	18	,1683	,37508
38. Using visuals which guide learners for writing poses a problem.	202	53	135*	14	,6683	,47199
39. Holistic scoring is used to see whether the learner is proficient or not at the end of the term.	202	117*	28	57	,5792	,49491
40. Analytic scoring leads to greater reliability than holistic scoring in writing.	202	119*	34	49	,5891	,49322
41. In controlled writing, learners have the chance to convey new information.	202	93	75*	34	,3713	,48435
42. Classroom evaluation of learning in terms of writing is best served through analytic scoring rather than holistic scoring.	202	89*	49	64	,4406	,49769
43. Irrelevant ideas are ignored in the assessment of initial stages of a written work in process writing.	202	109	67*	26	,3317	,47199
44. Providing a reading text for writing is a way of assessing writing skills.	202	116*	60	26	,5743	,49568
45. Mechanical errors (e.g., spelling and punctuation) are dealt with in the assessment of later stages of a written work.	202	129*	54	19	,6386	,48160
Writing-Total	202				7,0594	2,15943
Assessing Speaking						
46. When the interlocutor does not	202	111	76*	15	,3762	,48564

understand the learner, giving that feeling or saying it poses a problem.						
47. Giving learners one task is enough to assess speaking skills.	202	49	145*	8	,7178	,45118
48. Interlocutors' showing interest by verbal and non-verbal signals poses a problem.	202	66	111*	25	,5495	,49878
49. When it becomes apparent that the learner cannot reach the criterion level, the task is ended.	202	78*	83	41	,3861	,48807
50. Using holistic and analytic scales at the same time poses a problem.	202	67	74*	61	,3663	,48300
51. Reading aloud is a technique used to assess speaking skills.	202	96*	94	12	,4752	,50063
52. In interlocutor-learner interviews, the teacher has the chance to adapt the questions being asked.	202	163*	19	20	,8069	,39569
53. In interactive tasks, more than two learners pose a problem.	202	72*	113	17	,3564	,48014
54. The interlocutor gives the score when the learner is in the exam room.	202	87	89*	26	,4406	,49769
55. In a speaking exam, production and comprehension are assessed together.	202	166*	26	10	,8218	,38365
56. Asking learners to repeat a word, phrase or a sentence is a way of assessing speaking skills.	202	95*	90	17	,4703	,50036
57. Discussion among learners is a way of assessing speaking skills.	202	179*	13	10	,8861	,31843
58. A checklist is a means of scoring oral presentations in in-class assessment.	202	170*	20	12	,8416	,36604
59. When the focus is to assess discourse, role plays are used.	202	166*	17	19	,8218	,38365
60. In peer interaction, random matching is avoided.	202	65*	109	28	,3218	,46832
Speaking-Total	202				8,6386	2,26219
LAK-TOTAL	202				32,0990	5,43895

* Refers to the corrects answers.

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Investigation of the Relationship Between Preservice Teachers' Lifelong Learning Skills and Game Perceptions

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ABSTRACT

In this study, in which the quantitative research approach was adopted, we examined the relationship between the lifelong learning skills of preservice teachers and their game perceptions with the relational survey model. We used the descriptive survey model to investigate whether the preservice teachers' lifelong learning skills and game perceptions differ according to gender, grade level, number of books read, maternal/paternal education level and family income level. The sample consists of 1071 (Female: 823; Male: 248) preservice teachers who have studied at various universities in Turkey in the 2021-2022 academic year. We used the convenience sampling model in the choosing of relevant universities. In the data collection process of this study, we used two different measurement tools, 30 items "Lifelong Learning Skills Scale" and 20 items "Game Perception Scale. The results show that there is a significant difference between the function of the game, the level of interest/interest/discovery in the game and gender in favor of female. We found that preservice teachers' increased grade level, increased frequency of reading books, and higher levels of maternal education enhance their lifelong learning skills. We observed that a positive and meaningful relationship between preservice teachers' lifelong learning skills and play perceptions. We also found that preservice teachers with a high level of education and income of parents have high communication skills in a foreign language. On the contrary, we observed that preservice teachers with lower levels of income have higher gaming perceptions.

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INTRODUCTION

Learning is an individual process that starts before birth and continues until death, in which individuals create meaning from their knowledge and experience in their lives through their own perceptions, thoughts and feelings. As a consequence of the extraordinary changes and improvements in knowledge, it has been revealed that new strategies should be considered not only about learning current information but also about how to reach information that is likely to be encountered in the future. In this context, the need for learning has increased and "lifelong learning" has come to the fore, which supports realization of learning independent of time and place, not staying within the boundaries of the school.

Lifelong learning, which has become increasingly important from the past to the present and has taken its place among the popular concepts of the 21st century, emerged for the first time by Lindeman (1925) as adult education that begins where vocational education ends and then continues throughout life. In Yeaxlee (1929), it was emphasized that lifelong learning should not be limited only to adults and it was stated that education would continue as long as the individual's life continues. The fact that education is more planned and programmed, and learning continues throughout life in a more individual, formally or informally, has revealed the concept of lifelong learning rather than lifelong education (Fischer, 2001). Lifelong education and lifelong learning concepts are two basic concepts that should not be confused with each other. Life-long education is all of the arrangements that cover all kinds of formal and non-formal education activities, aiming to renew the existing system and develop the potential of all activities inside and outside the education system. Lifelong learning has a wide scope that includes primary schools, secondary schools, high schools, universities and even family and social learnings. Lifelong learning is be defined as the continuous, voluntary and free learning process of individuals in the light of their personal and professional knowledge in a constantly developing and changing information society (Toprak & Erdoğan, 2012). Moreover, lifelong learning is defined as an activity in which qualified and quality individuals will continue learning outside the traditional and formal education system and gain more knowledge throughout their lives (Fischer, 2001). Lifelong learning is a process that expresses the continuous development of knowledge and skills that individuals experience throughout their lives, and this process is a form of learning that occurs with formal or informal activities (Laal, 2011). Lifelong learning provides the opportunity to access the information needed from different sources, and the ability to use and evaluate the information obtained. In that case, lifelong learning, in its most common sense, emerges as a continuous process carried out to spread learning throughout life and to develop an individual's potential and competencies throughout life (Demirel, 2010). Lifelong learning consists of three basic elements: continuity, creativity and learning. As a matter of fact, the process we call education starts at a certain period of an individual's life and continues until his death. Creativity is creating original, original and socially aware products or ideas. Learning is another important element and in this process, individuals are expected to learn by themselves (Day, 1999). Another concept that is important in increasing creativity, applying the learned information and contributing to physical, mental, emotional and scientific development is ‘game’ (Güneş, 2015).

Games are a socio-cultural structure that existed since the birth of human history and contributes to the social, emotional, cognitive, physical and linguistic development of children (O. Kuzu, 2022). Games are activities that have their own rules, in a certain place and time, with physical and mental abilities around a goal. These are activities that involve social and emotional interaction with groups formed through voluntary participation, are based on talent, intelligence, attention, skill and coincidence, accompanied by a sense of tension, and provide pleasure without financial benefit (Hazar, 2000). As Eric Berne points out, the child, mother, father, adult sub-personalities that every person carries in the game have wishes on the self, and individuals need to play games with or without being aware of the wishes of their personalities. (Zülal, 2000). As a request, the game serves as a bridge

between generations as well as being a fun activity. In particular, children's games have been shaped by various changes from the past to the present and have gained a continuity between generations (Artar et al., 2002). These emerging changes are affected by the assimilation of the characteristics of the period, as well as the creative experiments on the games. The fact that games offer the freedom to make mistakes during the game and the voluntary acceptance of new rules offer a creative and wide area for lifelong learning of individuals (Nash, 1994). The game eliminates the fear of making mistakes for the players, enabling people to create creative experiences, as well as allowing the players to test their limits and develop new strategies (Ackerman, 1999; cited in Güleç-Özer & Turgay, 2016). In this respect, the game, which blends new experiences with active participation, creativity, social communication and pleasure, enables the mistakes to be noticed more easily and to learn the ways to correct them (Güneş, 2015). While individuals use their past learning against the problems they encounter throughout their lives, the learning provided by the games paves the way for effective solutions to the problems. With these aspects, games are closely related to continuity, creativity and learning, which are the three basic elements of lifelong learning. As an example of this, places called “Nest” were designed in Piacenza, Italy, where the elderly and children play and cook together. With the project titled "Old people and children together", children listened to fairy tales from their older friends and learned hand skills. Based on all these, although games find their place in the lifelong learning process, they have undergone changes under rapidly changing technology, environmental experiences, social orientations and creative changes. This change has also changed our perceptions of games that we may encounter throughout our lives (Kurt, 2015).

Game perception is defined as all of the positive or negative perceptions of individuals about the behaviors revealed in playing games and the results of these behaviors. The game, which is shaped by the perspectives of cultures and generations, is seen as a means of entertainment, pleasure and happiness for adults (Erbay and Durmuşoğlu-Saltalı, 2012). On the other hand, while adults tend to spend more time in games, the fun element of games comes to the fore for children. However, children complain that their parents or elders narrow down the playgrounds and impose some restrictions on games, and adults state that they set these rules for safety concerns. However, recent studies have revealed that games create an area that facilitates learning, and are a tool for trial and error, learning by experience (Yıldız & Perihanoğlu, 2004). However, games with a universal and transcendent structure are an indispensable part of life. The involvement of adults in games with their children strengthens the bonds of children with their families, increases intra-family cooperation and social support of family members to each other (Çalışandemir, 2014). Through games, the individual learns the social rules such as obeying the rules, respecting the rights of others, taking on the assigned tasks, accepting the role, making and applying decisions, and being able to cooperate (Kuşçu, 2014). Individuals who learn these rules can more easily adapt to the problem situations they encounter in real life. Play, which is a preparation process for problem situations, shapes our learning and experiences whether we are involved in lifelong or not. In this sense, it is expected that the perception of games will also affect learning in life. Our study aims to reveal the relationship between preservice teachers' lifelong learning skills and their perceptions of games. Considering the role of play in lifelong learning skills, it is thought that preservice teachers' perceptions of games are related to their lifelong learning skills.

METHOD

In this section, informations about the research design, research sample, research instruments and processes are presented.

Research Design

Quantitative research approach was adopted in this study, in which preservice teachers' lifelong learning skills, game perceptions, relationships between them and whether they differ according to various variables (gender, grade level, number of books read, maternal/paternal education level and family income level). While the lifelong learning skills and game perceptions of the preservice teachers

were examined with the descriptive survey model (Büyüköztürk et al., 2008), the relational survey model (Fraenkel et al., 2012) was used to investigate the relationship between them.

Research Sample

The sample of this research consisted of 1071 (Female: 823; Male: 248) preservice teachers studying at various universities in Türkiye in the 2021-2022 academic year. While the convenience sampling method (Patton, 2005) was used in choosing universities, the purposive sampling method (Bernard, 2002) was used in choosing the preservice teachers at these universities.

Research Instruments and Processes

Two different measurement tools were used in this study. The first of these is "Lifelong Learning Skills Scale (LLSS)" developed by Çiftçibaşı et al. (2020) and this scale consists 30 items, four factors and Cronbach Alpha value of .871. The "communication and productivity" factor of this scale has 12 items and Cronbach Alpha value .886. While Cronbach Alpha value of the four-item "communication in a foreign language" factor is .808, the Cronbach Alpha value of the nine-item "cooperation and learning" factor is .849. The fourth factor of the scale, the "self-confidence" factor has five items; the items in this factor are presented as reverse items and also the Cronbach Alpha value of this factor is .636. The second scale in this study is the 20-item and three-factor "Game Perception Scale (GPS)" developed by Güneş, Tuğrul and Demir-Öztürk (2020) and has a Cronbach Alpha internal consistency coefficient of .728. This scale consists of a six-item "originality and purpose of the game" factor, a 10-item "function of the game and interest/curiosity/exploration in the game" factor, and a four-item "nature and source of the game" factor, and the scale includes 11 reverse items in total. Positive items in these two scales, developed in accordance with the 5-Likert type, are as "1: I strongly disagree - 5: I strongly agree"; negative items were rated from 1 to 5 as "1: I strongly agree - 5: I strongly disagree". While the highest average score that can be obtained from the scales is 5, the lowest average score is 1. In this context, in this study, interpretation was made on the averages of the total scores from these two scales and the ranges were determined on the average score. In interpreting the scores obtained from the scales, the study by Kuzu (2021) was taken into account. Accordingly, five levels were evaluated as; 1≤score<1.80:Very low; 1.80≤score<2.60:Low; 2.60≤score<3.40:Moderate; 3.40≤score<4.20:High; 4.20≤score≤5.00:Very high. In this study, the data obtained from 1071 preservice teachers were transferred to the SPSS 23 program during the data analysis process. For data cleaning purposes, outliers for each item were calculated with "Outliers" and z-score values. As a result of the examinations, it was seen that there were outliers in 2 data and the z score of each item was calculated out of 1069 data. When the z scores of the items were analyzed, data with a z score greater than 4 or less than -4 were excluded from the analysis process (Mertler & Vannatta, 2005). As the relationship between the preservice teachers' lifelong learning skills and game perceptions will be examined in this study, the z scores of the two scale items were examined together and normality analysis was performed on 992 data by removing 77 data from the analysis process. In this process, histogram, box, normal probability graphs were examined and the extreme values were deleted and the analysis process was continued on 985 data.

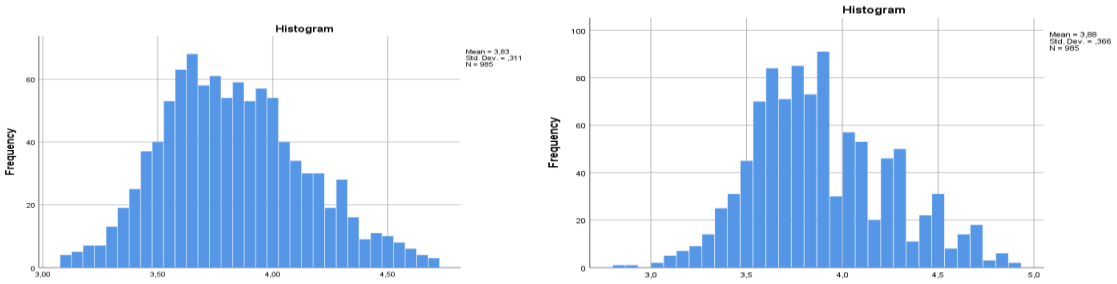

Figure 1. *Histogram of the Game Perception Scale and the Lifelong Learning Skills Scale*

In this study, it was observed that values such as arithmetic mean, mode and median of the distributions were close to each other and both skewness and kurtosis coefficients remained between -2 and +2 values (George & Mallery, 2010). Although the Kolmogorov-Smirnov test results for the normality of the distribution were p<.05, when the descriptive and graphical results were also evaluated, it was concluded that the distribution in this study was normal. The descriptive statistics results of the distribution of the data are given in Table 1.

Table 1. *Results of Data Distribution*

	Mode	Median	$\bar{X}$	Sd	Skewness	Kurtosis	Min	Max	Kolmogorov Simirnov
LLSS	4.00	3.83	3.88	.366	.401	-.201	3.00	5.00	.00
CP	4.00	4.08	4.15	.424	.212	-.357	3.00	5.00	.00
CIFL	3.00	3.00	2.97	.1.005	.130	-.493	1.00	5.00	.00
CL	4.00	4.22	4.30	.398	-.011	-.539	3.00	5.00	.00
SC	3.00	3.20	3.18	.682	-.231	.359	1.00	5.00	.00
GPS	3.65	3.80	3.82	.31	.325	-.233	3.10	4.70	.00
OPG	3.33	3.5	3.47	.47	.164	-.141	2.00	4.83	.00
FGIG	4.00	4.3	4.29	.36	.044	.622	3.20	5.00	.00
ODK	3.00	3.25	3.20	.52	.203	.154	1.50	5.00	.00

LLSS: Lifelong learning skills scale; CP: Communication and productivity; CIFL: communication in a foreign language; CL: cooperation and learning; SC: Self-confidence; GPS Game Perception Scale; OPG: originality and purpose of the game; FGIG: function of the game and interest/curiosity/exploration in the game; NSG; nature and source of the game.

After testing the normality assumptions, confirmatory factor analysis (CFA) was performed using the LISREL 8.80 (Linear Structural Relations 8.80) package program to verify construct validity of the two scales used in this study. Suggested modifications were made for the scales with low fit indices, and the CFA results before and after the modification of the four scales are presented in detail in Table 2.

Table 2. *CFA Results*

	LLSS						GPS					
	FL		SL		Fit		FL		SL		Fit	
	BM	AM	BM	AM	FL	SL	BM	AM	BM	AM	FL	SL
X^2/df	8.59	2.21	8.65	2.29	Perf.	Perf.	4.79	3.14	4.93	-	Acc.	Acc.
RMSEA	.088	.035	.88	.036	Perf.	Perf.	.062	.047	.062	-	Perf.	Acc.
S-RMR	.061	.037	.063	.041	Perf.	Perf.	.057	.047	.057	-	Perf.	Acc.
CFI	.92	.99	.92	.99	Perf.	Perf.	.91	.95	.91	-	Perf.	Acc.

FL: First level; SL: Second level; BM: Before modification; AM: After modification; Perf: Perfect fit; Acc: Acceptable fit; LLSS: Lifelong learning skills scale; GPS Game perception scale; df: degrees of freedom

In the study by Bollen (1989), it was emphasized that the χ^2/df value should be below 2, 3 or 5. Schermelleh-Engel and Moosbrugger interpreted CFI (Comparative Fit Index) value greater than .95; SRMR (Standardized Root Mean Square Residual) and RMSEA (Root Mean Square Error of Approximation) values less than .05 as perfect fit indicators. If the CFI value is between .90 and .95, and the SRMR and RMSEA values are between .05 and .10, it is expressed as acceptable fit values. It has been stated that there is no need to use and report other indices (Brown, 2006; Kline, 2005). Accordingly, it is observed that the CFA fit indexes of scales in this study are within the desired ranges. In addition, the Cronbach Alpha internal consistency coefficients were calculated in this study (Table 3), and the obtained values were found to be reliable (Sumintono & Widhiarso, 2015; Yockey, 2016).

Table 3. *Reliability Results for Scales and Their Factors*

			CP	CIFL	CL	SC
Cronbach Alfa (α)	LLSS	.865	.883	.912	.815	.594
	GPS	.731				

LLSS: Lifelong learning skills scale; CP: Communication and productivity; CIFL: Communication in a foreign language; CL: Cooperation and learning; SC: Self-confidence; GPS Game perception scale.

After the validity and reliability analysis, the lifelong learning skills and game perceptions of the preservice teachers were examined with descriptive statistics. Moreover, whether the preservice teachers' levels of these situations differed according to the two-category variables (gender) were investigated with the t-test for independent groups at a significance level of .05. In this process, it was examined whether the equality of variances was achieved (p>.05) or not achieved (p<.05) with the Levene test, and these results were taken into account in the interpretation process (Y. Kuzu, 2022). ANOVA test was used to examine whether the preservice teachers' levels differed according to three or more category variables (grade level, number of books read, maternal/paternal education level, income level). In this process, Post-Hoc analysis techniques were used to determine which variables differed in statistically significant results. Tukey HSD was used in cases where homogeneity of variances was provided (p>.05) with Levene test, and Games-Howell multiple comparison techniques were used in cases where it was not (p<.05) (Y. Kuzu, 2022). In addition, in this study, the relationship between preservice teachers' lifelong learning skills and game perceptions was examined with Pearson Correlation, and whether they predicted each other using simple and multiple regression analyzes. The obtained correlation coefficient (r) is very weak if r<.20; If .20<r<.40, weak; If .40<r<.60, medium; If .60<r<.80 it is high; r>.80 indicates that there is a very high level of relationship (Evans, 1996).

FINDINGS

In this study it was observed that the preservice teachers' lifelong learning skills were at a high level ($\bar{X} = 3{,}88$). When examined in terms of factors, cooperation and learning skills are very high ($\bar{X} = 4{,}30$), communication and productivity skills are high ($\bar{X} = 4{,}15$); self-confidence ($\bar{X} = 3{,}18$) and foreign language communication skills ($\bar{X} = 2{,}97$) were determined to be at medium level. On the other hand, it was observed that the game perception skills of the preservice teachers were at a high level ($\bar{X} = 3{,}82$). When examined according to the factors, it was obtained that the preservice teachers' skills were very high ($\bar{X} = 4{,}29$) in terms of the function of the game and interest/curiosity/exploration in the game, and high ($\bar{X} = 3{,}47$) in terms of the originality and purpose of the game. Finally, in terms of the nature and source of the game, the preservice teachers' skills were determined at a medium ($\bar{X} = 3{,}20$) (see Table 1). Whether there is a statistically significant difference between preservice teachers' lifelong learning skills and game perceptions according to gender was examined with the independent samples t-test and the findings are given in Table 4.

Table 4. *t-Test Results Regarding the Differentiation of Preservice teachers' Lifelong Learning Skills and Game Perceptions by Gender*

	Genders	N	$\bar{X}$	Sd	t	p
LLSS	Female	762	3.88	.37	.20	.84
	Male	223	3.87	.36		
CP	Female	762	4.14	.42	-1.81	.07
	Male	223	4.19	.43		
CIFL	Female	762	2.99	.98	1.19	.23
	Male	223	2.89	1.09		
CL	Female	762	4.30	.39	.26	.80
	Male	223	4.30	.41		
SC	Female	762	3.20	.66	1.48	.14
	Male	223	3.12	.75		
GPS	Female	762	3.83	.31	.42	.67
	Male	223	3.82	.31		
OPG	Female	762	3.46	.48	-1.57	.12
	Male	223	3.52	.47		
FGIG	Female	762	4.31	.37	2.57	.01*
	Male	223	4.24	.37		
NSG	Female	762	3.19	.53	-1.11	.27
	Male	223	3.24	.51		

*p<,05; LLSS: Lifelong learning skills scale; CP: Communication and productivity; CIFL: communication in a foreign language; CL: cooperation and learning; SC: Self-confidence; GPS Game Perception Scale; OPG: originality and purpose of the game; FGIG: function of the game and interest/curiosity/exploration in the game; NSG; nature and source of the game.

According to Table 4, there is no significant difference between preservice teachers' genders and both lifelong learning skills and game perceptions. On the other hand, a significant difference was obtained in favor of female in term of function of the game and interest/curiosity/exploration in the game. Whether preservice teachers' lifelong learning skills and game perceptions differ according to the level of their education was examined with ANOVA test and the findings are given in Table 5.

Table 5. *ANOVA Results on the Differentiation of Preservice Teachers' Lifelong Learning Skills and Game Perceptions According to the Grade Level*

	Grade Level	N	$\bar{X}$	Sd	F	p	Difference
LLSS	1: 1st grade	243	3.81	.33	7.19	.00*	1<4
	2: 2nd grade	193	3.85	.36			2<4
	3: 3rd grade	385	3.89	.37			3<4
	4: 4th grade	164	3.98	.39			
CP	1: 1st grade	243	4.08	.40	7.09	.00*	1<4
	2: 2nd grade	193	4.12	.45			2<4
	3: 3rd grade	385	4.15	.41			3<4
	4: 4th grade	164	4.27	.43			
CIFL	1: 1st grade	243	2.78	.89	6.32	.00*	1<4
	2: 2nd grade	193	3.01	1.02			2<4
	3: 3rd grade	385	2.96	.98			3<4
	4: 4th grade	164	3.21	1.14			
CL	1: 1st grade	243	4.27	.37	2.16	.09	-
	2: 2nd grade	193	4.28	.42			
	3: 3rd grade	385	4.31	.40			
	4: 4th grade	164	4.36	.41			
SC	1: 1st grade	243	3.19	.63	1.59	.19	-
	2: 2nd grade	193	3.09	.70			
	3: 3rd grade	385	3.21	.67			
	4: 4th grade	164	3.20	.75			
GPS	1: 1st grade	243	3.82	.30	.19	.91	-
	2: 2nd grade	193	3.83	.33			
	3: 3rd grade	385	3.83	.31			
	4: 4th grade	164	3.84	.31			
OPG	1: 1st grade	243	3.52	.45	1.07	.36	-
	2: 2nd grade	193	3.44	.47			
	3: 3rd grade	385	3.47	.49			
	4: 4th grade	164	3.45	.49			
FGIG	1: 1st grade	243	4.27	.35	.57	.64	-
	2: 2nd grade	193	4.30	.37			
	3: 3rd grade	385	4.30	.38			
	4: 4th grade	164	4.31	.37			
NSG	1: 1st grade	243	3.16	.52	1.55	.20	-
	2: 2nd grade	193	3.23	.56			
	3: 3rd grade	385	3.19	.51			
	4: 4th grade	164	3.26	.53			

*p<,05; LLSS: Lifelong learning skills scale; CP: Communication and productivity; CIFL: communication in a foreign language; CL: cooperation and learning; SC: Self-confidence; GPS Game Perception Scale; OPG: originality and purpose of the game; FGIG: function of the game and interest/curiosity/exploration in the game; NSG; nature and source of the game.

According to the Table 5, there is a significant difference between preservice teachers' grade levels and both their lifelong learning skills and its communication and productivity, communication in a foreign language factors. Games-Howell multiple comparison technique was used to examine between which groups this differentiation occurred. It was observed that as the grade level increased, the lifelong learning skills of the preservice teachers increased and the lifelong learning skills of the 4th grade preservice teachers were at the highest level. It was determined that the communication and productivity skills of the preservice teachers in the 4th grade and their communication skills in a foreign language were higher than the other grade levels. Whether preservice teachers' lifelong learning skills and game perceptions differ according to the frequency of reading books was examined with ANOVA test and the findings are given in Table 6.

Table 6. *ANOVA Results on the Differentiation of Preservice Teachers' Lifelong Learning Skills and Game Perceptions According to the Frequency of Reading Books*

	Frequency of Reading Books	N	$\bar{X}$	Sd	F	p	Difference
LLSS	1:Almost never	27	3.81	.28	8.04	.00*	1<5
	2:Rarely	135	3.82	.38			2<5
	3:Sometimes	404	3.83	.35			3<4
	4:Most of the time	331	3.92	.35			3<5
	5:Almost always	88	4.03	.41			
CP	1:Almost never	27	4.01	.30	7.01	.00*	1<4
	2:Rarely	135	4.08	.43			1<5
	3:Sometimes	404	4.11	.41			2<5
	4:Most of the time	331	4.19	.42			3<5
	5:Almost always	88	4.32	.46			
CIFL	1:Almost never	27	3.14	1.10	4.11	.00*	3<4
	2:Rarely	135	2.97	1.15			3<5
	3:Sometimes	404	2.83	.99			
	4:Most of the time	331	3.04	.90			
	5:Almost always	88	3.24	1.11			
CL	1:Almost never	27	4.31	.37	3.08	.02*	3<5
	2:Rarely	135	4.27	.41			2<5
	3:Sometimes	404	4.27	.39			
	4:Most of the time	331	4.32	.39			
	5:Almost always	88	4.42	.43			
SC	1:Almost never	27	2.95	.86	2.98	.02*	
	2:Rarely	135	3.08	.66			
	3:Sometimes	404	3.15	.65			
	4:Most of the time	331	3.25	.67			
	5:Almost always	88	3.26	.81			
GPS	1:Almost never	27	3.86	.30	.93	.45	-
	2:Rarely	135	3.87	.32			
	3:Sometimes	404	3.81	.30			
	4:Most of the time	331	3.84	.30			
	5:Almost always	88	3.82	.35			
OPG	1:Almost never	27	3.60	.51	2.52	.04*	3<1
	2:Rarely	135	3.56	.51			4<1
	3:Sometimes	404	3.46	.47			5<1
	4:Most of the time	331	3.47	.45			5<2
	5:Almost always	88	3.39	.53			
FGIG	1:Almost never	27	4.25	.35	2.36	.05	-
	2:Rarely	135	4.27	.37			
	3:Sometimes	404	4.26	.36			
	4:Most of the time	331	4.33	.36			
	5:Almost always	88	4.35	.39			
NSG	1:Almost never	27	3.27	.53	2.369	0.051	-
	2:Rarely	135	3.30	.54			
	3:Sometimes	404	3.22	.50			
	4:Most of the time	331	3.15	.52			
	5:Almost always	88	3.14	.62			

*p<,05; LLSS: Lifelong learning skills scale; CP: Communication and productivity; CIFL: communication in a foreign language; CL: cooperation and learning; SC: Self-confidence; GPS Game Perception Scale; OPG: originality and purpose of the game; FGIG: function of the game and interest/curiosity/exploration in the game; NSG; nature and source of the game

According to the Table 6, there is a significant difference between preservice teachers' frequency of reading books and both their lifelong learning skills and its communication and productivity, communication in a foreign language, cooperation and learning factors. Post-Hoc analysis techniques were used and Games-Howell multiple comparison technique was used to examine between which groups this differentiation occurred. Accordingly, it was observed that as the frequency of reading books increased, the lifelong learning skills of the preservice teachers increased, and that the lifelong learning skills and skills related to the sub-dimensions of the preservice teachers who almost always read books were at the highest level. When the game perception of preservice teachers is examined, it is seen that there is a differentiation in terms of the originality and purpose of the game. It has been determined that the preservice teachers who almost never read books have higher perceptions of the originality and purpose of the game. Whether preservice teachers' lifelong learning skills and game perceptions differ according to the maternal education level was examined with ANOVA test and the findings are given in Table 7.

Table 7. *ANOVA Results on the Differentiation of Preservice Teachers' Lifelong Learning Skills and Game Perceptions According to the Maternal Education Level*

	Maternal Education Level	N	$\bar{X}$	Sd	F	p	Difference
LLSS	1:Illiterate	100	3.74	.34	4.78	.00*	1<2
	2:Literate (Not a school graduate)	46	3.92	.38			1<3
	3:Primary school graduate	445	3.86	.35			1<4
	4:Secondary school graduate	139	3.91	.39			1<5
	5:High school graduate	165	3.95	.38			1<6
	6:Graduate of an associate degree or higher	90	3.89	.36			
CP	1:Illiterate	100	4.05	.43	2.47	.03*	1<5
	2:Literate (Not a school graduate)	46	4.24	.43			1<2
	3:Primary school graduate	445	4.14	.40			1<3
	4:Secondary school graduate	139	4.16	.45			1<4
	5:High school graduate	165	4.21	.44			
	6:Graduate of an associate degree or higher	90	4.12	.43			
CIFL	1:Illiterate	100	2.57	.96	8.37	.00*	1<3
	2:Literate (Not a school graduate)	46	2.89	.95			1<4
	3:Primary school graduate	445	2.88	.95			1<5
	4:Secondary school graduate	139	3.02	1.09			1<6
	5:High school graduate	165	3.23	1.02			3<5
	6:Graduate of an associate degree or higher	90	3.30	.96			3<6
CL	1:Illiterate	100	4.22	.43	1.60	.16	-
	2:Literate (Not a school graduate)	46	4.32	.43			
	3:Primary school graduate	445	4.31	.38			
	4:Secondary school graduate	139	4.33	.42			
	5:High school graduate	165	4.32	.42			
	6:Graduate of an associate degree or higher	90	4.24	.35			
SC	1:Illiterate	100	3.07	.71	1.66	.14	-
	2:Literate (Not a school graduate)	46	3.27	.53			
	3:Primary school graduate	445	3.15	.70			
	4:Secondary school graduate	139	3.29	.67			
	5:High school graduate	165	3.20	.66			
	6:Graduate of an associate degree or higher	90	3.20	.68			
GPS	1:Illiterate	100	3.86	.33	1.11	.35	-
	2:Literate (Not a school graduate)	46	3.79	.31			
	3:Primary school graduate	445	3.84	.32			
	4:Secondary school graduate	139	3.83	.30			
	5:High school graduate	165	3.83	.30			
	6:Graduate of an associate degree or higher	90	3.77	.29			
OPG	1:Illiterate	100	3.50	.45	.81	.54	-
	2:Literate (Not a school graduate)	46	3.44	.58			
	3:Primary school graduate	445	3.50	.48			
	4:Secondary school graduate	139	3.46	.44			
	5:High school graduate	165	3.45	.46			
	6:Graduate of an associate degree or higher	90	3.41	.52			
FGIG	1:Illiterate	100	4.32	.41	.49	.78	-
	2:Literate (Not a school graduate)	46	4.30	.36			
	3:Primary school graduate	445	4.30	.38			
	4:Secondary school graduate	139	4.30	.35			
	5:High school graduate	165	4.29	.36			
	6:Graduate of an associate degree or higher	90	4.24	.34			
NSG	1:Illiterate	100	3.27	.55	1.59	.16	-
	2:Literate (Not a school graduate)	46	3.04	.45			
	3:Primary school graduate	445	3.21	.52			
	4:Secondary school graduate	139	3.20	.56			
	5:High school graduate	165	3.23	.51			
	6:Graduate of an associate degree or higher	90	3.14	.55			

*p<,05; LLSS: Lifelong learning skills scale; CP: Communication and productivity; CIFL: communication in a foreign language; CL: cooperation and learning; SC: Self-confidence; GPS Game Perception Scale; OPG: originality and purpose of the game; FGIG: function of the game and interest/curiosity/exploration in the game; NSG; nature and source of the game

According to the Table 7, there is a significant difference between preservice teachers' maternal education level and both their lifelong learning skills and its communication and productivity, communication in a foreign language, cooperation and learning factors. Post-Hoc analysis techniques were used to examine between which groups this differentiation occurred and TUKEY HSD multiple comparison technique was used. Accordingly, it was observed that the preservice teachers with higher maternal education level had higher lifelong learning skills. In addition, it was observed that the preservice teachers with a high

level of maternal education also had significantly higher foreign language communication skills. Whether preservice teachers' lifelong learning skills and game perceptions differ according to the father's education level was examined with ANOVA test and the findings are given in Table 8.

Table 8. *ANOVA Results on the Differentiation of Preservice Teachers' Lifelong Learning Skills and Game Perceptions According to Father's Education Level*

	Paternal Education Level	N	$\bar{X}$	Ss	F	p	Difference
LLSS	1-2:Illiterate or literate (Not a school graduate)	32	3.81	.39	1.35	.25	-
	3:Primary school graduate	285	3.88	.36			
	4:Secondary school graduate	200	3.84	.34			
	5:High school graduate	255	3.91	.39			
	6:Graduate of an associate degree or higher	213	3.89	.36			
CP	1-2:Illiterate or literate (Not a school graduate)	32	4.04	.50	1.02	.39	-
	3:Primary school graduate	285	4.17	.42			
	4:Secondary school graduate	200	4.13	.40			
	5:High school graduate	255	4.17	.44			
	6:Graduate of an associate degree or higher	213	4.13	.42			
CIFL	1-2:Illiterate or literate (Not a school graduate)	32	2.79	1.13	3.24	.01*	3<6
	3:Primary school graduate	285	2.87	1.00			4<6
	4:Secondary school graduate	200	2.86	.93			
	5:High school graduate	255	3.06	1.04			
	6:Graduate of an associate degree or higher	213	3.12	1.00			
CL	1-2:Illiterate or literate (Not a school graduate)	32	4.33	.42	.44	.78	-
	3:Primary school graduate	285	4.32	.42			
	4:Secondary school graduate	200	4.28	.39			
	5:High school graduate	255	4.31	.40			
	6:Graduate of an associate degree or higher	213	4.29	.38			
SC	1-2:Illiterate or literate (Not a school graduate)	32	3.13	.76	.96	.43	-
	3:Primary school graduate	285	3.17	.71			
	4:Secondary school graduate	200	3.12	.61			
	5:High school graduate	255	3.24	.70			
	6:Graduate of an associate degree or higher	213	3.20	.68			
GPS	1-2:Illiterate or literate (Not a school graduate)	32	3.90	.39	.65	.63	-
	3:Primary school graduate	285	3.83	.31			
	4:Secondary school graduate	200	3.84	.33			
	5:High school graduate	255	3.82	.29			
	6:Graduate of an associate degree or higher	213	3.81	.30			
OPG	1-2:Illiterate or literate (Not a school graduate)	32	3.63	.49	1.78	.13	-
	3:Primary school graduate	285	3.45	.46			
	4:Secondary school graduate	200	3.53	.51			
	5:High school graduate	255	3.45	.47			
	6:Graduate of an associate degree or higher	213	3.45	.47			
FGIG	1-2:Illiterate or literate (Not a school graduate)	32	4.36	.44	.99	.41	-
	3:Primary school graduate	285	4.32	.38			
	4:Secondary school graduate	200	4.27	.38			
	5:High school graduate	255	4.30	.35			
	6:Graduate of an associate degree or higher	213	4.27	.36			
NSG	1-2:Illiterate or literate (Not a school graduate)	32	3.20	.67	0.277	0.893	-
	3:Primary school graduate	285	3.18	.52			
	4:Secondary school graduate	200	3.22	.53			
	5:High school graduate	255	3.20	.51			
	6:Graduate of an associate degree or higher	213	3.22	.53			

*p<,05; LLSS: Lifelong learning skills scale; CP: Communication and productivity; CIFL: communication in a foreign language; CL: cooperation and learning; SC: Self-confidence; GPS Game Perception Scale; OPG: originality and purpose of the game; FGIG: function of the game and interest/curiosity/exploration in the game; NSG; nature and source of the game

According to the Table 8, there is a significant difference between preservice teachers' father's education level and communication in a foreign language, cooperation and learning factors. Post-Hoc analysis techniques were used to examine between which groups this differentiation occurred and TUKEY HSD multiple comparison technique was used. Accordingly, it was observed that the preservice teachers with higher paternal education level had higher communication skills in foreign languages. Whether preservice teachers' lifelong learning skills and game perceptions differ according to the family income level was examined with ANOVA test and the findings are given in Table 9.

Table 9. *ANOVA Results on the Differentiation of Preservice Teachers' Lifelong Learning Skills and Game Perceptions According to Family Income Level*

	Income level (TL)	N	$\bar{X}$	Sd	F	p	Difference
LLSS	1:0-4000	385	3.87	.36	2.03	.09	-
	2:4001-7000	332	3.86	.37			
	3:7001-10000	145	3.94	.37			
	4:10001-13000	72	3.85	.34			
	5:13001 and higher	51	3.93	.41			
CP	1:0-4000	385	4.15	.43	1.32	.26	-
	2:4001-7000	332	4.12	.42			
	3:7001-10000	145	4.22	.40			
	4:10001-13000	72	4.16	.43			
	5:13001 and higher	51	4.15	.45			
CIFL	1:0-4000	385	2.93	.98	3.28	.01*	1<5
	2:4001-7000	332	2.99	1.03			4<5
	3:7001-10000	145	3.01	1.00			2<5
	4:10001-13000	72	2.72	1.01			
	5:13001 and higher	51	3.36	.96			
CL	1:0-4000	385	4.30	.41	1.35	.25	-
	2:4001-7000	332	4.29	.40			
	3:7001-10000	145	4.36	.39			
	4:10001-13000	72	4.30	.38			
	5:13001 and higher	51	4.23	.38			
SC	1:0-4000	385	3.15	.69	1.78	.13	-
	2:4001-7000	332	3.15	.67			
	3:7001-10000	145	3.29	.69			
	4:10001-13000	72	3.19	.67			
	5:13001 and higher	51	3.32	.66			
GPS	1:0-4000	385	3.87	.31	5.06	.00*	5<1
	2:4001-7000	332	3.82	.31			
	3:7001-10000	145	3.80	.31			
	4:10001-13000	72	3.81	.32			
	5:13001 and higher	51	3.69	.26			
OPG	1:0-4000	385	3.53	.48	4.90	.00*	3<1
	2:4001-7000	332	3.47	.46			5<1
	3:7001-10000	145	3.37	.50			5<4
	4:10001-13000	72	3.52	.50			3<4
	5:13001 and higher	51	3.30	.39			
FGIG	1 0-4000	385	4.33	.38	3.22	.01*	5<1
	2:4001-7000	332	4.26	.36			2<1
	3:7001-10000	145	4.32	.36			5<3
	4:10001-13000	72	4.25	.36			
	5:13001 and higher	51	4.19	.35			
NSG	1:0-4000	385	3.24	.52	2.66	0.03*	5<1
	2:4001-7000	332	3.21	.51			3<1
	3:7001-10000	145	3.13	.52			5<2
	4:10001-13000	72	3.17	.54			
	5:13001 and higher	51	3.03	.60			

*p<,05; LLSS: Lifelong learning skills scale; CP: Communication and productivity; CIFL: communication in a foreign language; CL: cooperation and learning; SC: Self-confidence; GPS Game Perception Scale; OPG: originality and purpose of the game; FGIG: function of the game and interest/curiosity/exploration in the game; NSG; nature and source of the game

According to the Table 9, there is a significant difference between preservice teachers' family income level and communication in a foreign language. Moreover, there is a significant difference between the family income level and game perception in terms of both the total score of the scale and its factors: "the originality and purpose of the game", "function of the game and interest/curiosity/exploration in the game", "nature and source of the game". Post-Hoc analysis techniques were used to examine between which groups this differentiation occurred and TUKEY HSD multiple comparison technique was used. Accordingly, it was determined that families with high income levels had higher communication skills in a foreign language. On the other hand, when the game perceptions of the preservice teachers were examined in terms of both the overall scale and its sub-dimensions, it was seen that these variables were higher in the preservice teachers with low income. In other words, preservice teachers with low income levels have higher game perceptions. The relationship between preservice teachers' lifelong learning skills and game perceptions was examined with the Pearson Correlation test and the findings are presented in Table 10.

Table 10. *The Relationship Between Preservice Teachers' Lifelong Learning Skills and Game Perceptions*

	LLSS	CP	CIFL	CL	SC	GPS	OPG	FGIG	NSG
LLSS	1	.860*	.546*	.775*	.476*	.281*	.082*	.391*	.037
CP		1	.289*	.684*	.213*	.347*	.147*	.423*	.087*
CIFL			1	.162*	-.024	.074*	.024	.061	.081*
CL				1	.231*	.415*	.207*	.475*	.116*
SC					1	-.137*	-.203*	.056	-.228*
GPS						1	.759*	.773*	.577*
OPG							1	.302*	.359*
FGIG								1	.126*
NSG									1

*p<,05; LLSS: Lifelong learning skills scale; CP: Communication and productivity; CIFL: communication in a foreign language; CL: cooperation and learning; SC: Self-confidence; GPS Game Perception Scale; OPG: originality and purpose of the game; FGIG: function of the game and interest/curiosity/exploration in the game; NSG; nature and source of the game

When Table 10 is examined, a positive weakly significant correlation was observed between preservice teachers' lifelong learning skills and game perceptions (r=,281). When the correlation between lifelong learning skills and sub-dimensions of the game perception was examined, it was seen that the highest correlation in the function of the game and interest/curiosity/exploration in the game sub-dimension (r=, 391). When the correlation between game perception and sub-dimensions of the lifelong learning skills was examined, it was seen that the highest correlation in the cooperation and learning sub-dimension (r=,415). When the correlation between sub-dimensions of the both game perception and lifelong learning skills was examined, it was seen that the highest correlation in the between "cooperation and learning" and "function of the game and interest/curiosity/exploration in the game" (r=,475).

CONCLUSION AND DISCUSSION

When the findings of the research were examined, no statistically significant difference was found between the lifelong learning skills and game perceptions of the preservice teachers and their gender. However, a significant difference was found in favor of female between the function of the game, the level of interest/curiosity/exploration in the game and their gender. In this context, it can be thought that female preservice teachers are willing and open to change, contrary to tradition. It seems that there are studies supporting this finding. Pilten and Pilten (2013) stated that especially female preservice teachers studying in later grades tend to play educational games. However, Bakar et a., (2008) observed that most of the preservice teachers who emphasized educational and personal development features were girls and that these preservice teachers generally used the game for learning purposes during the practices. From these results, it can be deduced that the game perceptions of female are based on learning. However, it is important for teachers to focus on individual differences, not gender, in order to understand their preservice teachers' learning styles. This will help teachers understand the individual differences of preservice teachers to enable them to best progress in the learning process.

In this study, it was observed that as the grade level increased, the lifelong learning skills of the preservice teachers increased and the lifelong learning skills of the 4th grade preservice teachers were at the highest level. In addition, it was determined that the communication and productivity skills of the preservice teachers studying in the 4th grade and their communication skills in a foreign language were higher than the other grade levels. Tunca, Alkın-Şahin, Aydın (2015) determined that second grade preservice teachers have higher average than fourth graders. It was concluded that the fourth-grade preservice teachers had a lower average than the other grade levels. The reason for this is that Public Personnel Selection Examination (KPSS) is the primary target of the 4th grade preservice teachers. In this context, preservice teachers aimed to find the right answer in a short time. Therefore, our study shows different results with the low level of lifelong learning skills of the 4th grade preservice teachers. According to Baykara Pehlivan's (2005) study, it was determined that there was a significant difference in favor of the 4th grades on the basis of preservice teachers' communication skill perception level averages. These results show that preservice teachers' lifelong learning skills can improve over time and increase as the education process progresses. At the same time, this may suggest that preservice teachers' lifelong learning skills may increase during the education process, starting from the preschool period. These results emphasize that teachers should monitor and support the development of their preservice teachers' lifelong learning skills. Thus, they can ensure that preservice teachers' progress in their learning processes in the best way possible. Therefore, teachers need to use various activities and materials to support and improve preservice teachers' foreign language learning

processes. This will help preservice teachers develop their communication skills in a foreign language and be able to compete in the global world.

It has been observed that as the frequency of reading books increases, the lifelong learning skills of the preservice teachers increase and the lifelong learning skills of the preservice teachers who almost always read books are at the highest level. It has been determined that the preservice teachers who almost never read books have higher perceptions of the originality and purpose of the game. When Arslan, Bıçakçıgil Özsoy and Aslan (2019) studies are examined, it is seen that preservice teachers' lifelong learning positively affects their attitudes towards reading habits. Ayra and Kösterelioğlu (2015) found in her study that there is a correlative relationship between teachers' lifelong learning tendencies and their frequency of reading books. Bulaç and Kurt (2019) stated in their study that the habit of reading books contributes to the personal and professional development of preservice teachers. Karaduman (2015) concluded that there is a significant difference between reading books and lifelong learning tendencies. Reading can help improve access to information, language skills, vocabulary, and cognitive functions. These are also important factors in the development of lifelong learning skills. In addition, there are not enough studies in the literature in the context of high game perceptions of the preservice teachers who do not read books. When the studies in the literature are examined, it can be said that the habit of reading books positively affects lifelong learning.

It has been observed that the lifelong learning skills of the preservice teachers with higher maternal education level are higher. In addition, it was observed that the preservice teachers with a high level of education in the mother and father also had significantly higher communication skills in a foreign language. These results show the effect of the family on the education of preservice teachers. The education level of the parents can affect the education level of the preservice teachers and increase their lifelong learning skills. In addition, it is important that parents support and set an example in matters such as learning a foreign language. Highly educated parents can provide their preservice teachers with opportunities to learn foreign languages and help them improve their communication skills in a foreign language. Mothers and fathers have a significant influence on children's attitudes towards foreign languages (Gardner, 1968). This view of Gardner also supports our study. These results also show that schools should care about the support and participation of preservice teachers' families. By involving parents in the education process, schools can help increase the education level of preservice teachers and improve their communication skills in foreign languages. It has been determined that families with high income levels have higher communication skills in foreign languages. On the other hand, it was seen that the game perceptions of the preservice teachers with low income level were higher. These results show that families and the environment can affect preservice teachers' language learning processes and game perceptions. In order to learn a foreign language, preservice teachers must have access to resources such as adequate materials, suitable environments and opportunities. Since families with higher incomes have more access to these resources, their children may also have higher communication skills in a foreign language. On the other hand, families may not be able to provide enough opportunities for their children when they have a low income level. This can increase productivity in children. The fact that low-income preservice teachers have higher game perceptions indicates that these preservice teachers are richer in terms of imagination and creativity. These results highlight the need for teachers to plan their education taking into account the different abilities and needs of preservice teachers. In addition, these results show that schools should help each student reach their full potential by providing equal opportunities to all preservice teachers.

A positive and significant relationship was observed between preservice teachers' lifelong learning skills and game perceptions. While learning skills include the ability to acquire, understand, remember, synthesize and apply knowledge, game perception refers to one's awareness of games, the ability to perceive the purpose and features of games. The fact that there is a positive relationship between these two concepts shows that the games have an effect on the learning process. Bardak (2018) stated that game is the first natural learning method used while meeting all of his physical and spiritual needs, except for sleep. Games can make learning more fun and enjoyable by improving people's learning skills. Thanks to the game, people can learn while having fun.

RECOMMENDATIONS

Based on the findings of the study, the following recommendations can be made:

• In order to use different techniques such as teaching with games in schools, it may be beneficial to give importance to practical courses as well as theoretical courses.

• Game materials that support teaching can be sent to schools by the Ministry of National Education

and preservice teachers and teachers can diversify the materials by taking examples from these materials.

• Academic studies on the role of games in teaching can be increased.

• Since there is a significant difference between the frequency of reading books and lifelong learning, it may be beneficial for teachers to direct preservice teachers to read more books.

• The educational needs of children can be supported by improving the financial means of families with low income.

• It would be beneficial to conduct similar studies with larger study groups to obtain better results.

Ethics Committee Approval Information

This study was approved for scientific research ethics in accordance with the Kırşehir Ahi Evran University Social Sciences and Humanities Publication Ethics Committee decision dated 21.04.2022 and numbered 2022/03/66.

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Opinions of Teachers' Conducting Science Courses Regarding Outdoor Education: A Phenomenological Study

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ABSTRACT

This study aims to determine the opinions of teachers who conduct science courses regarding out-of-school learning (OSL) environments. The participants who enrolled in this study were designed with a phenomenology research design, consisting of 33 teachers working in public schools in a district of Sakarya province. The interview form was developed by the researchers and used as a data collection tool. The data were analyzed through content analysis. According to the results, the subject area in which most OSL activities are carried out in science lessons is the content of "Living Beings and Life." According to the findings, the teachers emphasized informing the students about the content of science and learning outcomes and preparing a plan before the OSL activities were organized. Besides, they insisted on the importance of the teacher's role as a guide for the students during the implementation of the OSL activities and evaluating the students who made observations during the OSL at the end of the process. Regarding the challenges experienced in implementing OSL activities, issues such as paperwork and official transactions were mentioned during the planning of the activities. Besides, the problems encountered in classroom management, the difficulties experienced in virtual trips, and the disinterested attitudes of the individuals involved in the community awareness activities were also indicated.

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INTRODUCTION

Society predominantly considers schools as the primary learning spaces for scientific knowledge (Kisiel, 2003). However, it is crucial to recognize that learning extends far beyond the confines of the classroom, encompassing social and cultural contexts (Osborne & Dillon, 2007; Shaby et al., 2019; Tran, 2011). In order to better understand children's science learning, not only their learning that occurs in school but also their learning outside of school should be examined because there are many indications supporting the claim that learning takes place in an environment beyond the boundaries of the school (Shaby et al., 2019; Tran, 2011). OSL activities present new opportunities beyond the constraints of school bells and classroom hours, allowing students to engage with science in meaningful real-world contexts (Braund & Reiss, 2006). Rather than competing with or substituting classroom learning, OSL offers an integrative learning style that enriches education by providing a different dimension (Füz, 2018).

OSL activities can complement formal education content in schools by helping to create a more authentic science-making environment (Dairianathan & Subramaniam, 2011). It can stimulate curiosity, interest, motivation, and desire to learn, which are neglected in traditional school environments. It is argued that out-of-school learning is among students' and teachers' most rewarding pedagogical activities. This pedagogy is extremely important for teachers, as it helps students understand science in a fun, different, and more holistic way. It offers the opportunity to try new pedagogical methods and develop as a teacher (Rodehn, 2019). According to Vedder-Weiss & Fortus (2013), parents', peers', school, and teachers' perceptions of mastery emphasis are positively related to students' engagement in and out of school. Students are expected to find connections between out-of-school experiences and the science content taught in the classroom (Tran, 2011). However, it is stated that teachers are generally unaware of their roles, and their attitudes and opinions significantly affect the learning success of out-of-school learning experiences (Garner et al., 2015) For example, Henriksson (2018) found out that primary school teachers thought that OSL activities increase the children's interest but added that the scientific subject knowledge is limited, and teachers talked very little about the learning aims for teaching in out-of-school settings. The originality of this research lies in its focus on teachers' opinions, their role in facilitating OSL activities, and bridging out-of-school experiences with classroom content. By exploring these aspects, the study aims to contribute to understanding OSL implementation and its impact on students' learning experiences.

The research questions concern teachers who had OSL experience in their science courses. These are as follows:

1. In which grade level and subject area were the OSL activities implemented?

2. How did they plan the OSL activity process?

3. What indicators or assessment methods were used to evaluate the contribution of OSL activities to student learning?

4. What kind of problems did they encounter while performing OSL activities?

5. What are their reasons for implementing OSL activities?

LITERATURE REVIEW

Out-of-School Learning

The literature based on out-of-school learning demonstrates the value of out-of-school learning environments (Anderson et al., 2006; Anderson et al., 2000; Ramey-Gassert et al., 1994; Rennie & McClafferty, 1996). Out-of-school learning (OSL) is learning that progresses in a planned and adaptive way in institutions, organizations, and various real-world situations beyond the formal or nonformal education areas (Tamir, 1990) and shares the feature of mediating formal education (Eshach, 2007).

OSL is also defined as any class or student group activity organized by the school in a place outside the school and outside the school walls, in a natural or artificial environment during the school term (Füz, 2018). Places outside of the school to be learning environments can be considered OSL environments, such as; science and technology museums, zoos, botanic gardens, planetariums, industrial establishments, and national parks (Laçin-Şimşek, 2011), education tracks, agricultural facilities and factories (Füz, 2018). OSL environments offer a possible atmosphere where students can explore their ideas (Dairianathan & Subramaniam, 2011). In these environments, how science is conveyed and student experiences generally arouse excitement (Braund & Reiss, 2006). When students remember their experiences positively, they are likely to be open to further teaching in that field (Dairianathan & Subramaniam, 2011). For this reason, OSL environments propose precious opportunities. These environments create interest in the learner, a real connection with the thing studied, and long-term memory (Rodehn, 2019). Hence, the contribution of OSLs to permanent learning can be understood.

The diversity of experiences in OSL settings is more extensive than in traditional classroom instruction (Uitto et al., 2006). Out-of-school science learning experiences offer a unique learning opportunity for students of all ages (Tran, 2011). It increases students' interest in school lessons and provides better learning outcomes for visual and kinesthetic learners (Uitto et al., 2006). A growing number of studies reveal that OSL environments positively affect students' learning (Guardino et al., 2019). In order to improve students' science learning, the impact of their out-of-school experiences on their classroom learning should not be ignored.

Teachers' Roles in Out-of-School Learning

Teachers play the most crucial role in finding connections between students' out-of-school experiences and the science content taught in the classroom (Tran, 2011). By building the necessary bridges between students' knowledge and understanding, teachers can overcome challenges and take advantage of the opportunities inherent in OSL environments (Faria & Chagas, 2012). Despite the positive effects and contributions of out-of-school learning environments, some problems might occur in achieving learning goals (Griffin, 2004). For instance, for the field trips to reach their purpose, it is essential for the teachers to be aware of their duties and responsibilities and to perform the appropriate guidance process (Griffin & Symington, 1997). Teachers need to plan educational preparations, bureaucratic affairs, transportation, etc. The healthy execution of this process will be reflected in what teachers think about their out-of-school environments and how they perceive these environments.

Unfortunately, teachers' perceptions have rarely been the focus of research on the impact of out-of-school experiences aimed at supporting in-school learning (Luehmann & Markowitz, 2007). However, teachers' opinions on OSL experiences are essential to assess the potential impact (Guardino et al., 2019). Moreover, in the research conducted in our country on OSL environments, most of them are designed with the quantitative approach according to the type of method used (Saraç, 2017). In order to reduce this gap, this study was conducted with a qualitative method in order to obtain the opinions of teachers who play a leading role in the field and who teach science courses on the benefits of OSL environments that can be planned and managed by themselves as a part of science programs or as an extra-curricular activity (Braund & Reiss, 2006).

METHOD

Research Design

The current research was designed with the phenomenology method of the qualitative approaches. Phenomenology is a way of connecting science education theory and practice (Ostergaard et al., 2008). The use of this method aims to describe the phenomenon as accurately as possible, avoiding any pre-given framework but staying true to the facts (Groenewald, 2004). This study is aimed to determine the opinions of teachers who conduct science courses on using OSL environments.

Participant Selection Procedure

The research question guiding the study is about the usage of OSL environments. The most obvious element that comes to mind is to get the opinions of the teachers who apply to OSLs about the efficacy of OSL environments. Given that teachers are directly involved in the teaching process, they have a unique ability to observe and interpret the effects of instructional practices on student learning. The primary school teachers are included in the study because they conduct science lessons at the 3rd and 4th-grade levels. In this study, unlike the investigations in which teachers' opinions on using of OSL environments were taken, the study group was determined by focusing on the relevant discipline, not teachers' fields. Conducting science courses is the focus of identifying participants for this study. Teachers participated in the study based on volunteerism. The researchers prepared the questionnaire form. The most important feature of the questionnaire is that it includes questions that question the teachers' experience of OSL.

Participants

Within the scope of the research, 33 teachers working in a state schools affiliated with the Ministry of National Education in a district of Sakarya Province were reached. While determining the participants of the research, 70 teachers were reached, but teachers with experience in out-of-school learning environments that could be a part of the research problem constituted the research participants. Among the current research participants, science teachers (n=11) and primary school teachers (n= 22) could be included in the research problem and had experience in OSL environments. Science courses in the Turkish education system are carried out by primary school teachers at the 3rd and 4th-grade levels and science teachers at the 5th, 6th, 7th, and 8th-grade levels. Primary school teachers were included in the study because they conduct science courses at the 3rd and 4th-grade levels. It is essential to describe the participants in detail in the studies designed with the qualitative method. Characteristics of the participants are given in Table 1 below.

Table 1. *Characteristics of the participants*

		N
Field	Science	11
	Primary school	22
Gender	Female	16
	Male	17
Professional seniority	Less than 5 years	4
	6 to 10 years	8
	11 to 15 years	8
	More than 16 years	13
Educational Institution	Faculty of Education	31
	Faculty of Science	2
	Other	1
Educational level	Bachelor	31
	Masters	2
The prior learning experience according to fields	Science teachers	11
	Primary school teachers	22

Data Collection Tools and Procedure

The data in this study were obtained with a questionnaire developed by the researchers. The questionnaire consists of the "Personal Information Section," which consists of questions to determine some demographic characteristics of the participants, and the "Questions" sections, which include open-ended questions to determine their views on using OSL environments.Some sample questions in the form are as follows:

"What out-of-school learning means to you?

"What do you think are the out-of-school environments to be used in science lessons?"

"How can out-of-school learning environments contribute to the teaching of science lessons?"

Before the questionnaire form was developed, the relevant literature was examined, and a draft form was prepared. The draft form was presented to experts' opinions. The questionnaire was refined based on insights and suggestions provided by experts in the field of science education. One of the strengths of this form is that the open-ended questions, which could be completed in approximately 10 minutes, are detailed with probing questions.

What is essential in phenomenological research is how that person makes sense of this situation rather than how many people experience it. From this point of view, the importance of numerical data should be decided by the researcher himself (Ersoy, 2019; p.133). In the table given in the findings related to the first sub-problem, the percentage values for the grade level and subject areas are essential for analyzing the problem.

Data Analysis

In phenomenological research, data analysis is conducted to reveal experiences and meanings. For this purpose, in content analysis, data is conceptualized, and categories that can describe the phenomenon are discovered (Yıldırım & Şimşek, 2016; p.72). In this study, which employs descriptive and content analysis, codes and categories were obtained for each sub-problem framework. What remains unchanged in different experiences is the essence of that phenomenon (Mayring, 2000). Based on the view that the codes frequently expressed by the teachers and the categories created by the codes are the essence of the phenomenon of the study, the research is designed to infer the meaning and structure of the participants' experience of the relevant phenomenon. The coder reliability was ensured in data analysis. Compatibility between encoders was calculated as 89 %. The agreement between the coders is expected to be at least 80% (Patton, 2018).

Consistency

In qualitative research, validity refers to the researcher's control for the accuracy of the findings through specific processes. In contrast, reliability refers to the consistency of the researcher's approach from the point of view of different researchers (Creswell, 2017). In the data analysis process, attention was paid to adverse event analysis (Mroczkowski et al., 2021) to determine the reliability of the researcher's results. The findings present these examples in the presence of data that contradicts the emerging categories and codes. In qualitative research, the researcher may use different pseudonyms for individuals and places to protect the participants' identities (Creswell, 2017). In this study, the teachers who had the experience of OSL were referred to as T1, T2, T3, …, and T33.

FINDINGS

Findings related to the first sub-problem

The first sub-problem of the study was about which grade level and subject area the OSL activities were implemented by the teachers conducting science courses with OSL experience. Codes and categories were created in line with the answers given by the participants. The categories created are grouped under the units of "Earth and Universe," "Living Beings and Life," "Physical Events," and "Matter and its Nature" and are presented in Table 2.

Table 2. *Grade Levels and Subject Areas*

Grade Level	Category	Code	f	%
3rd grade	Physical Events	Let us recognize the force	3	11,42
		Electric vehicles	1	
	Living Beings and Life	A Journey to the World of the Living	4	11,42
	Earth and Universe	Getting to Know Our Planet	1	2,85
4th grade	Living Beings and Life	Human and Environment	11	34,28
		Food	1	
	Physical Events	Effects of the Force	4	11,42
5th grade	Living Beings and Life	Human and Environment	2	5,71
6th grade	Physical Events	Force and Motion	4	11,42
	Matter and its Nature	Matter and Heat	1	2,85
7th grade	Physical Events	Interaction of Light with Matter	2	5,71
	Matter and its Nature	Pure substances and mixtures	1	2,85

According to Table 2, OSL activities were carried out in the subject area of "Living beings and life" mainly at the 4th-grade and in primary school levels. At the middle school level, it is seen that the 8th-grade level of OSL activity is not applied, and the subject area of Physical Events comes to the fore. The subject area in which most OSL activities are carried out at all levels is the subject area of "Living Beings and Life."

Findings related to the second sub-problem

The second sub-problem of the study was about how they planned the OSL activity process. The codes and categories were created in line with the answers given by the participants. The categories created were gathered under the headings "Before, during, and after the OSL Activities" and presented in Table 3.

Table 3. *OSL activity process*

Categories	Code	f
Before OSL activities	Presentation	15
	Planning	10
	Getting official permissions	4
	Announcement	3
	Supplementing teaching materials	2
	Field trips	2
	Watching documentaries	1
	Drawing attention	1
During OSL activities	Observation	14
	Guidance	6
	Structured student engagement	5
	Making statements	5
	Drawing attention	5
	Demonstration	2
	Group activities	1
	Worksheet exercises	1
After OSL activities	Evaluation	23
	Questioning techniques	6
	Making products	5
	Long-lasting learning activities	2
	Implementations	2
	Making suggestions	1

According to Table 3, in the "Before OSL Activities" category, it is seen that the teachers focused on a theoretical presentation about the learning goals and planning before the OSL activities. T13 indicated that he informed students of the content concepts before the OSL activity within the scope of the "Explaining the differences between natural and artificial environment" learning outcome.

When the codes that make up the "During OSL activities" category are examined, it is seen that the students make observations during the implementation of the OSL activities. It was also emphasized that the teachers were the guide in that process. T6 stated, "We observed the living things around with the students." T26 added, "The position of the sun was observed in the morning, noon, and evening." They mentioned the importance of making observations during the activity. T18 stated that "It should be active with them without intervening too much depending on the event." He stated that the teacher undertakes the role of a guide and that structured student engagement should be provided.

When the codes consisting of the "After OSL Activities" category are examined, it is seen that the teachers emphasized that the process should be evaluated after the OSL activities. They underlined the importance of assessing the process. For example, T3 explained, "I learned about the efficiency of the process through evaluation activities." He also talked about the place and importance of post-event evaluation in the process.

Findings related to the third sub-problem

The third sub-problem of the research was about how teachers with experience in OSL evaluated the contribution of OSL activities. Codes and categories were created in line with the answers given by the participants. The categories created were grouped under the titles of Cognitive and Affective elements are presented in Table 4.

Table 4. *Contributions to OSL activities for students*

Categories	Code	f
Cognitive elements	Long-lasting learning	14
	Concretization	4
	Enjoyment of learning	3
	Observational skills	2
	Appealing to five senses	2
	Improving thinking skills	1
	Improving learning skills	1
Affective elements	Raising interest in the lesson	3
	Gaining environmental awareness	2

As can be seen in Table 4, the "cognitive elements" category is examined and teachers express the reflections of OSL activities on student learning. T5 stated, "This subject has become more concrete in the students' minds." In this statement, she pointed to permanent learning and concretization. When the codes that consist of the "Affective elements" category are examined, it is understood that participants also mentioned the affective contributions of students, such as interest and environmental awareness of the OSL activities. T6 indicated, "Students were more motivated to the lesson by doing activities." and T19 made statements as "I observed that they created environmental awareness."

Findings related to the fourth sub-problem

The fourth sub-problem of the study was what kind of challenges the teachers who conduct science lessons encountered while performing the OSL activities. Codes and categories were created in line with the answers given by the participants. The categories created are grouped under official procedure, classroom management, and other headings are presented in Table 5.

Table 5. *Challenges experienced in OSL activities*

Categories	Code	f
Official procedures	Parent permission form	3
	Transportation	3
	Paperwork	2
	Budget	2
	Timing	2
	Lack of interest from workplaces	1
Classroom management	Controlling students' behaviours	3
	Unadaptive students	3
	Ensuring safety	1
Other	Unreadable text at virtual tours	1
	Disinterested attitudes of the individuals	1

According to Table 5, the codes constituting the category of "Official Procedures" were analyzed; it is seen that teachers emphasize problems such as paperwork and official procedures during the planning phase of OSL activities. "The lack of interest from workplaces" code is among the exciting findings. T16 noted the neutral feedback received from the workplaces where the OSL activity was planned to be organized as a problem encountered in the process.

In the "Classroom Management" category, the teachers emphasized the problems encountered in implementing OSL activities related to classroom management outside the classroom. T5 said that "It becomes difficult to control students' behaviours that cause problems." Additionally, T14 expressed that "It can be difficult to control in crowded classes."

When the codes that make up the "other" category were examined, it was found that the problems experienced in the virtual trips that had never been mentioned in the "official procedure" and "classroom management" categories were mentioned. For example, the unreadable text of exhibition pictures in virtual tours. In addition, the indifferent attitudes of the individuals who are parties in the community awareness studies have been mentioned. T1 said that "Harmful habits would not have quite struck the people around us."

Findings related to the fifth sub-problem

The fifth sub-problem of the study was to determine why teachers who teach science courses and have experience in OSL want to pursue these activities. Codes and categories were created based on the answers given by the participants. The category was grouped under the "Contributions to the learning process" and is presented in Table 6.

Table 6. *The reasons for pursuing OSL activities*

Categories	Code	f
Contributions to the learning process	Enjoyment of learning	4
	Long lasting learning	3
	Learning by doing	1
	Concretization	1
	Reinforcement	1
	Associating with daily life	1
	Increasing joining the lessons	1

Table 6 shows the codes forming the "Contributions to the Learning Process" category. It is seen that the reasons why teachers want to pursue the activities are centered on their contributions to the learning process. It was observed that teachers stated that OSL activities contributed to students in many ways. In particular, it was determined that they emphasized the enjoyment of learning and providing long-lasting learning.

DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS

Among the results obtained in light of the first sub-problem, it was found that at the primary school level, most of the OSL activities were carried out in the subject area of "Living Beings and Life" at the 4th-grade level. In contrast, the subject area of “Physical Events” came to the fore at the middle school level, and no OSL activities were used at the 8th-grade level. Among the significant results, the subject area in which the highest number of OSL activities were carried out at all levels was the subject area of "Living Beings and Life". The primary school teacher is the person who makes the critical decision about whether or not to involve students in a particular OSL experience (Luehmann & Markowitz, 2007). It is precious for primary school teachers to engage in OSL activities within the scope of science courses. In this study, it was observed that primary school teachers included OSL activities in their science lessons.

It was seen that teachers focused on theoretical information and planning for the science acquisition learning goals before OSL activities among the results obtained in light of the second sub-problem. During the implementation of the OSL activities, it was determined that the students made observations, and the teachers acted as guide positions. It is seen that teachers emphasized that the process should be evaluated after the OSL activities as they thought that an evaluation after the completion of the process would give better and more comprehensive ideas. Planning an activity in an OSL environment is a challenging task. There are many logistical variables to consider before, during, and after the trip (Kisiel, 2003). A preparatory learning phase at school is necessary to enhance effective learning during an OSL experience (Garner et al., 2015). Science teachers are expected to be willing to explore and utilize these new experiences to guide their students to develop their understanding of science by visiting OSL environments and then through appropriate post-visit activities. The reality is that teachers need to implement specifically designed post-visit activities (Anderson et al., 2000). Once the OSL activities are completed, the content and topics covered should be revisited at school (Garner et al., 2015). In most cases, evaluation is not done through formal grades but through mutual feedback by the participants of the group and their teachers (Fallik et al., 2013).

The results from the third problem showed that the teachers mentioned the contributions of OSL activities to students in cognitive and affective areas. In the cognitive sense, teachers emphasized the reflections of OSL activities on student learning, such as long-lasting learning, concretization and enjoyment of learning. They also mentioned the affective contributions of OSL activities on students, such as interest and sensitivity to the environment. According to the teachers' views, OSL is based on students being active in the learning process and using all their senses (Tuuling et al., 2018). Learning by doing and experiencing and appealing to the five senses are among the codes created in this study.

According to the results obtained in the fourth sub-problem are the challenges encountered by teachers during the planning phase of OSL activities, such as paperwork and official procedures, difficulties encountered in classroom management outside the classroom, problems experienced in virtual excursions, and the unwillingness attitudes of individuals involved in the community. Teachers' concerns about their ability to manage or control student behavior, especially in learning environments outside the classroom, and their inability to maintain control are frequently expressed by teachers (Dillon et al., 2006).Furthermore, Anderson et al. (2006) revealed that the difficulties teachers experienced in organizing OSL activities were related to cost, time, and the program of the out-of-school learning environment itself.

The findings obtained from the fifth and last sub-problem showed that the reasons why teachers would like to pursue the OSL activities were categorized under the category of "contributions to the learning process." Long-lasting learning, concretization, and enjoyment of learning were among the most frequently mentioned codes by teachers. Tran's (2011) study provides strong evidence to support

that students' engagement with out-of-school experiences can lead to positive learning outcomes. An enjoyable visiting experience will predispose students to further cognitive learning (Dairianathan & Subramaniam, 2011).

Consequently, the participants mainly addressed the cognitive aspects of the contributions of OSL activities to students as the reasons for pursuing OSL activities. It was observed that they did not mention the social, personal, and psychomotor benefits of OSL activities. The results in this direction are also striking in the literature. In the Tuuling et al. (2018) study, only a few teachers mentioned the role of OSL learning in supporting children's social and personal development. However, negative situational analysis requires presenting the findings of studies that contradict the study's results. There are also studies in the literature that contradict this finding. In the study by Guardino et al. (2019), most participants stated that OSL helped students' cognitive and social development and increased their awareness of environmental problems. Among the results of this study, a few of the teachers also indicated acquiring environmental awareness. Nevertheless, it was seen that teachers develop cognitive understanding while addressing the contributions of OSL activities to students; they still need to address social and personal aspects. However, OSL experiences provide opportunities to actively support the affective dimension of classroom learning rather than the cognitive aspects of science alone (Mayoha & Knuttona, 1997).

Raising awareness of OSL can arouse teachers' desire to plan OSL activities. It is recommended that courses on OSL should be included in the education of pre-service teachers. These courses should be directed toward the development of projects. In this study, teachers pointed out the cognitive contributions of OSL to students. In future research, in-depth studies can be conducted on why and which dimensions teachers focus on the contributions of OSL. Qualitative studies produce analytical generalizations by their nature. The results obtained in this study can be generalized analytically. In this respect, mixed-method design studies will add depth to the studies on OSL. Data collected from different provinces and districts will provide a broader perspective.

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Exploring Early Childhood Teachers' Beliefs and Practice on Sexual Education

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ABSTRACT

It is known how important sexual education is in the preschool period. Teachers play a key role in this process. Therefore, the aim of this study is to examine the views and practices of pre-school teachers about sexual education. The participants of the study, which was designed as a qualitative case study, consisted of 8 female preschool teachers working with pre-school children for 36-72 months. Observation and interview techniques were used to collect data. The data obtained were analyzed in depth with descriptive analysis and evaluated under 7 themes. As a result of the research, it was determined that preschool teachers were partially sufficient in terms of their knowledge about sexual education, the aims of sexual education, and the skills aimed to be gained. It was determined that they applied sexual education in daily life skills rather than the scope of the course. However, it was determined that the teachers of the 3-year-old group had little knowledge about sexual education. In line with these results, suggestions were made that pre-school teachers and our country's parents should be trained in childhood sexual education and that sexual education teacher activity booklets should be created to include more activities related to sexual education.

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INTRODUCTION

Early childhood is the period when the child's interest in sexual matters is intense. This curiosity manifests itself (Deniz & Gözütok, 2017). The child's curiosity about sexual matters is appropriate and natural, like many other topics s/he is curious about (Yavuzer, 2007). Children's questions should be answered convincingly and should not be silenced, otherwise the sense of curiosity will intensify (Deniz & Gözütok, 2017). Especially when children start going to preschools, they would have sources of information about sexuality and they ask many questions about the words that seem taboo (Pandia et al., 2016).

Children's questions about sexual issues may recall the concept of sexual education. Sexual education covers the subjects of interpersonal relations, sexual roles, love, privacy, and reproductive health (Elikucuk & Sonmez, 2011). It aims to help people to understand and develop a positive personality concept and gain a respectful perspective on human sexuality (San Bayhan & Artan, 2004). While giving sexual education, children's age and readiness based on their developmental process should be taken into consideration (Yavuzer, 2007).

Sexuality is a sensitive issue that concerns every individual, has great effects on people in terms of both physical and mental health, can cause social problems that are difficult to solve, and is one of the most fundamental facts of our health (Poroy, 2005). Sexual development emerges as an important discipline in the education of preschool children as a part of social, mental, and emotional development. Sexual development is a lifelong process that occurs with the determination of the baby's gender in the mother's womb (Beyazıt & Ayhan, 2018). In Freud's theory, one of the psychoanalytic development theorists, he mentioned that sexual-based experiences in early childhood affect adult personality. Stating that there are psychosexual dynamics in the development of the individual, he divided the development into periods (Beyazıt & Ayhan, 2018). The preschool period is called the phallic period in Freud's psychoanalytic theory of development. In the phallic period, 'the child's interest and sense of pleasure are directed towards the genitals. Also, the boy is interested in the mother, the girl in the father, and has a sense of competition against the same-sex parent (Haktanır, 2005).

Erikson describes each age as an emotional struggle between a bipolar internal state, one positive and one negative in his theory (Trawick-Smith, 2014). He also states that gender was discovered during this period and that the sense of curiosity was intense. Therefore, children's intense questions about sexuality should be answered by parents and early childhood teachers with sufficient and correct information.

When learning theories are examined, it is seen that the acquisition of gender roles is generally mentioned in this period. For example, according to the operant conditioning theory, sexual role acquisition is gained through reinforcements such as rewards and punishments, the child is rewarded when he shows gender-based behaviors and is not approved when he does not. In social learning theory, it is stated that the child learns through imitation. A girl learns the roles of behavior by observing her mother, a boy by observing his father (Saranlı, 2014).

Cognitive development theory, on the other hand, refers to the concept of gender constancy. In the preschool years, the child gains a full understanding of biological sex, including the awareness that gender remains the same over time, even though hairstyles, clothes and play activities change (Berk, 2018). He then uses this information to guide his behavior (Berk, 2018).

When the studies conducted in Türkiye on the sexual development and education of the child in the pre-school period are examined, it is found that the child starts to ask questions about sexual issues at the age of three. Tuzcuoğlu and Tuzcuoğlu (1996) attribute this to the fact that the three-year-old child is mostly speaking. This period, when children begin to realize their gender, is the period when they begin to ask questions about the child's genitals.

When the studies on sexual education are examined, it is seen that pre-school teachers do not know the concept of sexual education, or they define it incorrectly. In the study conducted by Tuğrul and Artan (2001) in which they examined the opinions of preschool teachers about sexual education of children, 395 of 665 preschool teachers answered, "I don't know", 223 of them said "sexual intercourse" and 47 of them stated "knowing one's own body" to the question of what sexual education is. In Ceylan and Çetin's (2015) study, pre-school teachers mostly defined sexual education as gender differences, recognizing the body, being able to answer the questions that the child was interested in, made statements about reproduction, gaining a sexual identity, protection from sexual abuse, sexuality and choosing a toy.

Child's sexual education and development, perceptions of sexual issues have not been sufficiently emphasized and clarified in our country (Ceylan & Çetin, 2015). When we look at the studies, it has been determined that the knowledge and attitudes of teachers who have an explanatory and supportive attitude about sexual education have changed and increased positively (Adogu & Nwafulume, 2015; Martin et al., 2020). When the studies are examined, it is seen that majority studies on sexual education in early childhood are about parents (Eliküçük & Sönmez, 2011; Tuğrul & Artan, 2001). However, there are not sufficient studies conducted with teachers and teacher candidates about children's sexual education.

Therefore, considering that sexual education is affected by the knowledge and approach of the teacher, the purpose of this study is to explore early childhood teachers' knowledge and practices on sexual education and seeking to answer the following questions:

1- What early childhood teachers know about sexual education?

2- How do early childhood teachers integrate sexual education into their teaching practice?

METHOD

Research Design

This study was designed as qualitative research, which was conducted to learn early childhood teachers' knowledge about sexual education and how they integrate their knowledge into their teaching practices. The purpose of the research is taken into consideration because the qualitative research model presents perceptions and events in a realistic and holistic way in the natural environment (Patton, 1990). By examining how people interpret their experiences and the environment around them, qualitative research enables the researcher to comprehend the meaning that people have created. This study was created as qualitative research since it aims to examine teachers' knowledge and practice about sexual education.

Participants and Research Context

For this study, eight female early childhood teachers were selected in Denizli which is stated on the southwestern part of Türkiye. According to Merriam (2009), a qualitative study's participant selection could be based on either probability or nonprobability sampling. In contrast to these sample techniques, probability sampling allows the researcher to generalize the findings. Purposeful sampling is predicated on the idea that the researcher wants to learn, comprehend, and acquire insight, hence they must choose a sample from which the most may be inferred (Merriam, 2009). Therefore, the features of the participants were limited. The requirements of the participants in this study were:

- working at the same kindergarten to prevent a variety of school atmospheres.
- teaching 36-72 months-old children to prevent effects caused by age differences.
- all females to prevent gender effects on sexual education.
- supposed to have a bachelor's degree to prevent educational differences.

Table 1. *Demographic Information of the participants*

Teacher 1	• has been working as a preschool teacher for five years. • has been working at this school for two years. • was 27 years old and single.
Teacher 2	• has been working as a preschool teacher for four years. • has been working at this school for three years. • was 29 years old and married.
Teacher 3	• has been working as a preschool teacher for five years. • has been working at this school for three years. • was 28 years old and single.
Teacher 4	• has been working as a preschool teacher for eight years. • has been working at this school for six years. • was 30 years old, married with children.
Teacher 5	• has been working as a preschool teacher for eight years. • has been working at this school for three years. • was 35 years old, married with children.
Teacher 6	• has been working as a preschool teacher for three years. • has been working at this school for three years. • was 27 years old, and single.
Teacher 7	• has been working as a preschool teacher for five years. • has been working at this school for three years. • was 30 years old and married.
Teacher 8	• has been working as a preschool teacher for one year. • has been working at this school for one years. • was 30 years old and married.

Research Instruments and Processes

Observation and interview were used to collect data in this study. Interview, which is used as a research method, is a form of systematic verbal communication between the researcher and the researched person (Cohen & Manion, 1994). The researchers aimed to explain the feelings and thoughts of the interviewee by asking questions to the other party in line with the questions he has prepared beforehand about the work he is doing. The questions prepared by the researchers were finalized by taking the opinions of 2 experts in the field. For this purpose, semi-structured interviews lasting 40-45 minutes were conducted with preschool teachers in a quiet and appropriate environment. In addition, to deepen the answers of the participants, they will be asked to give examples during the interviews or by asking additional questions such as why and how, the answers of the participants were enriched. The interview data were recorded on audio cassettes and videos and then converted into written format.

Data Analysis

Descriptive analysis was used in the analysis of the data. Descriptive analysis method is used in studies where the conceptual and theoretical structure of the research is clearly determined beforehand. In this analysis, the data is organized and interpreted according to pre-arranged codes and themes (Yıldırım & Şimşek, 2008). This research was carried out by making use of the descriptive analysis of qualitative data.

The interview data will be recorded on audio tapes and then converted into written format. The interviews with the teachers were converted into written format, descriptive analyzes were made with the data obtained, and their opinions and practices were determined.

In the interviews examined within the scope of the study, the general opinions of the preschool teachers about sexual education were determined. Codes were created in line with the interviews, and themes were determined by evaluating the codes.

The concept of sexual education was examined under 7 themes, namely, sexual education information, family attitudes in sex education, behaviors encountered in sexual education, reactions to behaviors, sexual education practices, and teacher competencies. Table 1 includes categories and subcategories.

Table 2. *Themes and Codes*

Theme	Codes
Sexual Education Concept	• Those who define it as body awareness. • Being aware of your body • Recognition of the body • Recognition of private zones • Knowing bodily limits • Those who define it as sexual information. ●Knowledge about sexuality ●Learning information about people's sexuality ●Those who define it as gender discrimination
Sexual Education Information	● Information about sexual education ●Knowledge about the aims of sexual education ● Information about the skills targeted in sexual education
Family Attitudes in Sexual Education	●How family attitudes are ●How family attitudes should be
Behaviors Encountered in Sexual Education	● Sexual questions encountered ● Encountered sexually explicit behaviors
Reactions to Sexual Behaviors	●Answers to sexual questions ●Reactions to sexual behavior
Sexual Education Applications	●In-class applications (activities) ●Daily practices (routine)
Teacher Competencies	●Teachers' Knowledge ● Teachers' Experiences

Validity and Reliability

Yıldırım and Şimşek (2008) recommended taking expert opinion to ensure reliability in qualitative research. In this study, to ensure reliability, the three researchers who conducted the research received two different expert opinions, who were not involved in the study, after preparing the interview questions. Creswell (2013) stated participant confirmation would be useful to increase internal validity. For this reason, after the data was transcribed, participants received the transcripts and were asked if they want to add or remove any information they gave. After that, the necessary changes

were done based on their responses. To increase external validity, purposive sampling method was used as suggested by Guba and Lincoln (1982) and inclusion/exclusion criteria were included.

Ethic

All the rules stated in the "Higher Education Institutions Scientific Research and Publication Ethics Directive" were complied with in the whole process from the planning of this research to its implementation, from data collection to data analysis. None of the actions specified under the title of "Actions Contrary to Scientific Research and Publication Ethics", which is the second part of the directive, were not carried out. Scientific, ethical and citation rules were followed in the writing process of this study; No falsification was made on the collected data and this study was not sent to any other academic publication medium for evaluation. To conduct this study, ethical permission was obtained from Non-interventional Clinical Research Ethics Committee at the Burdur Mehmet Akif Ersoy University with the number 2022/996.

FINDINGS

Considering that there is an in-depth description in qualitative research (Bengtsson, 2016; Seidman, 2006), the characteristics of the teachers participating in the study are explained as follows in line with the codes given to the teachers. Below, the findings obtained during the research process are presented in the form of the answers and opinions of 8 teachers by coding the names of the teachers in line with the themes of the research.

The Term of Sexual Education

It was observed that teachers defined sexual education as body awareness. They reported that the individual should know his body and be aware of his private parts.

“I can say that sexual education is the child's self-knowledge, knowing his body, knowing his differences physically, and knowing his bodily limits” (Teacher-3).

In addition to these, it has been determined that they consider knowing about sexuality and giving information about this subject in the concept of sexual education.

“Sex education is learning information about people's sexuality” (Teacher-1).

“It is giving information about sexuality” (Teacher-4).

It was determined that the concept of sexual education was defined differently by the teachers according to their experience and the age group they actively teach. It was observed that the teachers of the three-years-old group expressed sexual education as only knowing the gender difference of the child.

“To be able to distinguish between sexes, what it means to be a girl, to be a boy, is to be able to distinguish this. That's all we know in this age group” (Teacher-8).

Sexual Education Information

The answers given by the teachers show that they have a general knowledge about sexual education.

“Sex education covers the person's emotional relationships, responsibilities, self-understanding, general information about sexual life” (Teacher-1).

Looking at the knowledge of the teachers about sexual education, they reported that the aim was to make the child aware of his body, that others should not touch our bodies unintentionally, and to provide information about sexuality. In this context, they stated that the correct information can be given to the child by the teachers.

"The child is curious about a subject, but when he learns about it from his family or teachers, he becomes healthier. If he tries to learn from somewhere else, that child may learn wrong things" (Teacher-1).

Considering the skills that should be gained in sexual education, it has been determined that there are views on the protection of private parts of the child, such as ensuring that the child can dress himself, going to the toilet alone, and keeping children away from inappropriate behaviors.

"They should learn to be careful while dressing, they should learn that no one should touch their private parts" (Teacher-3).

The observations made and the answers given by the teachers agree. Girls and boys are dressed individually in separate places. Again, when one of the children touches the other's private area, my teacher can express himself as X touched my private area.

However, they stated that children's ability to express themselves is the most important skill to be acquired.

"I think it is most important for children to be able to explain this situation when they encounter a situation" (Teacher-6).

"They should be able to express this situation when others do not want it, they already learn, when their private parts are touched, they come and tell me immediately. This is very important for me" (Teacher-6).

In line with the answers given, it has been observed that the aims and skills that the younger age group teachers should gain are limited to the gender of the child.

"Girls and boys need to learn their gender and act accordingly" (Teacher-8).

It is necessary to give information to the child within the scope of sexual education: "When they reach the age of six, children realize their differences. There are children who do not know this, so children should be educated. We should train him so that he can recognize when there are different kinds of approaches and touches outside. Teacher-3 said, "But they stated that more of this information caused different stimuli in the child".

"They should know the points that should not be touched, but they should not know those words and sexual expressions that they have never used before. Or they should not yet know that kissing involves different feelings. I think this scope should be separated" (Teacher-7).

Family Attitudes in Sex Education

In line with the discourses given, it was seen that teachers gave answers as to how family attitudes towards sexual education are and how they should be. They reported that their current parents are open-minded about sexual education and support their children and themselves in this regard.

"As our parents, they are very open-minded and learn new things with their children" (Teacher-6).

Again, they said that the parents in their own schools could have a positive attitude towards the education that could be given on sexual education.

"The families realize this with the trainings given. We are getting more positive feedback. They say that my child is aware of everything, and they are satisfied with these" (Teacher-3).

On the other hand, they stated that the families in our society are closed to sexual education and remain unconscious due to utterances such as shame and sin.

"Families do not feel the need to explain the shameful thing under the assumption that their

children are small, that they cannot understand this situation, they gloss over it, they cover it up" (Teacher-2).

It has been determined that they think that this situation should be differentiated and that it is important to educate them in their families.

"Most families in our society do not know, for example, children can masturbate. They don't know this. Parents need to be educated on this issue before the child is born. Because if the family is not educated, the education of the child does not mean much" (Teacher-1).

"But they should totally talk to their children and inform them about this issue. It is important that they do this, especially when the child starts school" (Teacher-6).

However, in the answers given, it was stated that family attitudes in sexual education differ from culture to culture.

"I come from Izmir. While the children here (Denizli) react by saying 'ah', how would it be, even if they kiss on the cheek, it is considered normal for children to date in primary school in İzmir" (Teacher-5).

Behaviors Encountered in Sexual Education

It was determined that the most common sexual behavior teachers encountered was masturbation or touching their private parts, and this was more common in boys. It was determined that this behavior attracted attention by other children.

"It may be that they are playing with their private parts, I see this behavior especially in boys" (Teacher-7).

"Other friends ask questions such as, 'Why does my teacher always touch his private parts?'" (Teacher-4).

In the questions asked, whether the teachers were also mothers or not, showed differentiation in the answers given. Although the teachers do not encounter many questions, it is seen that the participant, who is both a mother and a teacher, who has a child attending pre-school, faced more questions.

"Why isn't yours swollen when you take a shower (showing your private area) or why does your mom have big breasts and why doesn't dad have too? These inquiries happen" (Teacher-5).

In addition, they stated that they were showing their private parts to each other and looking at each other's private parts.

"The sexual behavior I encounter very often is looking at each other's private parts. Come on, open it too. I was witnessing their laughter saying show us. This was very funny to the kids. For them, it's like a forbidden game that should be laughed at" (Teacher-4).

Reactions to Sexual Behaviors

It was determined that the teachers first tried to find the cause of the sexual behaviors seen in children and followed how long they had been doing.

"First of all, we examine, how often he does it, when he does it, how he does it when he feels himself, we try to see it first" (Teacher-7).

They stated that after finding the reason for the sexual behavior, they tried to attract the attention of the child in different directions in the classroom environment.

"These situations are usually made in places that are not visible to the naked eye. Calling the child slowly, it's very hot, isn't it? By saying that because the child was sweating at that time, it was too

hot, saying that it would be better if we changed our clothes, I try to change the atmosphere by washing the child's hands and changing his clothes, and if we are in a classroom environment, I try to cool the class a little bit" (Teacher-5).

"I'm not saying get your hand out of there, I'm drawing his attention in another direction" (Teacher-3).

It has been observed that the child learns by experiencing that distracting the attention of the child has a greater effect than other stimuli.

I could be shocked at first, and that's why I was giving big reactions, but that was wrong. Then it attracts more children's attention. The child is paying attention to what I'm doing. Instead, I learned that it is necessary to divert the child's attention and find out what is causing it (Teacher-2).

Sexual Education Practices

They stated that activities related to sexual education should be given considering the age and development of children.

"Because children's curiosity increases at this age, it should be given in a language they can understand" (Teacher-2).

It was determined that special regions were explained to children within the scope of the guidance lesson at the school and activities related to this were carried out. In addition, it was determined that activities such as storytelling and drama were included.

"I am reading stories. Especially for those who have a new sibling or whose mother is pregnant, there are many questions about how I was born. for him" (Teacher-1).

They stated that together with the narration and activities, children learn by taking role models, imitating, and experiencing, so sexual education is a part of life.

"When the child enters the room, parents should enter by knocking on the door. While getting dressed, the child should be aware that no one should be with him" (Teacher-3).

"I make sure that children dress in different places while dressing" (Teacher-3).

"We also have older sisters who are housekeepers at the school, but they allow the child to go to the toilet by himself or herself. I can't touch it, it's your private area" (Teacher-4). In the observations made, it was observed that the children entered different toilets without anyone's instructions, and that the children's friends who accidentally entered another toilet were warned that it is not the girls'/boys' toilet.

Teacher Competencies

They reported that the knowledge of teachers about sexual education was limited to what they learned at the undergraduate level and that they did not have enough information on this subject. They said that sexual education was not on the agenda so much in their time, therefore, they should be more conscious about this topic while teaching.

"This is not something that has been around since I was a child, this is sexual education, I would be more conscious" (Teacher-2).

Teachers said that the importance of sexual education is increasing day by day and that children can now access more and faster information. It has been determined that teacher competencies will increase by recommending books, giving seminars for teachers, and sharing information with other teachers.

DISCUSSION, CONCLUSION, RECOMMENDATIONS

In this study, in which the views and practices of pre-school teachers about sexual education were examined by using in-depth interview technique, preschool teachers were asked what the definition of sexual education meant to them. All the participants defined sexual education as 'the child's knowing his body' and 'having knowledge about sexuality'. In Balter et al.'s (2016) study, early childhood teachers also determined sexual education as 'knowledge about self'. Kardeş and Kahraman (2018) found out early childhood teachers are wise about sexual education. Gökdeniz (2008) stressed teachers know what they supposed about sexual education, and they are eager to talk about with their students.

All participants stated that masturbation is the most common behavior related to sexuality in early childhood settings. Artan's (2001) research included sexual questions, sexual games, and masturbation in parallel with the study of common behaviors in sexual development. Similarly, Balter et al. (2016) concluded their study while saying the most sexual behavior exhibited by preschool children is masturbation. It has been determined that preschool teachers use solutions to these behaviors, such as attracting the attention of the child, learning the causes of the behavior, and producing solutions accordingly. Furthermore, Counterman and Kirkwood (2013) asked early childhood teachers to answer 15-question survey, which includes a question as 'I believe masturbation is normal in young children'. 10 out of 15 teachers were agree with this idea while four of them disagree and one of them was not sure. All of these articles supported the result saying masturbation is the most common behavior and teachers are aware of them. Finally, Bulut (1998) stated that masturbation in early ages are often seen and parents should not be worried about it.

As a result of this research, it was determined that the teachers used story-reading and drama methods in the activity dimension in sexual education practices. Along with the activity, it was determined that she mostly included sexual education practices in daily life. Also, children have sexual education in their daily life skills because they learn by doing and experiencing. Other than that, Acar and Temizyürek (2014) stressed that children should be careful about what they watch since they spend much time while watching screen and they could learn harmful contents about sexuality via cartoons.

When the attitudes of their families towards sexual education were examined in line with the opinions of the teachers, they reported that their parents exhibited open-minded and positive attitudes, but when they evaluated the families in our country, sexual education was seen as an issue that should not be talked about. Parental education about sexuality is crucial, and parents are the main source of information for children, as noted by Sieswerda and Blekkenhorst (2006). Parents must also have an open mind regarding these matters and teach their children sexual education. According to Bulut Beduk (2016), the fact that families confuse sexual education with adult sexuality and that sexual education is evaluated with the concept of shame within the cultural structure explains this situation. Prior research indicates that a mother's understanding of sexual education may be influenced by her cultural, educational, and socioeconomic background (Visi, 2014). On the other hand, in the preschool period, children are very curious about their own and others' bodies (Deniz, 2012), and ignoring, shaming, or silencing children's curiosity about this issue causes children to have negative feelings, to fear about this issue, and to feel their curiosity about the wrong person. It has also been determined that families should be made aware of this issue, and they should guide their children in a healthy way, since they can learn through roads (San Bayhan & Artan, 2004). Finally, according to the results of the study conducted by İşler and Gürşimşek in 2018, it is seen that parents need education on sexual development and sexual education of children.

The last but not least finding in this study is teacher competencies. Teachers mentioned that they were not prepared to teach sexual education, which was not on the agenda during their undergraduate education. They said they should be more careful while teaching. Eventhough there is a misconception, which is giving sexual education in early ages is very early, it is crucial and appropriate for a child's age level must be provided as early as feasible (Pandia et al., 2016). Also, Martin et al., (2020) claimed consistent with other research, the findings showed that the educational intervention enhanced teachers'

understanding. Therefore, they emphasized the necessity of providing educational programs, seminars, and courses.

In summary, it has been determined that the preschool teachers within the scope of the research are partially sufficient in terms of their knowledge about sexual education, the aims of sexual education, and the skills aimed to be gained. It was determined that they applied sexual education in daily life skills rather than the scope of the course. However, it was determined that the teachers of the 3-year-old group had little knowledge about sexual education. This situation reveals that children's sexual curiosity begins around the age of five or six, and because of the questions they ask and the differentiation of their behaviors, teachers make more efforts to improve themselves and increase their knowledge. Çalışandemir et al., (2010) suggested that a definition about sexual education should be determined for children in our country first. Then, the aims of sexual education should be created and taught. Finally, there must be an assesment tool to measure if children can learn the aims of sexual education to ensure sexual education in early childhood period in Türkiye.

Based on the research results, it is recommended to prepare pre-service early childhood teachers to teach sexual education and give periodic seminars on sexual education to in-service early childhood teachers. Training programs on this subject can be prepared and their effectiveness can be examined to ensure what they learn and what they do about sexual education. In addition, sexual education teacher activity booklets can be created to include more activities related to sexual education. It would be useful for future research to examine the effect of teachers' competence with a larger group in sexual education practices in detail. Finally, parents should be taught about sexual education by teachers. Since when parents are not knowledgeable about sexual education they may not behave appropriately to their children. This could cause various problems in their children's life.

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Examining the Effect of The Psychoeducation Program for Mothers of Preschoolers on Self-Efficacy Perception of Mothers and Communication with Their Children[1][2]

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ABSTRACT

The aim of the study is to examine the effect of a psychoeducation program for mothers of preschoolers on mothers' perceptions of self-efficacy and communication with their children. The study group was created by mothers who have children ages 4 to 6 in Selçuklu district of Konya province. Pretest-posttest, control group semi-experimental pattern was used. A needs analysis form was applied to determine the mothers who would participate in the study. As a result of the needs analysis, 20 volunteer mothers who needed an educational program and could participate in the training program formed the experimental group. The control group consisted of 20 mothers. The training program consists of 10 sessions of 90 minutes each. The data for the research were collected by the Personal Information Form, the Parent-Child Communication Evaluation Tool (ABÇİDA), and the Parental Self-Efficacy Scale. Non-parametric analyses were used. In the study, it has been concluded that the applied psychoeducation program increased sub-dimensions of communication consisting of speech, listening, and empathy; also, it has been concluded that it has a significant effect on the development of self-efficacy perceptions consisting of the sub-dimensions of interest, discipline, and participation. By contrast, mothers' messages and nonverbal communication and the care and health sub-dimensions of parental self-efficacy were not affected. In line with the results obtained from the research, recommendations for research and implementation have been developed.

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[1] This study was presented at 23rd International Psychological Counseling and Guidance Congress

[2] This article is based on the first author's master's thesis, which was directed by the second author.

INTRODUCTION

Communication is an absolute part of human life. Confucius emphasized how important communication is in human life with this quote: "It is lovelessness that makes people incompetent. It is the miscommunication that makes each other hostile. It is indifference that destroys everything that favors beauty". Humans, due to their nature, need to communicate. Although communication is needed at all ages, it is important as a requirement of socialization as well. It is the process that continues from birth to death for humankind.

Communication is carried out in three ways: verbal, non-verbal, and written. The communication established by the individual is affected by elements such as tone of voice, emphasis, gaze, body posture, communication environment, gestures, and facial expressions. There are many elements that have an impact on communication, but one of the most important is the family. The individual's ability to establish positive relationships with his environment depends on his experiences in early childhood. In early childhood, the child learns by first observing, then imitating, and taking the parents around them as role models (Arabacı, 2011). Branden said that "the foundations of a person's way of looking at themselves and life are laid in childhood", and states that the individual's relationship with themselves appears in the reflection of their relationship with life (as cited in Cüceloğlu, 2019a). The first social environment that a child encounter is his family. The child's communication is shaped by the family. It is important for parents to be the right model for their children to develop healthy communication. Parents transfer the communication skills that they learned from their parents to their current, established family. Grusec (2007) stated that parents raise their children by modeling the raising style of their parents or using sources such as magazines, books, and the internet. The way for parents to develop healthy communication with their children is by learning the necessary communication knowledge and skills (Yalçın, 2013).

Positive communication skills, where the children are accepted as they are, not judged, and listened to, while positively affecting the child's personality, development, and emotional intelligence; negative communication skills, in which the child is not seen as an individual, is not allowed to express himself, and is criticized, negatively affect the personality, development, and emotional intelligence of the child. As Cüceloğlu (2019a) stated, the family that gives the message 'you exist, you are valuable' and uses positive communication will make their child feel valuable and gain self-confidence. The basis of quality communication is the family.

In the family, the mother is often at the forefront of the child's responsibility. Children's first communication begins when they are in their mother's womb. Pestalozzi said that the best teacher for children is their mother. When mother-child communication is evaluated, the self-efficacy perception of the mother about her parenting affects her behavior. Bandura used the concept of self-efficacy for the first time in 1977. Parental self-efficacy belief is the self-evaluation of parents about their parenting role (Kotil, 2010). Bandura (1977) states that the basis of parental behavior is based on parents' efficacy beliefs. High self-efficacy is related to active participation in the parenting process, while low parental self-efficacy is related to stress, anxiety, and depression. The child's behavioral problems stem from the mother's low self-efficacy (Coleman & Karraker, 2003). The more adequate the mother feels, the more positive the communication with her child will be. Parents with high self-efficacy perceptions will also make their children feel competent (Bandura, 1995). Parent-child communication and the concept of self-efficacy affect each other indirectly.

There are many factors that affect the self-efficacy perceptions of mothers. Some of these factors include the personality development of the mother, the child's characteristics, and the social environment. The level of self-efficacy of the mother also determines her communication with her child. While mothers with high self-efficacy levels communicate more healthily with their children, mothers with low self-efficacy levels have difficulty communicating with their children in a healthy

way. Studies have shown that parental self-efficacy is affected by positive communication (Coleman & Karraker, 1998; Demirtaş Zorbaz, 2018; Glatz & Buchanan, 2015). It has been observed that children whose mothers received training in effective communication have healthier communication skills than other children (Lado & Hart, 2002). While the communication established by the parents with their child can be affected by the self-efficacy perception of the parents, the established communication can also affect the self-efficacy perception of the parents (Ardelt & Eccles, 2001; Glatz & Buchanan, 2015; Jones & Prinz, 2005).

It has been observed that communication and self-efficacy issues are given limited space in psychoeducation programs in our country. Gable (2003) stated that every parent should establish a positive communication and healthy relationship with their child and that they can improve their effective communication skills with their children only by getting an education. Parents need help to be effective parents, to feel competent, to prepare a supportive environment for their children, to develop healthy communication with their children, and to increase their self-confidence (Özel & Zelyurt, 2016). Parent education programs guide families in line with their needs. Educational programs teach parents about both being a parent and childcare (Tezel Şahin & Ersoy, 1999; Tezel Şahin & Özbey, 2007). It is thought that the psychoeducation program prepared for mothers will contribute to self-efficacy and communication with their children, that parents will apply the new information they have learned in their communication with their children at home, that it will guide preventive studies, and that it will help the mothers to reduce the negative communication ways that they have established with their children and to raise awareness.

The general aim of the study is to examine the effect of the preschool mother psychoeducation program on mothers' self-efficacy perceptions and communication with their children.

The following hypotheses will be tested for the purpose of the study:

1. The pretest-posttest difference scores on the care, discipline, interest, participation, and health sub-dimensions of the Parental Self-Efficacy Scale differ significantly in favor of the experimental group.

2. The pretest-posttest difference scores on the speaking, listening, messaging, nonverbal communication, and empathy sub-dimensions of the Parent-Child Communication Assessment Tool differ significantly in favor of the experimental group.

METHOD

Research Design

A quasi-experimental design with a pretest-posttest control group was used for this study, which aimed to examine the effect of a preschool mother psychoeducation program on mothers' self-efficacy perceptions and communication with their children.

Participants

The universe of the study consisted of mothers with preschool children aged 4-6 years in Selçuklu district of Konya province. A needs assessment form was used to determine the mothers who would participate in the study. As a result of the needs analysis, 20 volunteer mothers who needed the training program and could participate in the training program formed the experimental group. 20 mothers formed the control group.

Table 1. *Demographic features of research groups*

Variables	Experiment Group	Experiment Group	Control Group	Control Group

		Frequency (f)	Percentage (%)	Frequency (f)	Percentage (%)
Age of the Mother	25-30	5	25.0	4	20.0
	31-35	10	50.0	9	45.0
	36-40	4	20.0	5	25.0
	41 and above	1	5.0	2	10.0
	Total	20	100	20	100
Education Status of the Mother	Primary Education	1	5.0	2	10.0
	Secondary Education	10	50.0	8	40.0
	Bachelor's Degree	7	35.0	8	40.0
	Post Graduate Degree	2	10.0	2	10.0
Count of Child	1	6	30.0	5	25.0
	2	9	45.0	10	50.0
	3	4	20.0	4	20.0
	4	1	5.0	1	5.0
Working Status of the Mother	Yes	9	45.0	10	50.0
	No	11	55.0	10	50.0
Sex of the Child	Female	11	55.0	10	50.0
	Male	9	45.0	10	50.0

Examining Table 1, 5 (25%) of the mothers in the experimental group were between the ages of 25 and 30, 10 (50%) were between the ages of 31 and 35, 4 (20%) were between the ages of 36 and 40, and 1 (5%) was 41 years or older. In the control group, 4 (20%) were between the ages of 25-30, 9 (45%) were between the ages of 31-35, 5 (25%) were between the ages of 36-40, 2 (10%) is 41 years and older.

In the experimental group, the educational status of the mothers was as follows: 1 (5%) had completed primary education, 10 (50%) had completed secondary education, 7 (35%) had completed undergraduate studies, and 2 (10%) had completed postgraduate studies. In the control group, 2 (10%) of them graduated from primary school, 8 (40%) graduated from secondary school, 8 (40%) graduated from undergraduate, 2 (10%) graduated from graduate school.

In the experimental group, 6 (30%) had 1 child, 9 (45%) had 2 children, 4 (20%) had 3 children, and 1 (5%) had 4 children. In the control group, 5 (25%) had 1 child, 10 (50%) had 2 children, 4 (20%) had 3 children, and 1 (5%) had 4 children.

In the experimental group, 9 (45%) worked in a job, 11 (55%) did not work. In the control group, 10 (50%) worked in a workplace, 10 (50%) did not.

11 (55%) of the mothers in the experimental group had girls and 9 (45%) had boys. 10 (50%) of the mothers in the control group had girls and 10 (50%) had boys.

Research Instruments and Processes

The data of the study were collected with the Personal Information Form, Parent-Child Communication Assessment Tool (ABÇİDA) and the Parental Self-Efficacy Scale.

Personal Information Form

Personal Information Form prepared by the researcher, demographic characteristics of mothers and their children; it was created to obtain information about mothers' age, educational status, work status, child's gender, and number of children in the family.

Parent-Child Communication Assessment Tool (ABÇİDA)

The Parent-Child Communication Assessment Tool (ABÇİDA) was developed by Arabacı (2011)

to assess the communication behaviors of parents with children aged 48-72 months toward their children. It has five sub-dimensions: speaking, listening, message, nonverbal communication and empathy. It consists of 37 items. The tool, which can be administered individually or in groups, has eight items for speaking, six for listening, eight for message, six for nonverbal communication, and nine for empathy. There is no time limit for administration. Five-point Likert-type ratings, "always," "often," "sometimes," "rarely," and "never" were used. Reverse-coded items are item 6 in the Listening subscale, items 1, 3, 4, 6, 7, and 8 in the Message subscale, and item 1 in the Nonverbal Communication subscale. The internal consistency coefficient of the Parent-Child Communication Assessment Tool (ABÇİDA) was 0.67 for the speaking subscale, 0.70 for the listening subscale, 0.60 for the message subscale, 0.56 for the nonverbal communication subscale, and 0.73 for the empathy subscale.

Parental Self-Efficacy Scale

The scale adapted by Kotil (2010) measures mothers' self-efficacy perceptions about parenting. The original scale developed by Coleman and Karraker in 2000 is the Self-Efficacy for Parenting Tasks Index (SEPTI). For the Turkish adaptation of the Parental Self-Efficacy Scale, 300 mothers with a 5-year-old child attending kindergarten were reached. As 3 of these mothers did not complete the forms, 266 mothers remained for the evaluation. Data were collected in a total of 24 schools. The scale consists of 5 subscales: interest, discipline, care, participation, and health. After adaptation, the scale was reduced from 36 to 20 items. A six-point Likert scale was used. Responses to items are "I strongly disagree", "I somewhat disagree", "I disagree", "I agree", "I somewhat agree" and "I strongly agree". Scoring is from 1 to 6, but 6 to 1 is used for reverse items. The number of items belonging to the subscales are indicated as; the interest subscale has four items as 1st, 2nd, 9th and 11th items, the discipline subscale has five items as 3rd, 8th, 13th, 15th and 17th items, the care subscale has four items as 5th, 7th, 12th and 20th items, the participation subscale consists of four items as 4th, 6th, 10th and 14th items, and the health subscale consists of three items as 16th, 18th and 19th items. The reliability coefficients for the sub-dimensions of the scale were found to be 0.81 for interest, 0.94 for discipline, 0.75 for care, 0.88 for participation, and 0.94 for health. The overall Cronbach's alpha coefficient was found to be 0.78.

Data Collection Process

The study was conducted in the first semester of the 2020-2021 academic year. In the study group, 40 mothers with preschool children aged 4-6 years were included in the study. 20 mothers formed the experimental group, and 20 mothers formed the control group. The scales were administered to the mothers at home by the researcher before the training program began. Necessary permission was obtained from the mothers in cases such as photographing and videotaping. The mothers who volunteered to participate in the study were given an invitation and a brochure, and it was explained that they would receive a certificate if they attended the program regularly. During the preparation of the mother education program, studies on family education were reviewed. The program was created by using four main books, which are; Parent Education Practice Guide with Creative Drama Method [Yaratıcı Drama Yöntemi İle Anne Baba Eğitimi Uygulama Rehberi], Şahin Karapınar (2015); Psychodrama 400 Warm-Up Game and Auxiliary Techniques [Psikodrama 400 Isınma Oyunu ve Yardımcı Teknikler], Altınay (2019); Mindfulness: The Art of Being in the Moment with Conscious Awareness [Mindfulness: Bilinçli Farkındalık Farkındalıkla Anda Kalabilme Sanatı], Atalay (2020); Speak So They Listen, Listen So They Speak: Ways to Communicate Correctly with Your Child [Konuş ki Dinlesin Dinle ki Konuşsun: Çocuğunuzla Doğru İletişim Kurmanın Yolları], Faber and Mazlish (2018). At the same time, a needs assessment form was prepared to determine the topics needed in the preparation of the content of the training program. While the creative drama method was dominant, methods such as narration, question and answer, problem solving, and group discussion were also used. Necessary tools and equipment were used according to the methods and techniques used in

the sessions. The training program consisted of 10 sessions of 90 minutes each. The sessions are structured with activities to realize the identified gains. A warm-up activity was performed before the start of the sessions. The training program was carried out with the experimental group once a week, on Fridays, at home. The mothers in the experimental group were given a movie projector, a poster was printed, and a room was set up for the presentation conditions only. At the end of some sessions, the participants were given homework. The scales used at the beginning of the program were administered again to the participants at the end of the program. After obtaining the feelings and thoughts of the group members about the training program, a certificate of participation was distributed at the end of the program and after the ceremony.

The content of the mother education program prepared for preschool mothers is as follows:

Session 1: Introduction to Mother Psychoeducation Program

Aims

1. Ability to recognize Mother Psychoeducation Program

2. Ability to gain knowledge about Mother Psychoeducation Program

3. Meeting group members

Materials: Some upbeat music, paper, pen, bag, color pencils, “Why I am Here?” form.

Process: The session started with the "My Name" activity, after applying the Parent-Child Communication Assessment Tool (ABÇİDA) and the Parental Self-Efficacy Scale to the participants. The mother psychoeducation program was introduced. Activities applied during the presentation, respectively; "You Have a Letter!", "Who Am I?", "Introducing Myself", "Why Am I Here?" At the end of each activity, shares were received from the group members and the session was terminated.

Session 2: Developmental Characteristics of 4-6 Years Old Children

Aims

1. Gaining knowledge about developmental characteristics of 4-6 years old children

2. To understand the importance of getting to know children

Materials: The article "Are You Ready to Take the Responsibility of a Child?", paper, pencil, the article "King's Garden", the form "Completing Sentences", the form "Being a Parent", Documents prepared from newspapers about the Parent -child relationship.

Process: Warm-up activity: "Empty Chair" was applied, and the presentation started. Information on the developmental characteristics of children was given. The activities implemented respectively are "Are You Ready to Take the Responsibility of a Child?", "How Should I Raise My Child?", "Completing Sentences", "Being a Parent". At the end of each activity, shares were received from the group members and the session was terminated.

Session 3: Communication and Elements of Communication

Aims

1. To be able to explain the importance of communication

2. Obtaining information about communication types

3. To be able to comprehend the ways of communicating

4. To be able to raise awareness about the importance of body language in communication

Materials: Various soft rhythm music, book, form called “Tell Me!”.

Process: Warm-up activity: "Missing Chair" was applied, and the presentation started. Information was given about communication and communication elements. The activities implemented are “Communication Starts with Me!”, “Body Language”, “Do the Reverse of What I Say!”, “Read Me!”, respectively. At the end of each activity, shares were received from the group members and the session was terminated.

Session 4: Interfamilial Communication

Aims

1. To be able to explain the importance of interfamilial communication

2. To be able to understand the characteristics of parent-child relation

3. To be able to gain awareness about interfamilial communication styles

4. To be able to gain awareness about “Acceptance”, one of the most important variables of parent-child relation

Materials: The form named "Items are Talking", the form "If I Were", children's pictures used in Haluk Yavuzer's book "Child with Pictures", A-4 paper, crayons, "Do you accept me?" form.

Process: Warm-up activity: “Family Game” was applied, and the presentation started. Family communication was mentioned. The activities implemented are "Items are Talking", "Communication Begins with Family", "My Family", "Do You Accept Me?", respectively. At the end of each activity, shares were received from the group members, homework was given, and the session was ended.

Session 5: Obstacles Faced in Interfamilial Communication

Aims

1. To be able to detect the importance of the effect of obstacles in family communication on the child.

2. To be able to gain awareness about the obstacles in parent-child communication

3. To be able to realize the importance of effective use of time in parent-child communication

Materials: The article titled “20 Dollars Time”, the form called “What Is It Saying?”, the form called “Communication Obstacles”, the form called “How Do We Use Communication Obstacles?”

Process: Warm-up activity: “Colors and Emotions” was applied, and the presentation started. Communication obstacles within the family were mentioned. The activities implemented are "Can you spare time for me?", "Yes-No", "What is he saying?", "Communication Barriers", respectively. At the end of each activity, shares were received from the group members and the session was terminated.

Session 6: Parent Attitudes

Aims

1. To be able to explain the effects of parental attitudes on child development

2. To be able to recognize the importance of positive parental attitude

3. To be able to gain awareness of parents' attitudes towards their children

Materials: "Race of Frogs", large size paper, pencil, form called "I'm a Mom/Dad", a form called "What Kind of Mom/Dad Am I?", "From You to Me, from Me to Them" named form.

Process: Warm-up event: "Chinese Roulette" was applied, and the presentation started. Information was given about the attitudes of the parents. The activities implemented are "How Should

You Treat Me?", "I Am a Mom/Dad", "What Kind of a Mom/Dad Am I?", "From You to Me, from Me to Them". At the end of each activity, shares were received from the group members and the session was terminated.

Session 7: Mother Child Conflicts and Their Effects on the Child

Aims

1. To be able to raise awareness about parent-child conflicts

2. To be able to raise awareness about the causes of conflicts between parents and children.

3. To be able to raise awareness for the resolution of parent-child conflicts

Materials: The article titled "Perspective", the form "Whose Problem?", the form "How Can I Solve the Problems I Have with My Child?", the form "Tactics Used in Coping with Conflict Situation", the form named "How Can I Solve Conflict?".

Process: Warm-up activity: "Empathy Study" was applied, and the presentation started. Information was given about mother-child conflicts. The activities implemented are "No Difficulty Can Depress Us!", "Whose Problem?", "How Can I Solve the Problems I Have with My Child?", "Let's Solve This Conflict!", "How Can I Solve Conflict?". At the end of each activity, shares were received from the group members, homework was given, and the session was ended.

Session 8: You Language- I Language and the Importance of Listening

Aims

1. To be able to raise awareness about the importance of listening in communication

2. To be able to comprehend the importance of active listening in parent-child communication

3. To be able to comprehend the importance of "I language" in parent-child communication

Materials: Instruction sheets in which listening types are written, the form called “How Do I Feel?”, the form called “How Should You Listen to Me?”, large paper, pencil.

Process: Warm-up activity: “The Object of Important Emotion” activity was implemented, and the presentation started. The importance of You-I language and listening was emphasized. The activities implemented are "What Did I Do Today?", "How Do We Listen?", "How Do I Feel?", "How Should You Listen to Me?", "You Language-I Language". At the end of each activity, shares were received from the group members, homework was given, and the session was ended.

Session 9: Ways of Coping with Anger and Anxiety

Aims

1. To be able to raise awareness about the causes of anger in parent-child communication

2. To be able to raise awareness about how to control the feeling of anger experienced in parent-child communication

3. Gain knowledge of ways to cope with anxiety

Materials: The form called "Emotion Bingo”; the form called "What Happens When I Get Angry?"

Process: Warm-up activity: “The Anger Machine, the Love Machine” activity was implemented, and the presentation started. Information was given about ways to cope with anger and anxiety. The activities implemented are "Reaction to Impact", "Emotion Bingo", "What Happens When I Get Angry?", respectively. Mindfulness-based practice studies were conducted on anxiety. These applications were: "Breath Monitoring", "3 Minute Breath Field", "4D". At the end of each activity,

shares were received from the group members and the session was terminated.

Session 10: Evaluation of the Mother Psychoeducation Program

Aim

1.To be able to evaluate the Mother Psychoeducation Program

Materials: Large paper, colored pencils, "Parent Education Program Evaluation Form".

Process: Warming up event: "Three Rooms" event has been applied. The activities implemented are "Complete My Sentence!", "What Have I Won?", "There Is a Letter to My Leader!", "I'm Making an Evaluation", respectively. After the leader's evaluation of the process, the Parent-Child Communication Assessment Tool (ABÇİDA) and the Parental Self-Efficacy Scale were administered to the participants. The session was ended by giving a certificate of participation and a story book to the group members.

Data Analysis

Non-parametric analyzes were used because the number of participants in the experimental and control groups (n<30) was low (Büyüköztürk, 2020). Pretest-posttest was applied to the experimental and control groups. Research data were analyzed with the "IBM SPSS Statistics 23.0" package program. The Mann Whitney U-Test was used to compare the pretest scores and difference scores of the experimental and control groups (Büyüköztürk, 2020; Bayram, 2017).

Ethic

Ethics committee approval was obtained with the decision of Maltepe University dated 17.09.2021 and numbered 2021/24.

RESULTS

The general aim of the study is to examine the effect of the psychoeducation program for mothers with preschoolers on mothers' self-efficacy perceptions and communication with their children. Table 2 shows the descriptive statistics of the pretest-posttest scores of the mothers in the experimental and control groups on the parent self-efficacy scale and the parent-child communication assessment tool.

Table 2. *Mean and standard deviation values of pretest and posttest scores of parental self-efficacy scale and parent-child communication assessment tool (abçida)*

Parental self-efficacy scale	Group	Test	N	$\overline{X}$	SD
Interest	Experiment	Pretest	20	12.90	2.80
		Posttest		7.75	2.95
	Control	Pretest	20	12.95	1.70
		Posttest		12.80	1.90
Discipline	Experiment	Pretest	20	16.85	3.49
		Posttest		14.70	3.13
	Control	Pretest	20	15.65	3.29
		Posttest		15.40	3.31
Care	Experiment	Pretest	20	11.65	3.54
		Posttest		9.05	2.96
	Control	Pretest	20	13.05	1.95
		Posttest		12.95	2.25
Participation	Experiment	Pretest	20	14.45	3.62
		Posttest		9.75	3.55
	Control	Pretest	20	13.40	3.20
		Posttest		13.25	2.95
Health	Experiment	Pretest	20	9.15	3.36
		Posttest		6.55	2.74

	Control	Pretest Posttest	20	8.35 8.40	1.38 1.78
Parent-child communication assessment tool	**Group**	**Test**	**N**	$\overline{X}$	**SD**
Speaking	Experiment	Pretest Posttest	20	15.55 29.40	4.48 5.68
	Control	Pretest Posttest	20	17.90 18.05	5.56 6.04
Listening	Experiment	Pretest Posttest	20	13.95 21.35	3.77 3.29
	Control	Pretest Posttest	20	15.65 16.00	4.22 4.21
Message	Experiment	Pretest Posttest	20	19.85 28.20	7.36 6.89
	Control	Pretest Posttest	20	19.15 18.90	7.74 7.41
Nonverbal Communication	Experiment	Pretest Posttest	20	16.70 21.15	5.30 2.99
	Control	Pretest Posttest	20	16.25 16.10	4.26 4.59
Empathy	Experiment	Pretest Posttest	20	22.65 33.95	8.36 6.58
	Control	Pretest Posttest	20	21.90 21.70	8.37 8.38

The pretest scores of the parent self-efficacy scale and the parent-child communication assessment tool sub-dimensions of the experimental and control groups were analyzed with the Mann Whitney U-Test, and the analysis results are given in Table 3.

Table 3. *Results of mann whitney-u test for pretest scores of parental self-efficacy scale and parent-child communication assessment tool*

		n	Rank Average	Rank Sum	U	*p*
Parental self-efficacy scale						
Interest	Experiment Control	20 20	21.45 19.55	429.00 391.00	181.00	.603
Discipline	Experiment Control	20 20	23.13 17.88	462.50 357.50	147.50	.153
Care	Experiment Control	20 20	18.35 22.65	367.00 453.00	157.00	.241
Participation	Experiment Control	20 20	22.58 18.43	451.50 368.50	158.50	.259
Health	Experiment Control	20 20	22.50 18.50	450.00 370.00	160.00	.275
Parent-child communication assessment tool						
Speaking	Experiment Control	20 20	18.23 22.78	364.50 455.50	154.50	.217
Listening	Experiment Control	20 20	17.78 23.23	355.50 464.50	145.50	.139
Message	Experiment Control	20 20	21.80 19.20	436.00 384.00	174.00	.481
Nonverbal Communication	Experiment Control	20 20	21.33 19.68	426.50 393.50	183.50	.654
Empathy	Experiment Control	20 20	21.35 19.65	427.00 393.00	183.00	.645

Examining Table 3, the sub-dimensions of the Parental Self-Efficacy Scale are interest (L:

181.00, p>.05), discipline (U:147.50, p>.05), care (U: 157.00, p>.05), participation (U: 158.50, p>.05) and health (U: 160.00, p>.05) there was no significant difference between the experimental and control groups in the analysis results. The sub-dimensions of the Parent-Child Communication Evaluation Tool are speaking (L: 154.50, p>.05), listening (U:145.50, p>.05), message (U: 174.00, p>.05), nonverbal communication (U: : 183.50, p>.05) and empathy (U: 183.00, p>.05) there was no significant difference between the experimental and control groups in the analysis results.

According to these results, it was observed that although there was a difference in the mean scores between the experimental and control groups before starting the experimental application of the "Parent Self-Efficacy Scale" and the "Mother-Father-Child Communication Evaluation Tool", this difference was not significant. The Mann Whitney U-Test results are given in Table 4 to look at the significance of the difference scores of the experimental and control groups.

Table 4. *Results of mann whitney-u analysis of parental self-efficacy scale and parent-child communication assessment tool (abçida) pretest*

		n	Rank Average	Rank Sum	U	*p*
Parental self-efficacy scale						
Interest	Experiment	20	25.58	511.50	98.50	.005
	Control	20	15.43	308.50		
Discipline	Experiment	20	24.38	487.50	122.50	.033
	Control	20	16.63	332.50		
Care	Experiment	20	22.65	453.00	157.00	.238
	Control	20	18.35	367.00		
Participation	Experiment	20	25.73	514.50	95.50	.004
	Control	20	15.28	305.50		
Health	Experiment	20	23.60	472.00	138.00	.090
	Control	20	17.40	348.00		
Parent-child communication assessment tool						
Speaking	Experiment	20	14.00	280.00	70.00	.000
	Control	20	27.00	540.00		
Listening	Experiment	20	15.08	301.50	91.50	.003
	Control	20	25.93	518.50		
Message	Experiment	20	17.80	356.00	146.00	.139
	Control	20	23.20	464.00		
Nonverbal Communication	Experiment	20	17.75	355.00	145.00	.131
	Control	20	23.25	465.00		
Empathy	Experiment	20	16.15	323.00	113.00	.016
	Control	20	24.85	497.00		

Examining Table 4, it was concluded that, the sub-dimensions of the Parental Self-Efficacy Scale (U: 98.50, p< .05), discipline (U:122.50, p<.05) and participation (U:95.50, p<.05) pretest posttest difference scores differed in favor of the experimental group, and there was no significant difference between the experimental and control groups in the pre-test post-test difference scores of care (U:157.00, p>.05) and health (U:138.00, p>.05). It was concluded that the sub-dimensions Parent-Child Communication Assessment Tool speaking (U: 70.00, p< .05), listening (U:91.50, p<.05) and empathy (U:113.00, p<.05) pretest posttest difference scores differed in favor of the experimental group, and there was no significant difference between the experimental and control groups in the message (U:146.00, p>.05) and health (U:145.00, p>.05) pretest posttest difference scores. According to these results, it can be said that mother psychoeducation has a significant effect on the development of self-efficacy perceptions consisting of interest, discipline, and participation sub-dimensions of mothers in the experimental group, also has a significant effect on increasing the communication of mothers in the experimental group, which consists of the sub-dimensions of speaking, listening and empathy.

DISCUSSION AND CONCLUSION

In this in this study, the effect of the psychoeducation program for mothers of preschoolers on perceptions of mothers' self-efficacy and communication with their children was investigated. In the study, it has been concluded that mothers in the experimental group of mother psychoeducation increased their communication skills consisting of speaking, listening, and empathy sub-dimensions, and there was a significant effect on the development of self-efficacy perceptions consisting of interest, discipline, and participation sub-dimensions. On the other hand, it was concluded that there was no significant effect on messages, nonverbal communication, or the care and health sub-dimensions of mothers. This result obtained from the studies reflects the findings of other studies conducted in Turkey and abroad (Bağatarhan, 2012; Çağdaş et al., 2010; Elibol, 2007; Evirgen, 2002; Fox et al., 2006; Landy & Menna, 2006; MacPhee & Miller-Heyl, 2003; Naik-Polan, 2004; Öğretir & Demiriz, 2009; Özel & Zelyurt, 2016; Reid et al., 2004; Sala Razı, 2004; Simpkins et al., 2006; Yalçın, 2013; Temiz, 2014; Uçar Çabuk, 2017).

According to the results of the interest sub-dimension of parental self-efficacy, the psychoeducation program for preschooler mothers was effective in increasing interest significantly. It can be said that activities such as group animations and What Kind of Parent Am I, which are applied in the education program so that mothers can spend more productive time with their children and raise awareness about their attitudes towards their children, are effective in the positive development of mothers' self-efficacy perceptions about attention. When similar studies on this subject (Landy & Menna, 2006) are examined, it is revealed that the education given to mothers is effective in changing mothers' self-efficacy perceptions about interest in a positive way.

The finding for the parent self-efficacy discipline sub-dimension showed that the preschool mother psychoeducation program was effective in increasing mothers' self-efficacy perceptions about discipline. It can be said that activities such as conflict resolution skills, mindfulness-based practice exercises, which are applied in the education program to develop awareness for the resolution of mother-child conflicts, ways of coping with anger and anxiety, and ways to provide positive discipline are effective in the positive development of mothers' self-efficacy perceptions about discipline. When similar studies on this subject (MacPhee & Miller-Heyl, 2003; Reid et al., 2004) are examined, it is revealed that the education given to mothers is effective in changing the self-efficacy perceptions of mothers about discipline in a positive way.

The findings obtained for the parental self-efficacy participation sub-dimension showed that the preschool mother psychoeducation program was effective in increasing mothers' perceptions of participation self-efficacy. It can be said that activities such as playing games, spare time for me, what do children and parents say, etc., which are implemented in the education program so that mothers can spend productive time with their children, are effective in the positive development of self-efficacy perceptions of mothers about participation. When similar studies (Bağatarhan, 2012) on this subject are examined, it is revealed that the education given to mothers is effective in changing the self-efficacy perceptions of mothers about participation in a positive way.

The findings obtained for the parental self-efficacy care and health sub-dimensions revealed that the preschool mother psychoeducation program was not effective in increasing the self-efficacy perceptions of mothers about care and health. It can be said that the activities implemented in the education program so that mothers can feel competent about their parenting skills and that mothers can obtain information about the developmental characteristics of their children are not effective in the positive development of self-efficacy perceptions of mothers about care and health.

The finding obtained from the Parent-Child Communication Assessment Tool for the speaking sub-dimension showed that the preschool mother psychoeducation program was effective in increasing

the speaking skills of mothers in their communication with their children. The activities applied in the education program so that mothers can comprehend the importance of communication within the family and gain awareness about the communication styles, such as communication starts within the family, were positively effective in increasing the speaking skills of mothers with their children. It can be said that after education, parents benefit from effective communication skills in their conversations with their children. When similar studies (Duncan et al., 2006) on this subject are examined, it is revealed that the education given to mothers is effective in improving the speaking skills of mothers in their communication with their children.

The finding obtained for the listening sub-dimension of the Parent-Child Communication Assessment Tool showed that the preschool mother psychoeducation program was effective in increasing the listening skills of mothers in their communication with their children. It can be said that activities such as how we listen and how I want you to listen to me, which are applied in the education program so that they can comprehend the importance of active listening in mother-child communication, were effective in the positive development of listening skills of mothers in their communication with their children. After the training, parents stated that they started to realize that their children were being listened to. The children, who know that they are listened to by their parents, feel more peaceful and comfortable. As a result, the child develops emotionally and socially in a healthy way. The child who is listened to learns to listen to others (Navaro, 2020). When other studies (Akgün, 2008; Sevinç & Evirgen, 2004; Temiz, 2014) are examined in parallel with the research, it is revealed that the education given to mothers is effective in improving listening skills and the communication of mothers with their children.

The results obtained from the message and nonverbal communication sub-dimensions of the Parent-Child Communication Assessment Tool and the psychoeducation program for preschooler mothers were not significantly effective for the message and nonverbal communication of mothers with their children. It can be said that the activities applied in the education program to help mothers raise awareness about ways of communicating and the importance of body language were not effective in the positive development of message and nonverbal communication skills in the communication of mothers with their children.

The finding obtained for the empathy sub-dimension of the Parent-Child Communication Assessment Tool showed that the psychoeducation program was effective in increasing the empathy skills of mothers in their communication with their children. It can be said that activities such as how I feel and empathy practice, which are applied in the education program so that mothers can improve their awareness of what their children think and feel in a situation, were effective in the positive development of empathy skills in the communication of mothers with their children. After the training, parents stated that the frequency of putting themselves in their children's shoes and trying to understand their children increased. When we look at other studies in parallel with the research (Havighurst et al., 2010; Öğretir & Demiriz, 2009; Ünal, 2003), it is revealed that the education given to mothers is effective in improving the empathy skills of mothers in their communication with their children.

When the results of the research are evaluated, it is seen that the mother psychoeducation program applied to the mothers increased the communication of mothers consisting of speaking, listening, and empathy sub-dimensions; also, it has been concluded that there is a significant effect on the development of self-efficacy perceptions consisting of interest, discipline, and participation sub-dimensions. Some of the benefits of psychoeducational groups are that parents feel that they are not alone, that they understand other parents in the group through what they have shared about their lives, and that they gain new experiences and skills. It should be taken into account that it is important to show hope that other group members have successfully overcome similar problems that they have experienced. It is observed that parent education strengthens the family structure and makes its functionality healthy. Family education given to the parents of the child in the critical period has a great

contribution to lifelong learning. With family involvement, family members can become the best advocates of educational programs. They gain experience in how to support their children in the home environment and can contribute to the development of their children in many ways. By meeting the educational needs of parents, it contributes to their becoming more active in their relations with their children. The fact that the research was applied to a certain number of mothers in Konya and only mothers were included is among the limitations of the study. Future research can include studies involving their fathers. In future studies, demographic variables such as the relationship status of the parents and who provides care for the child (e.g., caregiver, grandparents) may be included. A study on family guidance education can be made into a policy by including the parents of children who need special education. Follow-up studies can be applied to see the long-term effects of the study.

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An Action Research on the Development of Research and Formatting Data as a Table Skills through Research-Based Teaching in Life Studies Course

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ABSTRACT

The aim of this study is to develop third grade primary school students' research skills and formatting data as a table skills as a secondary skill through research-based teaching in Life Studies course. Within the scope of this purpose, action research design was used in the study. The study group consists of third grade primary school students in the researcher participant's class in the 2021-2022 academic year. As a sampling technique, easily accessible sampling, one of the purposeful sampling methods, was used. The research lasted eight weeks, one day a week. During this period, activity-based skills training was applied to improve students' research and formatting data as a table skills. Through these activities, solutions were sought for the deficiencies observed in the process. Data were collected through observations made during the trainings, researcher diary, field notes and student worksheets. The data obtained from the research were analyzed with descriptive and content analysis. As a result of the study, students gained knowledge about research skill and its sub-steps and developed awareness and perception change towards research. They realised that conducting research is not only collecting data but also has other stages. However, they conducted all their research on the internet. They had difficulties in interpreting and organising the complex and dense information they encountered on the internet. This situation caused loss of motivation from time to time. However, students formed an idea about the steps to be followed while conducting a research.

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INTRODUCTION

In the 21st century, individuals are expected to have attitudes and behaviours such as processing information, questioning, researching, directing information with observations, implementing an idea, learning to learn and being curious and entrepreneurial. Defined as 21st century skills, these are also the priority of curricula. In this context, the use of skill-based practices in teaching is among the prominent issues in research.

Acquiring and using knowledge effectively is realised in situations where people have the chance to choose. Therefore, when an individual comes to the conclusion that the information is useful for them, they tend to do research (Hepworth & Walton, 2009, pp. 3-4). Among 21st century skills, ability to do research is among the capabilities that need to be acquired in advance for the development of many essential qualities. The inevitable increase in information sources makes it difficult to access accurate and reliable information. Therefore, studies on the relationship between research and learning have increased day by day (Arı, 2017; Bilir, 2015; Çavuşlu, 2014; Çelik, 2012; Dilbaz, Yelken & Özgelen, 2013; Duran, 2015; Duran & Dökme, 2018; Kaya, 2009; Keçeci, 2014; Kidman & Casinader, 2017; Obwegeser & Papadopoulos, 2016; Sarı & Ören, 2020; Tsivitanidou, et al. 2018). Jerome Bruner (1960) defines research as *"a process of discovery in which students find solutions to problems through scientific enquiry"* (Alouf & Bentley, 2003, p.3). Dochartaighise (2012) describes it as *"channelling, evaluating, selecting and delimiting information rather than gathering information"*. Looking at the foundations of research skills, the educational theory of pragmatism, which was influential with Charles Sanders Pierce, William James, and John Dewey in the early 20th century in America after the industrial revolution, emerges with progressivism. Pragmatism aims for knowledge that can be adapted to the future through the reconstruction of experience and knowledge. A good curriculum programme and inquiry-based activities have an important place in making this possible (Cevizci, 2019). *"Creating an active, enquiring classroom environment in school is indispensable in achieving the goal"* (Cevizci, 2019, p.132). Research in education is considered to be a powerful tool that enables people to learn about a subject area, learn how to learn by helping people develop independent learning skills (Hepworth & Walton, 2009).

Studies show that research-based methods increase the retention of knowledge and academic achievement (Bozkurt, 2012; Bozkurt, Ay & Fansa, 2013; Çalışkan & Turan, 2008, p.619). Llewellyn (2007, p.27) states that learning through research leads students to independent thinking by strengthening their knowledge, skills, and attitudes. For this reason, Carnell, and Fung (2017) state that research skills are necessary for all students and all disciplines. They also state that it should be explicitly included in curricula. In the literature, there are various studies conducted to develop research skills with students of different age groups and in different disciplines (Altay, 2022; Coşkun, 2018; Ecevit, Balcı, Yıldız, & Sayan, 2021; Hotaman, 2008; Kanatlı-Öztürk, 2018; Ödün-Başkıran, 2022; Tekindur, 2022). In the curriculum in Türkiye, research skill has taken its place in the curricula in line with the developments in the world throughout the history of the republic. In this context, it is seen that research skills are included in the majority of the programmes (Ministry of Culture, 1936; Ministry of Culture, 1948; MoNE, 1968; MoNE, 1997; MoNE, 2005; MoNE, 2009; MoNE, 2018). For example, among the aims of the 2005 Primary Education Curricula is to direct students towards scientific thinking, research, and study skills. One of the eight common basic skills in all courses in the programme is research skill. Research-inquiry skill is explained in the programme with the following statements: *"Research skill includes recognising and comprehending the problem by asking correct and meaningful questions, planning research on what and how to do in order to solve the problem, predicting the results, considering the problems that may arise, testing the results and developing ideas..."* (MEB, 2009, p.17-18). As can be seen, research skill enables the student to take a mentally active role. What is important here is that the teacher is equipped to guide the student. 2009 Life Studies Programme prepares this ground for teachers. It does this through outcome-skill matching in terms of

which skill is appropriate for which outcome. It also explains the steps of the skills in detail. Thus, it guides the instructors. The first step of research skill in the programme starts with asking questions. Then, students are asked to make observations and make predictions based on their observations. Then the data are collected, recorded, organised, and explained. Finally, the research results are made ready for presentation. Thus, the process related to the skill is completed (MEB, 2009, p.17-18).

Formatting data as a table skill is addressed in a broad and descriptive manner as *table, diagram and graph reading skills* in the 2009 Programmes. However, while research skills are included in the 2015 and 2018 Life Studies programs, formatting data as a table skills are not included separately. The sub-steps of research skills are as follows: “asking questions, observing, predicting, collecting data, recording data, organizing data, explaining data, presenting research results” (MEB, 2009). Formatting data as a table skill was included with the statement "Reads maps, tables and diagrams easily." (MEB, 2009). In this study, formatting data as a table skill is handled within the scope of the sub-step of research skill. For this reason, it is included as an indirect skill in the study. While applying the sub-steps of the research skill, it is involved in the stages of expressing and interpreting the results of observation in various ways as tables, graphs, and writings. Especially in studies that encourage students to research, it is aimed to transform the research results into simple materials such as tables and graphs. More precisely, students are expected to transform their data into appropriate tables according to the research questions (Aşkar vd., 2023).

The general aim of the Life Studies course is to provide students with practical knowledge. Tuncer (2009) says that the learning areas artificially divided by education are actually intertwined in real life and that the Life Studies Curriculum aims to present this to students. Research skills help the development of practical knowledge. Gültekin (2015, p.16) states that the Life Studies course is a life lesson that helps children gain versatile day-to-day abilities. The fact that the research skill that will be used throughout life is addressed within the scope of this course is also related to the overlap between the course and the skill. In the literature, it was not found that teaching practices for the development of research skills were carried out within the scope of Life Studies course. This study is considered important in terms of filling the gap in the field.

Purpose and Importance of the Research

In this study, it was aimed to enable third grade primary school students to actively use the research skill and the indirectly the formatting data as a table skill through various activities implemented in the Life Studies course and to teach them how to conduct a research and which stages to go through. For this basic purpose:

"1. How is the contribution of the research skill-based practice in the teaching process?

2. How is the contribution of the research skill-based practice on students' research?" questions were sought to be answered.

In the Life Studies course, skills are used in an integrated manner. While developing research skills, what is learnt is presented in a simpler and more comprehensible way such as tables, graphs, and diagrams. This study was considered important in terms of demonstrating the functionality of research skill in the programme.

METHOD

Information about the research design, study group, data collection tools and processes, data analysis and ethics committee approval are given below.

Research Model

In this study, action research design, one of the qualitative research methods, was used. "Action research is a continuous process for problem solving" (Yıldırım & Şimşek, 2013, p.335). Its aim is to

produce solutions to the problems that the researcher observes in the school or educational environment through remedial practices (Creswell, 2017, p.776). In this study, action research design was preferred in order to reach the solution of the problem experienced by the researcher participant in the classroom. Berg (2011) brought together different action research approaches and categorised them under three types: "technical/ scientific/ collaborative action research", "practice/ cooperation/ discussion-oriented action research" and "emancipatory/ developmental/ critical action research" (as cited in Yıldırım & Şimşek, 2016, p.308). In this study, "technical/scientific/collaborative action research" was used. In this approach, the aim is to test or evaluate an application within a predetermined theoretical framework (Yıldırım & Şimşek, 2016, p.308). Accordingly, the researcher participant implemented the research-based teaching approach in their own classroom. The process was analysed by all researchers and evaluations were made regarding the application.

In this study, the action research process consisted of 4 stages. Firstly, the research topic was decided (1). Then the study group was selected (2). Then action plans were prepared and implemented (3). Finally, the data obtained were analysed and their credibility was ensured (4). All these stages are explained below.

Selection of Research Topic

Researchers have been working on issues such as the development of the skills in the Life Studies curriculum and the inclusion of the related skills in the curriculum from past to present. Research and formatting data as a table skills are two of the skills that researchers have been working on. During the studies on these capabilities, the researcher (the first author of the study) realised that the students in the class did not perform well in studies that required them to use research skills. The teacher observed that the students could not follow the steps of the research process and that they asked for help from other people more often in these studies compared to other works. In addition, students were not aware of how to present their research using tables, diagrams, or graphs. The researchers thought that they could develop solutions to these observed problems by developing action plans together.

Formation of the Study Group

The study group consisted of 9 female and 8 male students in the researcher participant's class in a private primary school with a relatively high socio-economic level in Istanbul. The school offers International Baccalaureate (IB) education. The International Baccalaureate aims to raise inquiring, knowledgeable and sensitive young people who will help create a better and more peaceful world through intercultural understanding and respect (IB, 2017, p.7). In line with this purpose, education and training activities are carried out at the school to ensure that students grow up as inquiring and enquiring individuals both in the classroom and outside the school. The determination of the study group was influenced by the fact that the IB education implemented at the school offers a suitable school-classroom atmosphere for the development of the skills discussed in the study, and that the researcher participant thought that they could obtain in-depth and rich information from the students in their class. Since the researcher participant chose their class as the closest sample, easily accessible case sampling, one of the purposeful sampling methods, was used in this study (Yıldırım & Şimşek, 2013, pp.135-141).

Preparation and Implementation of Action Plans

Since it is contrary to the nature of the research process to give all of the research skill sub-steps in a single lesson consecutively, the research process sub-steps were divided into two groups by the researchers as shown in Figure 1. All subsequent studies and action plans were carried out according to this binary grouping.

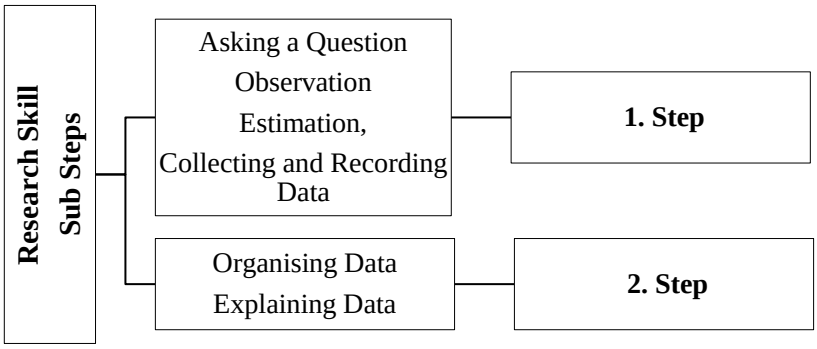


Figure 1. *Research skill sub-steps divided into two groups by the researchers*

Action plans and worksheets were prepared by the researchers according to the research skill sub-steps divided into two groups. The prepared plans and worksheets were finalised by taking expert opinion. Ethics committee permissions were obtained. According to the action plans, a total of 8 lesson contents, in which 5 Life Studies course outcomes were addressed, were applied to the students. The application was continued for 8 weeks in total.

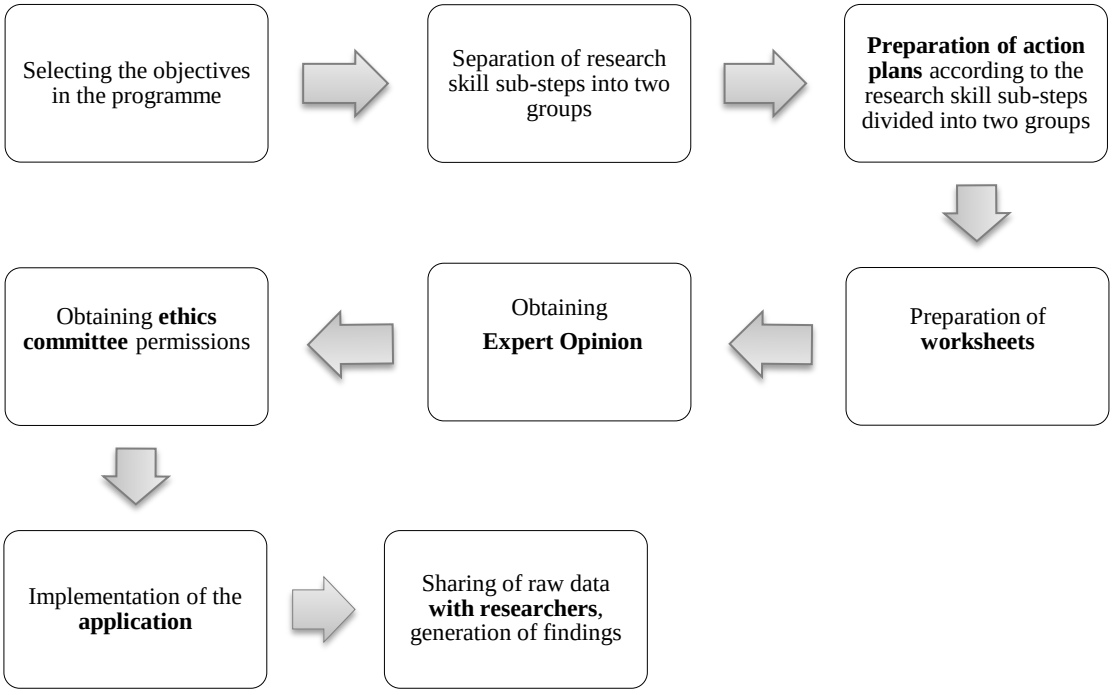


Figure 2. *Process path of research-based applications*

In the study, each action plan was carried out one day a week for one lesson hour. A Life Studies lesson topic was discussed for two weeks. In the first lesson on the selected topic, the lesson was usually started with an introduction that could attract the students' interest in the topic. Through dialogues with the students, it was ensured that they felt the need to do research on the selected subject. Below is the introduction of the lesson on "Wasted Resources" and a sample of typical dialogues between the students and the researcher:

The lesson started by watching a short animation of a mother who makes use of stale bread and her children who love to eat this bread, and the students were asked "Do you also have bread that you buy at home but cannot consume?" and "What do you do with the bread that you cannot consume?". The students were asked to give examples from their lives about the bread and food that

were not eaten. They gave answers such as "We feed it to animals", "My mother uses it in other dishes". The students were asked the question "Why do your mothers make so much effort to prevent the bread that you cannot consume from becoming waste?". The answers from the students were as follows: "There is a lot of labour in the production of bread.", "There are people in the world who cannot find food. Even a single grain is valuable.", "We are trying to prevent waste." "Let us not waste our resources" poster was shown to the students and the question "What is meant by the word resource in the sentence?" was asked. The answers from the students are as follows:

Duygu : It is what we need.

Veli : Water is a resource.

Mete : Our food, time.

Eda : Electricity is like water. Air is also a resource.

Based on these answers, the resources used at home, at school and in our country were determined with the students and the word "resource" was defined. Then, the questions "What is waste and saving?" were asked to the students. From the answers given by the students, it was seen that they had knowledge about the concepts of resource, waste and saving. The researcher asked the students "Do you know which resources are wasted the most in Türkiye or in the world?". The students listed the answers that came to their minds one after the other: "Electricity, water, food...". The researcher said that everyone had different estimates, but they were looking for the most accurate answer and asked the question "How can I get the most accurate information about the most wasted resources?". The students gave the following answers to the question:

Eda : We will do research.

Mert : We can ask Google.

Can : If we do research, we will find many sources. We can find accurate information.”

The students were asked the question "Shall we research the subject of waste?" and they enthusiastically answered that they wanted to do research."

After an introduction to the determined topic that could attract the students' interest and direct them to research, the first stages of the research skill given in Figure-1 were taught together with the students. Worksheets prepared by the researchers according to the sub-steps of the research skill were used for the students to record their work. By using a common worksheet format, it was aimed for the students to recognise the sub-steps of the research process. In addition, it was tried to develop an awareness of the order of these steps. At the end of the first lesson on the subject, students were directed to conduct research and record the results with the method of their choice. The students carried out these studies at home, outside of class time. In the face-to-face lessons in the classroom during this time interval allocated to the students for research, discussions were held about the difficulties experienced by the students in the research process and how they could overcome these difficulties. Students were frequently reminded that they should continue their research by focusing on their research questions.

In the second lesson of the determined subject, the second stage of the research skill given in Figure-1 was discussed. Accordingly, the activities of organising and interpreting the data obtained by the students by using tables, graphs and diagrams were carried out. During these activities, the worksheet format prepared by the researchers was used. At the end of this lesson, students were given the opportunity to present their work to their friends one by one. The Life Studies course outcomes selected in the preparation of the action plans, the names of the action plans and the dates of implementation are given in the table below.

Table 1. *Implementation process and topics addressed*

Objectives Addressed	Topics	Action Plans	Research Skill Sub-Step Group Addressed	Dates
HB.3.2.1. Compares the characteristics of the childhood of family elders with the characteristics of their own childhood.	**Comparison of Childhood Periods**	1. Action Plan	1. Step	23.11.2021
		2. Action Plan	2. Step	30.11.2021
HB.3.1.9. Makes unique suggestions for the effective and efficient use of school resources. **HB.3.2.6.** Makes original suggestions for effective and efficient use of resources at home.	**Wasted Resources** (Distance Learning)	3. Action Plan	1. Step	07.12.2021
		4. Action Plan	2. Step	14.12.2021
HB.3.3.4. Takes adequate and balanced nutrition to maintain health.	**Get to know the Food Pyramid** (Distance Learning)	5. Action Plan	1. Step	21.12.2021
		6. Action Plan	2. Step	28.12.2021
HB.3.5.9. Researches the people who have contributed to our country with their work.	**People who Contributed to Our Country** (Distance Learning)	7. Action Plan	1. Step	04.01.2022
		8. Action Plan	2. Step	11.01.2022
Total:	4 Topics	8 Action Plan		8 Days

Data Collection Tools and Processes

In the study, firstly, the gains of the Life Studies course that can be associated with research skills and then the sub-steps of the research skill to be taken as a basis for the creation of action plans were determined. These stages are asking questions, observing, predicting, collecting and recording data, organising data and explaining data (MoNE, 2009, p.17-18). These stages were guiding in the creation of action plans and materials. The data were collected online after the first implementation so that the research would not disrupt the programme at the school in the 2021-2022 academic year. In data collection, standardised worksheets prepared by the researchers, which were finalised after receiving expert opinion, lesson observation form, and field notes taken by the researchers were used.

Worksheets

The sub-steps of the research process were divided into two stages by the researchers. Accordingly, two separate worksheets were prepared. It was aimed that the worksheets would serve as a guide and the students would continue their research in accordance with the research skill steps in these worksheets. For this purpose, two standardised worksheets were used. In the first worksheet, the first stages of the research skill process given in Figure 1 (asking questions, making observations, making predictions, collecting, and recording data) were discussed. In the second worksheet, the second stages of the research skill process given in Figure 1 (organising data, explaining data) were addressed.

Field Notes

These are the observations made by the researchers during the application and the notes taken during the process, in which important moments and dialogues are recorded.

Data Analysis

Content analysis and descriptive analysis methods were used to analyse the data obtained from observations made during the lessons and worksheets. The main purpose of content analysis is to reach concepts and relationships that can explain the collected data. In cases where more than one researcher works together in data analysis, it is necessary to conduct a study on coding reliability. In this case, the researchers code the same data set and reach a coding percentage by numerically comparing the coding similarities and differences. In such studies, it is necessary to reach a reliability percentage of at least 70

per cent (Yıldırım & Şimşek, 2016, p.242, p.246). During the analyses, a second researcher coded the data to ensure coder reliability. Descriptive analysis is the analysis of the data according to the predetermined themes related to the research problem, aiming to reveal the data in a striking way with direct quotations from the participants (Yıldırım & Şimşek, 2013, p.256).

Analysis of Field Notes and Worksheets: In the study, Content analysis and descriptive analysis were used to analyse the field notes and student worksheets kept by the observers during the lessons. While analyzing the data, the researcher carefully read the student worksheets. Codes were created. Sub and main categories and themes were reached from the codes. The data quantified according to the themes were tabulated. Findings were supported with quotations from student worksheets. The data were also coded by the second researcher. The consistency value was found to be 0.89. The real names of the students were not included in the study. Instead, students were given nicknames such as Can, Ela.

In order to increase the validity of the research, one of the researchers conducted the implementation while the other one made lesson and student observations during the implementation process. The researchers took field notes separately. To better understand what was written on the worksheets, students were given the opportunity to explain their work during and between the lessons. It was aimed to ensure the reliability of the research with the worksheets and field notes kept by the researchers, and data diversification was used. The process was reported as detailed as possible. In addition, the data were confirmed by checking the consistency of the information obtained from various data collection tools (Güler, Halıcıoğlu & Taşğın, 2015). The opinions of three experts were taken to determine whether the activities were appropriate to the level, whether they covered the acquisitions, and whether they were purposeful or not.

Ethics

The ethics committee permissions required for the research were obtained from Istanbul University-Cerrahpaşa, Graduate Education Institute Social and Human Sciences Research Ethics Committee with the decision dated 09.11.2021 and numbered 2021/265.

FINDINGS

Figure 3, This figure describes the general systematics of the findings obtained in this study. As can be seen in Figure 3, the research skill sub-steps guided the preparation of lesson plans and the realisation of activities in all action plans, conducting student research and presenting the findings. All the data obtained through the implementation of the action plans are synthesised and shared below. In addition, student studies and notes obtained from the observer are also presented as examples to support the data obtained.

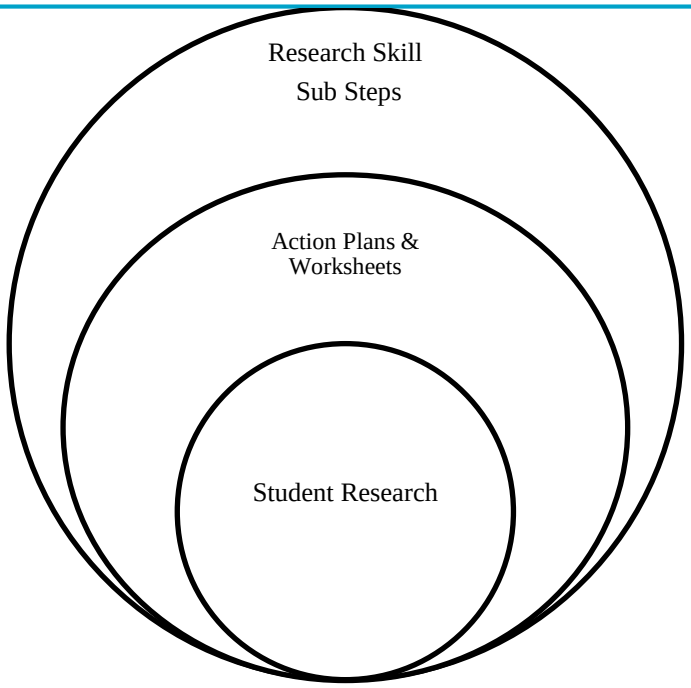


Figure 3. *General Systematics of Research Findings*

Action Plan 1

In line with Action Plan 1, the lesson on "Comparison of Childhood Periods" was started with an introduction that would attract students' attention to the subject. In order to make the students feel the need to do research on the subject, they were asked the questions "What do you think is the difference between your childhood and my childhood, how can we learn the differences between our childhoods?". The students gave answers such as "We can ask your mum, we can look on the internet, we can do research". The answers were collected, and it was stated that the most accurate information on the subjects of interest could be obtained as a result of research. It was stated that scientists also conduct research for this purpose. It was expressed that scientists first start their research by finding a topic and then ask questions that can direct the research process related to the topic they find. It was also added that scientists continue their research by following certain steps. The children were told that they could find the similarities and differences between their teachers' childhoods and their own childhoods by researching just like a scientist.

After this stage of the lesson, the research skill sub-steps (asking questions, making observations, making predictions, collecting, and recording data), which are given in Figure-1 and determined as Stage 1, were handled, respectively. Worksheets prepared by the researchers were used to take the necessary notes. The students were guided on how to think at these stages and to understand the effect of the stage they dealt with on the research process.

The work started with writing the topic sentence. How the topic should be determined and what to pay attention to were shared with the students. They were asked for their suggestions about the topic sentence. After the topic sentence was written, the stage of asking questions, which is the stage in which the research questions appropriate to the topic are written, was started. At this stage, the research questions suggested by the students were as follows:

Pınar : What was the name of your school?
Veli : Did children draw pictures?
Mete : How was the technology?
Duygu : How were the games?
Ebru : What games children used to play?
Okan : What did you do at school? How were the school buses?

When the research questions proposed and written by the students were analysed, it was seen that some students, such as Pınar, asked questions that required a single answer such as "yes, no". Others, such as Mete and Duygu, asked questions with more than one answer because they were not restricted and did not have the

necessary time and opportunities to conduct research. The answers were analysed in class. It was emphasised that questions with a single answer such as "Did children draw pictures?" caused the research process to end, the answers to other questions could not be obtained or additional questions were needed. It was stated that questions such as "What was the technology like?" were too wide-ranging to be answered completely. The reasons for the difficulty of answering wide-ranging questions during the research were discussed in the class. It was observed that many students, such as Ebru and Okan, were able to ask focussed research questions with a specific scope that could explain the research topic. The fact that such questions were suitable for clarifying the research topic was made realised by the class discussion with the students. Statements in the observer notes about the research questions are given below.

> "The students had no difficulty in asking questions. They were influenced by each other. They asked similar questions to each other. Some questions were narrow in scope, and some were too broad to be investigated." (Taken from the observer's notes dated 23.11.21)

It was stated that the next step after the writing of the research questions was the ***observation*** sub-step, which was the part where observations were made about the researched topic. The students were asked to describe the changes they had noticed since their birth or were aware of from the conversations they had with their families. Students had difficulty at this stage. They needed clues to give answers. Some observations shared by the students as a result of these clues are as follows:

Gül : Phone screens are getting bigger.
Mete : Gaming computers came out.
Veli : There were no drones back then.
Duygu : Foldable keyless phones came out.
Can : When my mother was little, they did not have mobile phones.
Pınar : There was no internet in the past. Everyone was doing research by looking at books.
Mert : Toys did not used to be electronic.
Eda : Houses were single storey. Children did not play with tablets. They played on the street. My parents always played hide and seek.

As can be seen when the answers given by the students are analysed, most of the students made their observations on the subject from a single perspective with a very narrow viewpoint. According to the field notes, only three students, together with Eda, wrote their observations from a broad perspective with the changes they were aware of in different areas such as "houses", "technology", "games".

After keeping records of the observations, the students were asked to write their predictions about the research questions they wrote. In the ***prediction*** sub-step, it was observed that the students avoided answering the questions because they were worried about giving wrong answers. After the students were informed about this issue, they gave more comfortable answers to the questions. The answers given by some students to the research questions in the prediction sub-step are as follows:

"Research question: What was the technology like?
Gül : Undeveloped.
Kaan : There was no technology.
Veli : Technology was zero.

Research Question: What was the things like?
Ebru : Things were very wormy.
Duygu : It was worn out.
Ali : Things were made of wood.

Research Question: How were the games?
Cansu : They were small.
Can : Games were played without technology.
Sinem : The toys were wooden.
Pınar : Games like hopscotch were played."

The above answers explain the observer's field notes.
"Students made predictions about some research questions based on their previous knowledge and

observations. While there were some students who made random guesses, it was observed that misconceptions affected the guesses of the majority." (Taken from the observer's notes dated 23.11.2021)

Collecting and recording data in this step, it was explained to the students that it was necessary to decide which methods should be used to collect and record data appropriate to the research topic and questions. The students were asked to determine and write down where they would collect the data in accordance with the subject. It was observed that the students were quite productive in this regard and had no difficulty in giving appropriate answers. Some of the data collected from the student worksheets related to the data collection and recording step are as follows.

"Data collection step:

Pınar : I can do interviews. I can look at old things. I can do research.

Mert : I will ask the old-timers. I will collect it by research.

Data recording step:

Cansu : I can file a report.

Mete : I will write it on paper. I will write it on the computer."

As can be seen in the examples above, many students answered the question *"Where will we collect the data?"* by doing research during the lesson. This situation made the researchers think that the students perceived the process of conducting research only as the process of data collection.

Action Plan 2

A box containing old toys, a photo album with old pictures, a slide prepared by the researcher about her childhood and a computer were brought to the classroom. The students recorded their data on the T-table by looking at the old toys belonging to their teachers, interviewing their teachers, and examining the albums with the data collection and recording method they determined in the previous lesson. The statement in the observer notes of the data recording step are as follows.

"The students were very excited throughout the process. They were able to record data with methods such as T-table and direct notetaking. Four students could not work efficiently in the data recording step due to reasons such as writing in a longer time than their peers, wasting a lot of time outside the subject with the material they examined, and losing motivation due to mistakes made. (Taken from the observer's notes dated 30.11.2021)

After this stage of the lesson, the research skill sub-steps (organising the data, explaining the data), which are given in Figure-1 and determined as Step 2, were handled, respectively. In the step of ***organising the recorded data***, it was explained to the students why the recorded data should be organised. The importance of choosing a method suitable for the characteristics of the data was emphasised. Students were shown examples such as figure graph, object graph, Venn diagram, tally table, frequency table and asked which representation method is suitable for their data. A class discussion was held on several methods about the suitability of the method for the research. Students were directed to organise their data with the methods they chose. At this stage, it was observed that all students except 1 student organised their data using a Venn diagram. The researcher noted in the practitioner field notes that this situation was related to the effect of the discussion in the classroom.

It was observed that the excitement observed in students while writing research questions and collecting data decreased while organising the data. It was thought that the decrease in motivation was due to physical and mental fatigue towards the end of the lesson. Below are sample studies of a student who recorded data using a T-table and partially organised them using a Venn diagram.

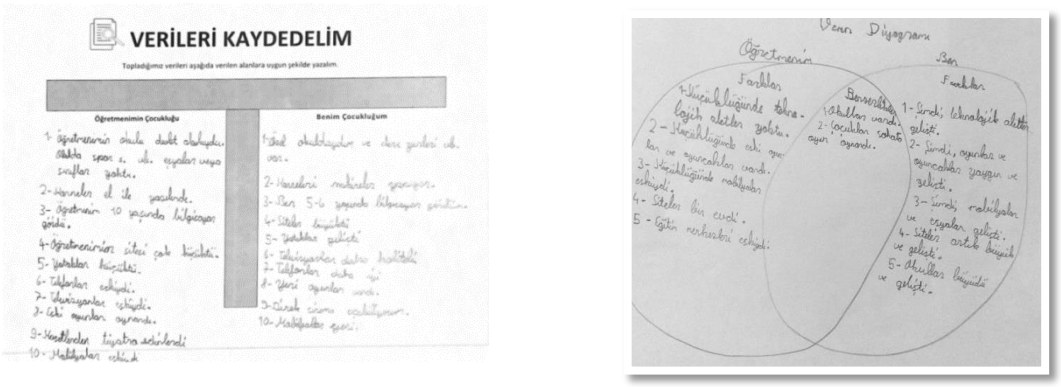


Figure 4. *T-table and Venn diagram of Can.*

In Figure 4, it is seen that some of the data recorded by the student in the T table are not in the Venn diagram. Like Can, many students had difficulty in transferring the data they recorded completely. In addition, at this stage, when the tables created by the students were analysed by the researchers, it was seen that there were no answers to the research questions in the tables. Therefore, it was thought that the students could not perceive that the research questions managed the whole process. It is planned to take additional measures for both problems in future lessons

After the data were organised with the selected method, the step of ***explaining the data*** was started. Students had no difficulty in reading and interpreting the tables and diagrams they created.

> Most of the students explained the recorded data with a single sentence in the section allocated in the worksheet. 7 students were able to summarise and explain their data. 1 student left this field unanswered. (From the observer's notes dated 30.11.2021)

Action Plan 3

In line with Action Plan 3, the lesson on "Wasted Resources" started with an introduction in which the concepts of "waste, saving, resource" were discussed to attract students' attention to the subject and to reveal their prior knowledge on the subject. For the students to feel the need to do research on the subject, questions were asked to the students -as in the previous lesson-. Accordingly, the students were asked "How can we access the most accurate information about the most wasted resources in the world?". To these questions, the students answered "We can do research. We can ask Google. If we do research, we can reach many sources and find more accurate information." At this stage, it was observed that the students were very excited and wanted to start the research process immediately. To start the research process, worksheets prepared for the students were distributed.

After this stage of the lesson, the sub-steps of research skill, which are given in Figure-1 and determined as ***Stage 1***, were handled in order. Students took the necessary notes about their research on the worksheets distributed.

The research process started with writing the topic sentence. By means of the suggestions from the students, the topic was determined as "Wasted resources". Then, the stage related to the sub-step of ***asking questions*** was started. The things to be done at this stage were reminded. Students were asked to write their research questions. The research questions suggested by the students are as follows:

Pınar : Which resource is wasted the most?
Can : Which resources are wasted the least?
Veli : Which resources are we wasting?
Mete : How many tonnes of water is wasted in our country?
Ayşe : How much food is wasted in a year?

At this stage, it was observed that the students did not have difficulty in finding research questions as in the previous lesson. As before, they were influenced by each other's research questions and wrote similar questions to each other. Unlike the previous lesson, in this lesson, it was noticed that students asked less questions that required a single answer or were not focused, that is, questions that were far from

explaining the research topic and were not circumscribed.

Observation stage was started. At this stage, students were asked to share what they noticed and saw about wasted resources. It was realised that the students did not have difficulty at this stage and that they had many observations on this subject. Some of the students' observations are as follows:

Can : I see bread being thrown in the bin. I see people crumpling napkins and playing basketball with it.
Kaan : They show their hands to the electronic soap dispensers at school. Soap runs down the drain and collects at the bottom.
Pınar : In restaurants, I see people leaving their food unfinished. The waiters throw away the leftovers. I see mouldy whole loaves of bread left on the street next to rubbish bins. Also, a lot of water is wasted when washing our apartment block.
Eda : Mum never throws bread in the bin.

As seen in the answers given in the sub-step of ***making observations***, Pınar makes her observations with a wide perspective with the events she witnessed in different places such as restaurants, streets, and apartments. The majority of the students in the class also recorded their observations about the subject using a wide perspective like Pınar. When Eda's answer is examined, it is seen that Eda made her observations with a narrow perspective by considering only her mother's behaviour. When the worksheets were analysed, it was seen that a total of 3 students, including Eda, recorded their observations about the subject with a narrow viewpoint.

At the ***prediction*** stage, the question "What should predictions be made according to?" was asked. The students answered this question as "We should look at the research question". It was noted in the observer notes that the students were much more comfortable and braver in the prediction step compared to the first lesson. Some of the predictions made by the students according to the research questions are as follows.

Okan's Estimation Related to the Research Question "Which is the Most Wasted Resource?" When I cross the bridge at night, I see that the top of Istanbul is white. That is why electricity is wasted the most.
Can's Estimation about the Research Question "Which is the Least Wasted Resource?" Fruits and vegetables are wasted the least.

When the predictions of Okan and Can given above as an example were analysed, it was seen that some of these students made predictions based on their observations, and some of them made random predictions independent of any criteria, as in the comment "The least amount of waste are of fruits and vegetables".

The students were informed about the last ***step of collecting and recording the data***. The students were asked to determine and write down where they would collect the data in accordance with the topic. They gave appropriate answers to the subject. They stated that they would collect the data "from the Internet, encyclopaedias, books, other people" and that they would record the data "by taking notes and using computers". The answer "by doing research" given to the question "Where will I collect the data?" in the previous lesson was not observed in any of the students in the second application. The studies with the students on the subject were terminated after this stage. They were directed to conduct research in their out-of-class time according to the research questions they wrote and the data collection-recording method they determined.

Action Plan 4

In line with Action Plan 4, the lesson was started by reminding the concepts mentioned and discussed in the previous lesson. Upon the students' impatient statements such as "I could not find the answers to all my questions. There was nothing on the internet.", a conversation was started with the students about whether they had difficulties in ***collecting and recording the data***. During the conversation with the students, some noteworthy sentences about the research are as follows:

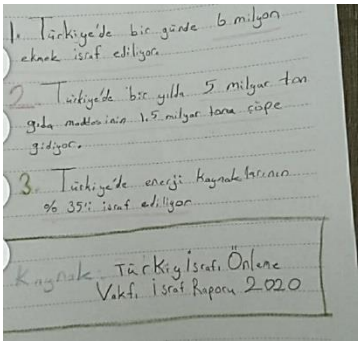
Mete : I could not find answers to some of my questions. I could not find anything for 2020. I found information according to 2018. I found that food was wasted, but I could not find how much it was wasted.
Pınar **:** I found percentage results. I could not find any other results.

Ali **:** In my research, I found strange things like natural gas, lignite. I could not figure out what they were.

Can : I could not find out how much food and water are wasted.

It was observed that the students had difficulties in reaching the right sources in their research, reading, and interpreting the sources they reached. It was thought that this situation was due to the fact that the students could not understand many written texts due to their age and could not recognise the units of measurement used in expressing the quantities of the sources. Due to the limitation of the application period, it was not possible to repeat the data collection phase or to change the research question. For this reason, the students were told that they could continue the research with the data they obtained. It was expressed in a language appropriate to the level that they may encounter similar situations in the research process.

After this stage of the lesson, the sub-steps of research skill, which are given in Figure-1 and determined as ***Stage 2***, were handled, respectively. In the step of ***organising the recorded data***, why the data should be organised was explained to the students once again. The students were shown various examples and asked which representation method was appropriate for the data obtained. A class discussion was held, but the students who could not understand the meaning of the data they obtained had difficulty in choosing reasonable representation methods. The researcher guided the selection of the graph. The tabular method was chosen, and the representation was reduced to the level appropriate. The following are examples of Eda's work, who organised her research notes with the tabular method.



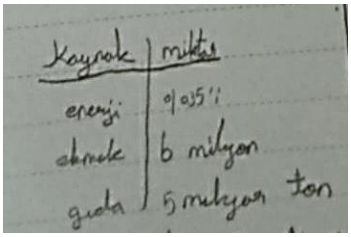


Figure 5. *Eda's research notes*

As it is clearly seen in Figure 5, the student reached different information about each source in their research. This student tabulated the results with the guidance given in the class. As can be seen in Figure 6, the data obtained cannot be compared with each other. It is also seen that the student made mistakes while transferring information from research notes to the table.

The students did not have any problems in drawing the table selected with the guidance of the researcher. It was also shared with the students that the data obtained were not suitable for interpretation and comparison with each other. For this reason, the desired efficiency could not be obtained in the step of ***explaining and interpreting the data.*** When the student worksheets were analysed, it was seen that 7 of the students left the relevant section unanswered, 5 students tried to explain the tabulated data with a single sentence as "The table shows the wasted resources". 2 students explained the tabulated data as "In my table, it is explained how much water and electricity are wasted in our country. It is seen in my table that clothing waste and bread waste are also quite high in our country."

Action Plan 5

In line with Action Plan 5, in the lesson on "Balanced Nutrition", it was tried to draw students' attention to the subject based on their prior knowledge on the subject. For this purpose, students were asked questions such as "With whom do we share the world we live in?", "Are plants and animals important for humans? If so, explain the reason for this." The students were made to think about the fact that plants and animals are our food sources. With the videos watched, it was aimed for students to learn about the areas in which plants and animals are utilised. Students were asked to classify foods as plant and animal foods through visuals. Students were presented with a visual of a newspaper article. The students were told "Plant and animal foods should be consumed in an

adequate and balanced manner. If you want to learn how much you should eat from plant and animal foods, you can look at the food pyramid." was read to the students. Drawing attention to the words "Food Pyramid" in this sentence, the students were asked the question "What is the food pyramid?". With this question, it was aimed to make the students realise what they know about this subject. The students were asked the question "If you are a scientist and you are invited to a television programme, if you are not sure about your knowledge about the food pyramid, what would you do to get accurate information?". The students gave the following answers to the question without thinking.

Sinem : We do research.
Pınar : We ask questions, we speculate.
Mete : We make observations.

The notes taken by the researcher during the observations about the answers given by the students are as follows:

> The answers given to the question "What do you do to obtain accurate information?" consist of research skill sub-steps. These answers suggest that students started to perceive the concept of "doing research" with its sub-steps (From the observer's notes dated 21.12.2021)

The students said "Come on, teacher! Let us investigate the food pyramid." and they were very eager to do research -as in the previous lesson- with excitement and by interrupting the lesson flow. After this stage of the lesson, the sub-steps of the research skill, which are given in Figure-1 and determined as ***Stage 1***, were handled in order. The students took the necessary notes about their research on the worksheets distributed. In addition, the support of the researcher on the students was deliberately partially reduced with this lesson.

At the stage of determining the topic, the students understood what the research topic was. The research topic was determined as "Getting Information About the Food Pyramid" by brainstorming in the classroom. The students were told that the sub-step of **asking questions** was started. The students were asked "What should be done at this stage?". They answered, "We will ask the questions we are curious about" and "We will write the questions we want to investigate". It is thought that the importance of the research question writing step in the research process has started to be understood by the students. The research questions suggested by the students are as follows:

Gül : How to read the food pyramid?
Pınar : What information does the food pyramid contain?
Eda : Which foods are at the top or bottom of the food pyramid?
Okan : What does the food pyramid do?

The notes kept by the observer during the writing of the research questions are as follows:

> "The students enjoyed writing and finding research questions. They were very excited to say the questions they found. The ones who could not find the answers to some of the research questions in the wasted resources lesson talked among themselves in this lesson and warned each other with sentences such as "Do not ask ranking questions, such answers do not exist on the internet." They warned each other with such sentences. This situation suggests that students have started to become aware of the writing of research questions and the importance of it in the research process (From the observer's notes dated 21.12.2021)."

When the worksheets of the students were analysed, it was seen that 12 students asked focussed research questions that could explain the research topic and had a specific scope. 2 students, on the other hand, asked unfocussed questions that were far from explaining the research topic, were not circumscribed, and did not have the time and opportunity to be investigated.

In the observation and prediction phase, students were asked to work individually. All of the students were able to write their observations in accordance with the research topic and their predictions according to their observations and research questions without the need for help. In the ***observation*** sub-step, it was observed that all students except 1 student made observations with a broad perspective. In the ***prediction*** sub-step, it was observed that almost all of the students made predictions about the research questions by determining their previous knowledge and lives as a criterion. The worksheets of two students are shown in Figures 6 and 7. These

worksheets provide examples that support the observations of the researchers below.

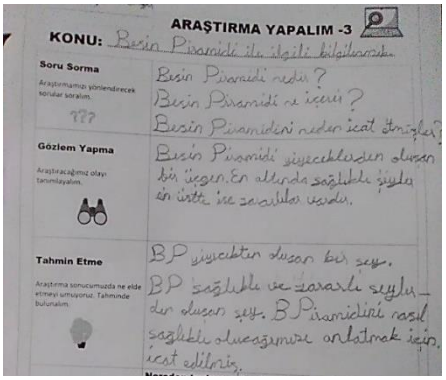


Figure 6. *Ela's worksheet*

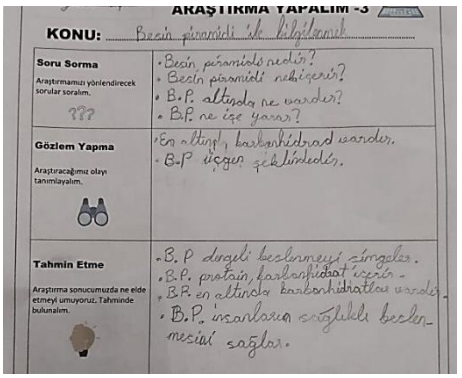


Figure 7. *Pınar's worksheet*

In the ***data collection*** step, students were asked to determine where they would collect the data in accordance with the subject. It was observed that the students gave answers similar to the answers they gave in the previous lessons. It was noticed that they often answered the data collection section as "Internet" or "Google". Examples of the answers given in the student worksheets are presented in the figures below.

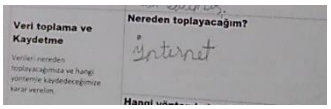


Figure 8. *Ela's worksheet*

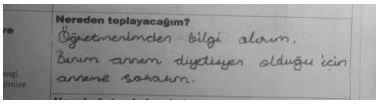


Figure 9. *Şirin's worksheet*

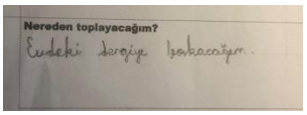


Figure 10. *Duygu's worksheet*

Like Ela, 14 students in the class stated that they would collect data through research on the internet or Google. Şirin said that she would get information from other people such as her teacher and her mother who is a dietician. Duygu and 2 students stated that they would collect data in different ways than their other friends by looking at magazines or books at home.

Almost all of the students answered the section on the worksheet related to the sub-step of ***recording the data*** as "I will make a report, I will take notes" as in the previous lessons. It was observed that the students were not willing to record the notes by means of tables, graphs, etc. and were timid. The observer's notes on this subject are as follows.

> "Students are not sufficiently familiar with methods other than note-taking. For this reason, they have difficulty in choosing the method suitable for their data. Methods other than note-taking require a higher level of cognitive competence. Therefore, I think that methods other than note-taking are less preferred (From the observer's notes dated 21.12.2021)."

The studies with the students on the subject were terminated after this stage. According to the research questions they wrote and the data collection-recording method they determined; students were directed to conduct research in their extracurricular time.

Action Plan 6

The students were reminded of the concepts and discussions about the subject in the previous lesson. It was observed that the students reinforced their knowledge about the subject covered in the previous lesson with their answers such as "We talked about the food pyramid", "Bread and cereals are at the bottom, teacher", "The pyramid tells people what they should eat". Since the majority of the class chose the "note-taking" method, it was desired to draw the students' attention to this area. Gül's mind map in **Figure 11** and Can's notes in **Figure 12** were analysed in the classroom. The advantages and disadvantages of both note-taking methods were discussed.

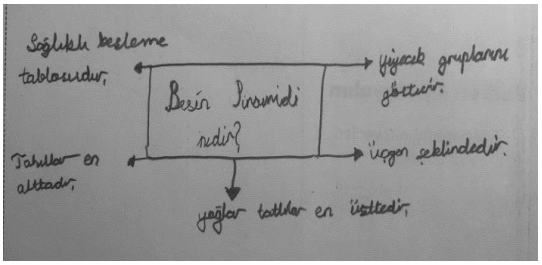


Figure 11. *Gül's research notes*

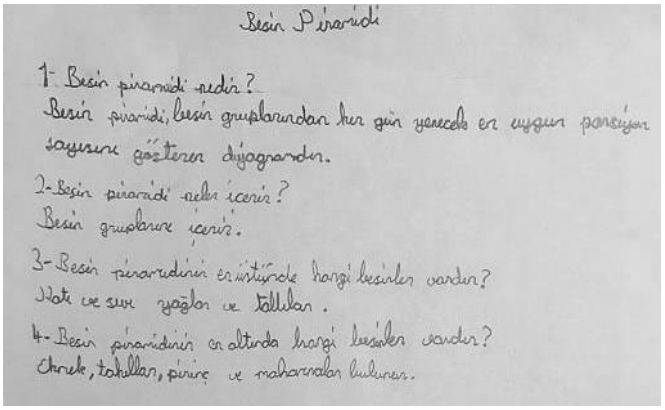


Figure 12. *Can's work*

During the conversation, the students stated that Gül's method was more effortless than the other methods in recording data. They said that with this method, readers can understand the information more easily. The students considered the fact that the research questions were not included in the mind map as a deficiency of the method. Regarding Can's study, they stated that writing was very tiring. They said that this difficulty could be solved with the help of computer.

During the processing of Action Plan 4, students stated that they had difficulties in the data collection phase. For this reason, in this lesson, the question "What difficulties did you experience during the data collection phase?" was asked to the students. They said that they did not have any difficulties. They wanted to share the results they obtained with excitement. The note taken in the researcher's diary about the data collection phase is shared below.

> "The fact that the students were directed to conduct research on understandable and accessible information appropriate to their level seems to have increased the motivation of the students during the research process. In the studies to be carried out on research skills, it should be considered whether the selected subject requires prerequisite learning and whether the data to be obtained will be appropriate for the level (From the observer's notes dated 28.12.2021)."

After the introductory activities of the lesson, the sub-steps of the research skill, which are given in Figure-1 and determined as **Stage 2**, were handled, respectively. In the step of ***organising the recorded data***, 2 of the students showed the data obtained as a result of their research on the table, while 13 of them showed them on the food pyramid. Individual studies were carried out with the students to prevent data loss while organising their data. The students were directed to include all the answers to the research questions in their tables or drawings. The students were asked the following questions about the food pyramid they drew: "Why was there a need for such a graphic about nutrients?", "What would happen if the information given in this pyramid was written in the form of items?". The answers from the students are as follows:

Ebru : It is more noticeable that way.
Mete : You do not waste time reading. It is more understandable.
Şirin : If it were written down, no one would pay attention and read it.

After the answers given, it was thought by the researchers as follows: The awareness of the students about the place and importance of the data organisation sub-step in the process has increased.

The step of ***explaining the data*** was started. At this stage, it was emphasised that it is also important to know how to read a diagram. The students were asked to explain whether they obtained results related to their predictions based on the predictions they made at the beginning of the research. The students explained the following:

Okan : I thought there were unhealthy foods at the bottom and healthy foods at the top. It turned out the opposite. I learnt that carbohydrates are at the bottom and fats and sugars are at the top."

Şirin : I thought there were vegetables at the bottom, but I saw those foods such as wheat

and bread were at the bottom. The food pyramid helps us to have a balanced diet."

Pınar **:** I found out that the food pyramid is a diagram showing the number of servings to be eaten daily. I had seen it before, but I didn't know how to read it."

The students enjoyed comparing the results of the research with their predictions. They answered the questions with fun. Students were excited to see in a concrete way that they could reach the right information through research. When the worksheets of the students were analysed, it was seen that 7 students explained their data with a single sentence and 8 students summarised their data in the sub-step of explaining the data. At the end of the lesson, an exit ticket activity was carried out with the students about reading the food pyramid. Students left the lesson by reading the pyramid correctly.

Action Plan 7

In line with Action Plan 7, in order to increase the readiness of the students for the lesson on "People Who Contributed to Our Country", a reading book about the life of Aziz Sancar was read with the students one week before the implementation. It was ensured that the students got to know Aziz Sancar. The lesson started with a video about him. In the video, he said "I am happy for my hometown. May it be auspicious for our country." Based on this, the contribution of the award to our country was questioned. Students were asked whether there were people other than Aziz Sancar who contributed to our country. They mentioned many names such as "Sabiha Gökçen, Akşemsettin". The students were asked "How can you find out that there are people who have contributed to our country other than the people you mentioned?". The students answered "By doing research" without any hesitation. Then the researcher asked the question "Which sub-steps does the research process consist of?". The students answered, "Asking questions, predicting, making observations", "The topic should be determined at the beginning." "Googling." "We take notes. We tabulate the notes we take.", "Lastly, we make comments." The observer included the sentence "Students' awareness of the sub-steps of research skills increased." in his notes dated 04.01.2023 about the dialogue.

After this stage of the course, the sub-steps of research skills, which are given in Figure-1 and determined as ***Stage 1***, were handled in order. In this course, the support of the researcher on the students was deliberately minimised. Students were directed to work individually.

During the topic determination phase, the students were aware that they would choose a research topic related to the activities in the introduction of the lesson, as they were used to from previous lessons. They were able to determine the research topic easily. In the sub-step of ***asking questions***, it was observed that the students acted in a way that they knew what to do. Some of the research questions written by the students at this stage are as follows:

Cansu : In which field are there the most successful people in our country?
Veli : How many scientists have lived in our country?
: Who has achieved the most success in the field of science in our country?
Pınar : In which fields has our country achieved the most success?
Duygu : Who received the Nobel Prize?

As can be seen in the examples above, when students worked individually, they wrote questions with a single answer and comprehensive questions with many answers. It was thought that the students still needed more guidance in this regard. For the research process to continue, students were allowed to think about the questions they wrote. Students were guided to organise their questions.

At the ***observation*** stage, it was observed that children with a low level of interest in their environment had difficulty in writing their observations about "People who contributed to our country". The students who had difficulty made sentences such as "I have no observations", "I can't think of anything".

In the ***prediction*** step, students wrote their guesses without any guidance. The research question "In which field are there people who have achieved the most success?" was asked. The question was asked: "I think the most success has been achieved in the field of sports. I hear this a lot." As well as the student who answered, "How many children have received awards in karate?", there were also students who answered, "There may be 20 children.". From this point of view, it was observed that some of the students in this lesson made predictions based on their observations, while others made random predictions. While writing their predictions, it was

recorded that some students made conversations such as "I wonder what will actually come out?". It was thought that being able to confirm their predictions with the results of the research excited them.

The step of ***collecting and recording the data*** was started. In this step, students did not need any guidance. As in the previous lessons, they frequently answered "Internet" or "Google" for data collection and "I will make a report, I will take notes" for data recording.

Action Plan 8

Before starting the implementation of Action Plan 8, students' research reports were analysed. It was observed that students mostly could not find direct answers to their research questions. It was noticed that they wrote the closest and shortest answers to their questions. As soon as the lesson started, the students wanted to read their research reports to their classmates. The other steps of the research were reminded, and the students were asked the question "Why should the notes taken in the research be organised?". Most of the students answered this question as "For the readers to understand...". According to the researchers, the practices carried out in the 1st, 3rd and 5th action plans and the subject of drawing and interpreting tables, graphs, diagrams influenced the students. This situation made it easier for them to understand why tables and graphs are needed.

After the introductory activities of the lesson, the sub-steps of the research skill, which are given in Figure-1 and determined as ***Stage 2***, were handled, respectively. In the ***data organisation*** stage, different table and graph examples were shown to the students. They were asked to choose the most appropriate representation method for their own data and organise their data accordingly. Fourteen of the students in the lesson chose the tabular representation method. Based on the fact that they frequently chose this method in previous lessons, the researcher wanted to learn the reason for this situation. The researcher asked the students the question "Why did you choose the table method?". The students gave answers such as "This method is easy for me", "I also use this method in my homework", "Readers can understand it immediately". One student in the class organised their data by using a mind map.

Figure 13. *Eda's work*

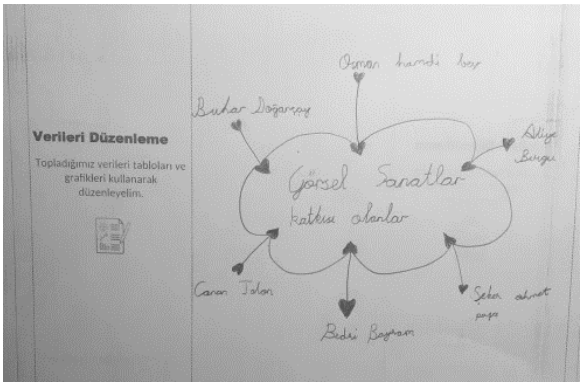


Figure 14. *Şirin's work*

As can be seen in the figures above, Eda organised her data using the table method. Şirin, on the other hand, organised her data using mind maps. Like Eda and Şirin, all of the students in the class were able to tabulate their data. However, when the research reports created by the students at the beginning of the lesson were compared with the tables they drew, it was observed that -as in previous lessons- they did not include some of the data they recorded in their tables.

In the sub-step of ***explaining the data***, students were able to interpret their data in accordance with the research questions and the tables they drew. In this step, two of the comments written by the students on the worksheets related to the data they organised are presented below as examples

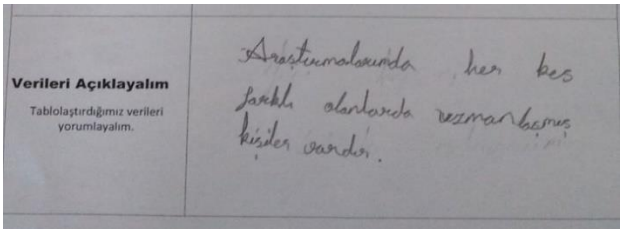


Figure 15. *Eda's work*

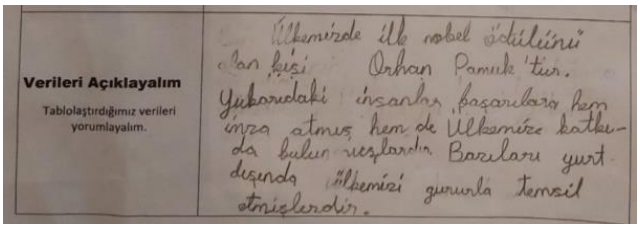


Figure 16. *Pınar's work*

Eda explained her data in her study using a single sentence. Eda did not include details in writing. When asked, she could explain her table in detail. Pınar summarised her table by mentioning the properties of the data she obtained. While 6 students in the class explained their data with a single sentence, 9 students summarised the data like Pınar.

Students were also asked to compare the results of the research with the predictions they made in the data explanation step. Accordingly, the students gave the following answers: "I thought Aziz Sancar was the first person to receive the Nobel Prize, but I learnt that Orhan Pamuk received it.", "I couldn't find an answer to my research question. I don't know if my guess was wrong.". At this stage, it was once again realised that not having the skills of writing the right research question and interpreting the data obtained from various sources affected the research process.

DISCUSSION, CONCLUSION, RECOMMENDATIONS

As stated in the literature, the development processes of students' research skills through research-based applications have been examined. The main purpose of this research is to reveal the development of research skills. In this way, the strengths and weaknesses of the application made in the development process of research skills were taken into consideration. This situation will shed light on the application of research skills in Life Studies course. Our study is important because it is the first in the field in terms of eliminating this deficiency in the Life Studies course.

The effectiveness of the application in the classroom and the effect of the application on students' research were analysed. In this context, the findings were analysed according to the sub-steps of the research skill in the 2009 Life Studies Programme. The first step is the step of asking questions. This step is important for students to acquire research skills. Because failure to acquire the first step of the process will negatively affect the other steps. The importance of the questioning step is also found in the literature (Akyol, Yıldırım, Ateş & Çetinkaya, 2013; Aydemir & Çiftçi, 2008; Dindar & Demir, 2006; Büyükalan-Filiz, 2002; Savaşkan, 2013; Yürümezoğlu, 2008). In this study, it was observed that students asked questions requiring a single answer such as "yes, no" or asked questions that were not focused on the topic. These types of questions appear in various studies as low-level cognitive questions in the literature (Akyol, 2001; Erdoğan, 2017; Yurtbakan, 2022). In a study, it was observed that the inability to ask questions continued in the later years of primary education (Çakıçı, Ürek & Dinçer, 2012). However, aiming to develop students' mental processes while conducting research, asking questions related to the subject and selecting useful ones from the questions are important on research skills (Karamustafaoğlu & Havuz, 2016). According to a research, the important thing is that the student asks their own question and searches for the answer themselves. (Karakuş, 2001). In this study, it was observed that students were able to produce research questions. It was understood that they easily grasped the process and did not have difficulty. It was concluded that they could answer the generated questions. However, students who asked longer or shorter questions than necessary lost motivation. As a similar result, a previous study states that in research-based classroom practices, students construct knowledge when they answer questions with efforts in accordance with the research steps. In addition, as a result of the study, if the questions formed by the students were appropriate for their level to answer, their motivation increased, if not, it decreased (Tatar & Kuru, 2006). From this point of view,

the step of asking questions motivates students while directing them to research and plays an important role in structuring knowledge. Since motivation provides meaningful learning, students who are not sufficiently motivated cannot participate in the research process or passively listen to the lesson (Edelson, Gordin & Pea, 1999). However, it is also known that research-based learning activities improve students' motivation (Bilir, 2015).

In addition, the importance of the teacher's guiding role in this process (Ash, 2000) is clearly evident at many stages of research and observation skills. Students may lose the integrity of research skills from time to time. They may deviate from the research question by making wide perspective observations. On the contrary, they can also make very shallow, narrow-perspective observations. At these points, the importance of the teacher's guidance is understood. Özdemir and Işık (2015) also revealed in their study that the teacher's guiding role is very important in the research and observation stages. Especially in research-based applications, the teacher's guidance is important in developing students' scientific process skills (Yıldırım & Altan, 2017). In this study, the observation skill progressed together with the prediction step, which is the third step of the research. Students learnt to confirm the prediction result through observation skill. In the study, the more the subject of observation was from life, the wider perspective they made their observations. This situation is in direct correspondence with the principle of close to far principle of the Life Studies course. For this reason, lessons are planned by considering the immediate environment in the Life Studies course (Uçar, 2004). In addition, while using the prediction skill, students either made predictions based on a criterion or made random predictions. In a study, it was concluded that students who made random predictions were ones with low metacognitive knowledge (Şengül & Budak, 2017). However, in this study, students' metacognitive knowledge levels were not addressed. In this study, students made random guesses that were not related to the topic.

Another result of the research is that the students received information only from the internet during the data collection phase. They preferred to record the data by taking notes. It is thought that this situation may have been caused by the students' choice of the easily accessible way of obtaining information and the familiar way of organising data. In addition, students developed awareness about the stage of collecting and recording data. Initially, students perceived research only as a data collection process. As a result of the study, they tried to find appropriate answers to the research questions by filtering the information. At the end of the process, they were able to explain and apply at least one of the research steps correctly. Students had a positive perception change about the research process. However, they had difficulty in interpreting the information they accessed from the internet during the research process. At this stage, they tended to abandon the research, or their motivation decreased. Students could not decide which information to choose among the large amount of information on the web. According to experts, information should be short. As it expands, it becomes difficult to make a decision when selecting because of the details (Durna & Demirel (2008). A similar study shows that unnecessary, complex, and dense information on the internet is information pollution. This pollution leads to results such as giving up searching for information and low motivation (Fırat & Kurt, 2008, as cited in Fırat & Kurt, 2015). In the literature, it is seen that students have difficulty in extracting the information on the internet (Yalçınalp & Aşkar, 2003) or they do not know how to use the information and resources they access (Ekici & Özenç-Uçak, 2012). This situation reveals the importance of applied studies that teach students how to use the information they access.

At the stage of organising the data, it was observed that the students tended towards a single type of arrangement in organising the information and preferred to create tables that they were familiar with. In this study, creating tables and graphs was easy due to the fact that the topic was previously covered in the mathematics course. In fact, the problems that Taşdemir, Demirbaş & Bozdoğan (2005) observed in their study on reading and interpreting graphs in the Science course, which arose from the lack of numerical operations, reveal the importance of this cooperation with the mathematics course. In

addition, another study shows that mathematics skills are highly effective in predicting table skills (Pala & Başıbüyük, 2019, p.51). In the last step, explaining the data, students explained the data in a single sentence or tended to summarise the topic.

As a result, inquiry-oriented learning activities develop research skills in students. Similar results were also seen in the literature (Bilir, 2015). However, this development does not evolve at the same rate in all steps of the research. For the research skill to develop fully, its sub-steps should have been improved separately before. Research skill is simplified by considering it separately from its sub-steps. It is more complex than it seems, but it is not at a level that cannot be gained. In addition, teacher guidance is also very important for this skill, especially in primary school. With the right and good guidance, research skills can be developed, and scientific process skills can be gained in children from an early age.

As a result of the research, it is possible to make the following suggestions:

- Sample activities suitable for the stages of research skill can be presented in Life Studies textbooks.
- The sub-steps of research skill can be studied separately.
- The number of objectives directly related to research skills in the Life Studies programme can be increased.
- Other methods and techniques can be used to improve the research skills of students at the third-grade level of primary school.
- The frequency of studies on research skills in the Life Studies programme can be increased.
- Primary school studies on which skills students need when using research skills can be diversified.
- In another study, students could be asked to format the data as a table using different methods.

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First-Year Teachers' Perceptions of Pre-Service Wellness and Physical Activity Integration Coursework and the First-Year Transition

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ABSTRACT

First-year teachers face a plethora of challenges as they enter the education profession. In addition to transitioning frameworks of pedagogy to real-world application, teachers are also learning to collaborate with colleagues and adjust to required curricula. Though pre-service teacher training can help mitigate some of the initial challenges for those who are entering the classroom for the first time, it is important that the training is effective and comprehensive. Teacher preparation coursework should address both subject-area pedagogy and supports that are available during first-year challenges in order to yield the best outcomes for its graduates. The present study aimed to explore the impacts of a wellness and physical activity endorsement program on first year teachers' preparedness and pedagogy as they entered the classroom. Using a phenomenological approach, the researchers utilized a focus group to measure first-year wellness and physical activity endorsement teachers' perceptions of coursework and its impact on pedagogy, preparedness, and usefulness of the endorsement program during the first year teaching experience. Following data analysis, three themes emerged as follows: (a) feasibility of putting it into practice; (b) sharing and collaboration; and (c) preparation is in the details. These findings suggest that the components of this wellness and physical activity endorsement program may help prepare and increase the self-efficacy for first year teachers, and could be applied to other programs in order to mitigate the challenges first year teachers encounter.

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INTRODUCTION

Teacher attrition across the globe has emerged as a major concern over the past decade, with nearly a third of all newly-hired teachers leaving the profession within the first five years (National Education Association, 2022; Whalen et al., 2019). Promising young teachers are leaving the profession at an alarming rate due to the expectations of carrying out the same tasks of an experienced teacher with limited support while learning new and complex parts of their daily routine: school environment, policies, curriculum, testing, and time-management (Barnum, 2023; Diliberti et al., 2021; Sözen, 2018). Subsequently, challenges during the transition from pre-service to first-year teacher can cause teachers to view their work as frustrating, unrewarding, and difficult, leading to an increase in resignations from the profession (Fantilli & McDougall, 2009; National Education Association, 2022; Varghese, 2022).

First-Year Teacher Challenges

Common challenges for teachers include time constraints, classroom management, and a robust curriculum. However, Sözen (2018) proposes that a first-year teacher's challenges emerge when they are not provided access to an effective mentor teacher and/or there is a lack of dedication to professional development. First-year teachers have also reported a lack of support from colleagues with regard to discipline and instructional practices (Cakmak et al., 2019), leading to feelings of isolation and even the loss of a first-year teacher. When a lack of instructional support is present teachers are less likely to utilize student-centered and innovative methods, which have been directly linked to improved student behavior, interest, joy, and responsibility for learning (Silva et al., 2021).

Lack of Instructional Support and Autonomy

It is common for teachers to have minimal autonomy over the curriculum they are required to teach. This lack of autonomy coupled with limited availability of supplies, time, space, content knowledge, and self-efficacy tends to discourage first-year teachers from investing time into the implementation of innovative pedagogical approaches (Johnson & Dabney, 2018). Compounding this issue is a lack of professional autonomy regarding teachers' abilities to explore new teaching strategies, such as collaborative learning or student-centered methods. While first-year teachers may have been exposed to innovative pedagogy during their time in teacher preparation programs, the constraint over instructional autonomy may inhibit new teachers from transferring learned pedagogies during pre-service coursework to their classrooms (Whalen et al., 2019).

Addressing First-Year Transition Challenges

Providing Support Mechanisms

While there are a multitude of challenges first-year teachers encounter as they transition from pre-service teaching to a classroom of their own, administration and veteran teachers can ease this process through the use of collaboration. Collaboration may be stimulated by providing planned teacher collaboration days, relationship building opportunities (i.e., welcome clubs), and vising other teachers' classrooms with clear intentions. When collaboration occurs, first-year teachers gain a sense of acceptance in their new environments, which helps foster their sense of belonging (Sözen, 2018). Beyond collaboration, Whalen et al. (2019) suggests providing opportunities for first-year teachers to observe peer teachers and then teach the lesson they observed to better understand and improve upon different teaching strategies and methods applicable to course content. Although this idea may resonate well in theory, first-year teachers report feeling anxiety and stress around seeking alternate sources of guidance and assistance from mentors or veteran teachers for instructional support (Dias-Lucy & Guirguis, 2017).

Cultivating Relationships

Before first-year teachers can begin to overcome challenges regarding curriculum, Sözen, (2018) notes that school administrators should work to cultivate an environment that supports the development of healthy

social and professional relationships between colleagues. Fantilli and McDougall (2009) suggest administrators should promote and create a sense of schoolwide culture by developing a resource model. Within this model, teacher leaders are easily accessible to first-year teachers and can help mitigate the anxiety and stress first-year teachers may encounter soliciting assistance on their own. Additionally, providing first-year teachers with professional development on orientation programs that brief teachers on the curriculum and expectations regarding it can help to bridge the gap between pre-service and curriculum, mentorship, and overall expectations for first-year teachers.

The Role of Teacher Preparation Programs

While the challenges for first-year teachers emerge once they have autonomy in their classroom, it has been suggested that core curriculum within teacher education programs should better address support mechanisms for the first-year teacher transition (Sözen, 2018). One way that teacher educators can better prepare first-year teachers is through the facilitation of discourse surrounding curriculum, research-based approaches to teaching, and new educational theories (Douglas, 2017). Cakmak et al. (2019) support this notion by stating that countries such as Turkey and Norway have begun to require more coursework regarding discourse around research-based, subject-specific methods.

The coursework on new and innovative pedagogies that pre-service teachers receive during teacher preparation is critical, as first-year teachers bring innovative and transformative approaches to teaching at their new schools (Whalen et al., 2019). However, it is not unusual for first-year teachers to be unable to share such pedagogies, as the barriers that they encounter can interfere with their capacity to reach beyond the minimum of just getting through daily tasks expected of new teachers. Despite these challenges, with administrative support, autonomy of curriculum and professional development, instructional support, and mentorships, new teachers may be able to utilize learned innovative methods in their classrooms, and even beyond into other facets of their new school (Sözen, 2018).

Developing Support Mechanisms Through a Wellness and Physical Activity Pre-Service Coursework

The challenges of first-year teachers can certainly be consuming and if not addressed, such variables can inhibit growth in a teacher just beginning his/her career or even prompt a teacher to resign. However, if teacher preparation programs can cultivate programs and corresponding curricula that aim to promote the overall success of the first-year teacher transition, then such challenges might be successfully mitigated. One program that aims to both provide innovative pedagogy while also supporting first year teachers in navigating common challenges was instated in 2015 in a teacher education program at a University in the Southeastern United States. As an add-on to an elementary or special education teacher's license, a four-course teaching endorsement in wellness and physical activity integration (see Appendix A) was developed in 2014 and approved by the state's board of education in 2015. To our knowledge, this endorsement is the only one of its kind in the United States within a teacher education program.

Theoretical Framework

The premise of this endorsement was to systematically design four scaffolded courses through a constructivist approach to provide pre-service teachers with the capacity to effectively create and implement an integrated standards-based curriculum consisting of all academic areas alongside wellness and physical activity (e.g., health and physical education standards). Simultaneously, the endorsement coursework provides students with effective tools to combat the challenges present during their first year of teaching as outlined in the literature above. These factors are taught and discussed within each course and students are provided opportunities to practice the skills learned through peer teaching, by developing an active classroom management plan to implement for daily tasks and routines once in student teaching, and an opportunity to develop and teach a fully integrated unit plan during their last semester with support from their mentor teacher, university supervisor, and the endorsement course teacher. This shift in developing assignments from a purely cognitive understanding to enacting the learned practices provides a theoretical lens of practice-based teacher education through which pre-

service teachers are asked to embody the pedagogy as opposed to being passive consumers of information (Hurlburt & Krutka, 2020).

Additionally, the endorsement provides a platform for pre-service teachers to transition smoothly into a classroom where they have been prepared to meet the social, physical, emotional, cognitive, and environmental needs of all students. Research indicates that when children's needs are met in the classroom, their academic and behavioral performance improves (Diamond, 2010). During the first two courses of the endorsement, students learn, develop, and enact standards-based wellness and physical activity integrated activities and lessons. This integrated and innovative approach to the elementary curriculum provides ample opportunities for pre-service teachers to not only learn the wellness and physical activity content but also to share it with teachers and implement it during their student teaching and receive real-time feedback. Ultimately, the underlying constructs of the wellness and physical activity integration courses aim to pair new and innovative methodologies in courses alongside support tools to aid pre-service teachers in bridging the gap of instruction, mentoring, management, and daily routine tasks from pre-service to in-service teaching.

METHOD

Design

In order to determine first-year teachers' perceptions of the four-course endorsement on their preparedness, ability to transition during their first year of teaching, impact on pedagogy, the usefulness of coursework, and student learning, a phenomenological approach was utilized. Phenomenology is a qualitative method that asserts humans can formulate meaning from the world around them through their personal experiences (Husserl, 1931; Hourigan & Edgar, 2020). More specifically, a phenomenological approach was employed through the lens of a focus group, in order to elicit more understanding than may be reached through individual interviews. Ultimately, leading to increased knowledge surrounding the teachers' lived experiences as it related to the impact of the endorsement courses on their first year of teaching. Thus, first-year teacher graduates of the wellness and physical activity endorsement participated in a focus group wherein the following research questions were addressed:

RQ1: What are first-year teachers' perceptions of the wellness and physical activity endorsement coursework as it pertains to their pedagogy and students' learning?
RQ2: How do first-year teachers perceive the wellness and physical activity endorsement courses regarding their preparedness for their first year of teaching?
RQ3: What are first-year teachers' perceptions of the usefulness of the wellness and physical activity endorsement coursework as described through their first-year teaching experiences?

Research Intruments and Procedures

All participants were first-year elementary teachers across Mississippi who had graduated with a wellness and physical activity endorsement from a teacher education program at a University in the Southeastern United States in May 2021. A recruitment email (see Appendix B) was sent to all 12 graduates of the wellness and physical activity endorsement who were currently teaching in their first year in Mississippi in April 2022. Thus, a convenience sample was utilized, as all possible participants had been part of the wellness and physical activity endorsement graduating class of 2021.

The focus group began at 4:45 p.m. Central Time and lasted for approximately 1.5 hours. It was both audio and video recorded via Zoom with verbal participant permission. Before the start of the focus group the researcher, who acted as the facilitator, read a script (see Appendix C) that shared the purpose and goals of the study with participants as well as the protocol for the focus group. As suggested by Stewart and Shadmasani (1990), all questions were developed so that they moved from general to more specific and were chronologically ordered with the most important foci of the research agenda first.

Table 1

First-Year Teacher Demographics

Teacher	Grade	School District	Race	Gender
Yuri	1st Grade	Oxford School District	African American	Female
Brianna	1st Grade	Madison County School District	White	Female
Katie	2nd Grade	Lafayette County School District	White	Female
Kayley	2nd Grade	Lee County School District	White	Female
Sara	3rd Grade	DeSoto County School District	White	Female
Karina	5th Grade	DeSoto County School District	African American	Female

Focus Group

A focus group was utilized for this research study to garner rich understandings of participants' perceptions and beliefs regarding their experiences as they pertained to the wellness and physical activity endorsement courses and their first year of teaching. Focus groups are employed by researchers to garner in-depth insight from participants regarding the topic under study (Morgan, 1998). There was already a level of comfort between the participants as they had previously taken coursework together. These prior relationships created a dynamic in the focus group that Jarett (1993) notes is beneficial in regard to self-disclosure. All participants openly shared their real-world experiences in alignment with the questions asked within the focus group. The use of group work played an important role in this research, as the focus group provided a unique platform for group members to clarify and express their views and perceptions more clearly, which would be much less accessible in a one-on-one interview (Kitzinger, 1995).

Out of the 12 participants invited to participate in the focus group, 6 participants (see Table 1) signed up for the focus group online and attended on May 10, 2022, via Zoom. Demographics of the participants consisted of 67% White and 33% African American. Zoom was chosen as the platform for data collection to make it accessible to all participants, as the teachers were still finishing up the school year in various geographic locations across Mississippi. After participants signed up for the focus group, a consent form approved by the University's Institutional Review Board was sent to each participant to sign and return to the researcher.

Data Analysis

The focus group data were first transcribed verbatim. During the transcription process, all participants were identified through the use of pseudonyms provided by the participants during the focus group. During the next phase of data analysis, the transcript was coded with a word or short phrase identifying the content of a sentence or paragraph utilizing MAXQDA, 2022 software (Qualitative Analysis Software, 2021) by the researcher and a graduate research assistant. This coding process enabled the researchers to make the raw data more sortable and thus provided a platform for examining and describing all data (Punch, 2013). After coding, the researcher and graduate research assistant met to compare and contrast their findings. Subsequently, the codes were synthesized for commonalities and categorized for further analysis to determine the underlying themes that emerged from the focus group.

FINDINGS

Once the transcript was analyzed and data were coded, three underlying themes emerged from the focus group. These three themes were categorized as follows: a) feasibility of putting it into practice; b) sharing and collaboration; and c) preparation is in the details.

Feasibility of Putting it into Practice

Integrated Activities, Transitions, and Management Strategies

As teachers reflected on how they had implemented what they learned through the wellness and physical activity endorsement courses different takeaways were shared regarding what they had been able to immediately

implement with ease during their first year of teaching. This theme is connected directly to research question one regarding first-year teachers' perceptions of the wellness and physical activity endorsement coursework as it pertains to their pedagogy and student learning.

Some teachers focused more on small strategies used in their classrooms, while others shared their ability to adapt activities, lessons, their own pedagogy, and tools learned during the endorsement courses. One outcome noted was the connection to academics, as teachers shared how they implemented integrated activities throughout the focus group. One teacher noted, *I haven't figured out how to implement everything yet, but my kids love when we do the ABC movement activity where we touch our shoulders for consonants and our toes when we say the vowels.* Another activity shared by a teacher was how she *used music and movement activity videos to get students engaged… It was a money dance where students would move and show the value of cents with their hands. My kids aced their math test that week.* Another integrated activity learned during the endorsement courses and put directly into practice by a first-year teacher was described as follows:

We have vocab every week and I have hashtags that go along with our vocab that we do. At the beginning of the school year I created a hand motion for them to do, we stood up, and then went over vocab and I created the motion for them to do to go along with the word. As the year went on, I put them in groups and they created the motion for them to remember the word. I think that was very good for them. It helped them learn the word but it also got them up and moving so I think that they were able to you know sit there and take the test and then go, oh we did this and this helps me remember what this word means. So, I think that it definitely does help with their learning and just to get them up. I think that's the main thing! (Katie, 2nd Grade Teacher)

Beyond instructional activities and lessons, one teacher mentioned the importance of some of the different movement activities utilized as transitions and management strategies learned during the endorsement coursework. Two teachers specifically noted their ability to feasibly implement brain breaks into their daily teaching routine. One teacher shared that she uses brain breaks as an opportunity to also reiterate what the students are learning:

I make sure to do brain breaks in between different things and then for example, if we're learning something big, like we learned measurement, and I use their bodies for that. When we learned about money I had them use their hands and stuff for that so, all the things that they're using that they're able to touch and feel they love! (Yuri, 1st Grade Teacher)

Brain breaks were also noted as a tool for students to "regain their attention" during or between instruction as noted by the following teacher's comment:

I do a lot of brain breaks. If I notice that they're getting sleepy or tired or they're not really paying attention I'm like okay, get up! And they're like [startled look]. *They wake up a little bit and then we do a few things, but I think that brain breaks are the biggest thing for me.* (Sarah, 3rd Grade Teacher)

Another strategy that emerged during the conversation was the use of the "movement box," which is a strategy learned during the third endorsement course, EDWP 342, as a management tool for providing personal space in the classroom for students to move within. The following statement describes how one teacher introduced the movement box to her students at the beginning of the year and how she continues to use it:

I just showed them what a music box is at the beginning of the school year. So every time we do anything physical, they know to get behind their chairs and get in their music box. And I also use it for brain breaks and different things like that. Oh, and I also have one student that cannot stay in her seat, so as long as she's in her music box, she's fine. But they definitely work, and it has helped with my patience as well. (Yuri, 1st Grade Teacher)

Flexible Seating

Another recurring theme that teachers noted they were exposed to during the endorsement courses and able to immediately put into practice was flexible seating. One teacher's observation was that *if they are able to sit comfortably then they're more attentive to you.* The same teacher also noted that *flexible seating has been the*

biggest thing I've implemented this year. This notion was iterated by her experience with flexible seating during her first year of teaching as noted below:

I've used a lot of flexible seating. And that has been beneficial for a lot of students. I have one kiddo that can't sit still whether he's on the floor or in his chair, anywhere it doesn't matter where he is, he can't sit still. So, at times the flexible seating has been good for him. So, it's kind of just going day by day to figure out what works for him, but overall, the class enjoys getting up and moving and being able to sit in something other than just a regular chair. (Katie, 2nd Grade Teacher)

Flexible seating that was mentioned throughout the focus group were wobble chairs, stools, balance ball chairs, and floor cushions. While one teacher mentioned that she used "floor cushions" for her "reading center," another teacher noted that she used "round stools at her teacher table." Concerning students' reactions to flexible seating, one teacher noted the following:

The kids like the ball chairs the best. It's neat to see them use those because they haven't had that in kindergarten or first grade and I'm teaching second grade. So, when they walked in and saw them on the first day of school, they were like oh my gosh what is that? (Katie, 2nd Grade Teacher)

Although the students' reactions to the use of flexible seating were positive as noted by 4 of the 6 teachers in the focus group, one teacher noted her challenges with the use and implementation of flexible seating during her first year of teaching:

I have four wobble chairs, I have the four stools, and then I had five bouncy ball chairs and somebody took a pencil to the side so I have four now. And then five of those cushion seats that I showed you, so 13 options. I think that if the school could, or any school was able to supply these things it might be a little easier that way everybody could have something and then the teacher could say 'hey this one works for so and so' and then you do it that way. And then you wouldn't have a problem of well he gets it and she doesn't and vice versa. (Brianna, 1st Grade Teacher)

Social-Emotional Tools and Teachable Moments

Another component built into the endorsement courses are social-emotional wellness and tools for teaching social-emotional skills. This is an area that all of the teachers shared they had intentionally worked on throughout the school year. While some of the social-emotional instruction was required by their schools, much of it was in direct alignment with ways they had opportunities to practice it in the endorsement courses. One teacher noted that she used *books in the very beginning to talk about social-emotional skills.* A particular book and how the teacher aligned the activity to it is described below:

We used I Promise which is a Lebron James book to come up with our own class promise. For example, I promise to be kind, I promise to respect others, I promise to help others, I promise to listen, I promise to take care of our classroom, and we promise to work hard, and we promise to have fun. So, I think that allowing them to help create those 'rules,' I don't like to call them rules, but just a promise that we follow was very fun for them in the beginning. (Katie, 2nd Grade)

Beyond utilizing literacy to teach personal responsibility as a social-emotional skill, another teacher noted that *social awareness and how students speak to one another* was something she had to work on with students during her first year. This teacher also noted she had conversations with students about how *what we say with our words is important* and she described a kind words and compliment activity she implemented wherein students had to *write something nice about their classmates throughout the week and place them in a mailbox.* After students placed their positive compliments in the box, she noted that she told the class, *you see we have so many nice things, and a lot of times that's not our first reaction.* Another teacher noted that a lot of teaching social-emotional skills comes from *what we learned in your class…. Even just stopping to talk to them when they come up to me mad or frustrated and asking them why they are feeling that way.* The teacher went on to say that for students who have difficulties with self-regulation, she will *stop them and ask them to backtrack to have a conversation about why it escalated and what problem-solving we can do to move forward.* A final comment

about developing social-emotional skills was about affirmations, which are practiced throughout the endorsement courses.

I guess motivational things like for social and emotional before we take the test, we say I'm smart, I know this material, and I will ace this test! That's definitely helping them just build their confidence, and assessments have definitely gone up. (Karina, 5th Grade Teacher)

Sharing and Collaboration

Another theme that emerged from the teacher focus group was the capacity to share learned ideas from the endorsement courses and collaborate with team teachers. One teacher noted, *I share everything that I learned during the endorsement courses, and whatever I come up with I make sure to share it with my pod teachers.* This theme connects directly back to research question two and the usefulness of what the teachers learned during the wellness and physical activity endorsement. This teacher went on to elaborate and provided a detailed example of how she uses what she learned during the endorsement courses to collaborate with her team teachers:

So, I'm in purple pod. I have taught them about the music boxes and also the physical activity as far as like, we were doing the butterfly life cycle. I remember in class [endorsement course] *that it was a book that we read and then we had the shoes and we had all of the instruments that go with everything to tell the story. So, I was thinking let's do it with the butterfly life cycle and my kids got to reenact the butterfly life cycle and we had the butterflies so they had the whole nine. And then one of my pod teachers was talking about how they didn't do plays so I was like let me make this into a little play. Our kids loved participating in that lesson and collaborating with my pod was great!* (Yuri, 1st Grade Teacher)

During the process of sharing about lesson development and management, the same teacher noted the following:

I provided an example, so what it [my dance sequence] *was supposed to look like, well I call it a little eight count and I just made sure that they knew the eight count. As far as the management for grouping and creating the movements for the life cycle, I matched them in groups like you did in the endorsement class and everyone got a prop to use for their part of the life cycle. I also made sure I didn't put friends together, and I made sure that they were thinking… we made it work and the teachers and kids had fun!* (Yuri, 1st Grade Teacher)

In addition to sharing instructional ideas, one of the teachers shared that she had been able to provide ideas regarding flexible seating to her partner teacher and was able to learn alongside her partner teacher as a "trial and error kind of year."

I showed my partner teacher these [balance balls] *and then she ended up getting some ball chairs too. She told me before she left today because I told her what I was doing this afternoon, she said 'You know I don't know that I used these correctly this year.' She was like 'I wish I would've done it a little differently.' She's had a very rough class and they don't mix very well and so at first, she tried to use it as a "good" behavior chair, and I was like that's not going to work. So now, she wishes she would've used it for the kids who needed it based on their behavior not necessarily because they were good and they deserved it. So, that was neat to watch happen and help her be able to kind of trial and error with the flexible seating this year.* (Karina, 5th Grade Teacher)

Another teacher mentioned a simple strategy of playing music as students entered into the classroom that she had shared with her Clinical Instructor during her student teaching and how the Clinical Instructor had picked up on how *well it worked getting students into the classroom quicker and quieter.* She shared her experience below:

You know last year in student teaching as the kids were walking into the classroom their to-do list was on the board and I always had music playing in the background. I like that myself, it helps me work. I might sit there and sing a little bit with it but, it's not distracting to me, but I know it can be distracting to some. So just playing music, I like to do that and the kids love it and my Clinical Instructor still does it in her classroom to this day after I shared it with her. (Brianna, 1st Grade Teacher)

Preparation is in the Details

Teachers also shared anecdotes regarding how the coursework set them up for success in different areas during their first year of teaching. This theme underpins research question three which alludes to the first-year teachers and their preparedness for their first year of teaching. One teacher mentioned the following in regard to being prepared:

I felt very prepared. On a scale of 1-10 I'd say probably a 9. I say that because of all the details we were asked to put into our lesson plans in the endorsement courses and all of the great discussions we had in class and I was able to have with my Clinical Instructor during student teaching. And even though where I'm at now doesn't require that much detail in my plans, I still make one similar to what we did in the endorsement classes because it just helps when I teach the lesson. (Sara, 3rd Grade Teacher)

Adding to the teacher's comment above another teacher outlined how the courses helped her to transition into her first year below:

> *I definitely felt very prepared for my first year and like she* [Sara] *said even lesson planning, we don't lesson plan here either, but knowing how to do that helped me feel like my foot was in the door in regard to the curriculum and instruction and how I'm supposed to be and am expected to teach the material. I feel like I learned not just how to teach, but also how to manage in the courses. The endorsement courses taught real-life lessons in what to expect and what we're getting into. Because of this I feel like my transition into my first year of teaching has been so much easier than some of my friends who are first-year teachers and did not take the courses.* (Kayley, 2nd Grade Teacher)

The word "details" emerged several times during the focus group, as one teacher shared that *we were asked to put so much detail into our lessons, and that did prepare us for our first year and the expectations of teaching so much curriculum.* Another teacher went on to share the following about her perspective on the endorsement courses and feeling prepared.

I would say that these endorsement classes prepared me for the classroom more than the other teacher education classes that we had to take. Because of how in-depth we were asked to be, which I greatly appreciate that looking back. I'm so glad I took these courses because I can now see the difference in a kid, you know sometimes they just need to be standing up or sometimes they just need to sit in a chair that's not the chair that has been given to them and you figure that out as the year goes on but I think that we were definitely prepared after taking the endorsement courses in terms of curriculum, how to seek help and collaborate, how to manage, and most importantly how to truly provide for the needs of the children in our classrooms. (Katie, 2nd Grade Teacher)

One last anecdote was shared by a teacher in regard to early immersion into the classroom and how it benefited her confidence in managing the classroom, instructional capacity, as well as developing relationships. She shared the following:

Within the endorsement courses, we had so many opportunities to practice and reflect on our skills in the actual classroom. Even though we had class on campus, we were asked to create and apply our assignments in the field during our junior year and also through our senior year of student teaching. I always felt like I was creating and implementing in collaboration with my Clinical Instructor and not just doing what my Clinical Instructor asked me to do. This is because of the expectations and assignments in the endorsement courses. Because of this I was able to have a lot more "real" classroom experiences, which has made my transition into my first year of teaching so much more seamless than I thought it would be and for that I am grateful! (Brianna, 1st Grade Teacher)

DISCUSSION

Results from the present study indicated that first-year teachers who completed all four wellness and physical activity endorsement courses were able to immediately translate many aspects of what they had learned into practice, share and collaborate with team teachers on ideas learned within the endorsement coursework, and identify how the coursework had prepared them for the realities of teaching and an easier

transition into their first year of teaching. In congruence with the literature, all teachers noted that they were able to bring with them different aspects of what they had learned during their pre-service coursework into their classroom (Glogger-Frey et al., 2022; Whalen et al., 2019; Yang, 2012). While some teachers shared specific strategies, methods, or lessons they had translated from pre-service to in-service teaching, others noted that one of the biggest things they brought with them was the ability to implement flexible seating to support their students' needs. Several teachers also identified the immediate benefits of using flexible seating, such as "increased attention" and higher levels of "focus" and "engagement." This is important to note, as pre-service teachers in the endorsement courses have ample opportunities to discuss, research flexible seating, present on it in class, while some even experiment with it during their student teaching. Additionally, several of the learning spaces that the participants had classes in during pre-service endorsement coursework mirrored that of elementary classrooms with flexible seating, wherein they were provided opportunities to test out several types of flexible seating while learning. Franklin and Pleis (2022) note that if the college environment that pre-service teachers learn within is to be relevant, then the setup should mirror real-world elementary classroom settings. While there is minimal research surrounding college and elementary classroom design and the enhancement of pre-service teacher learning, these findings might suggest that when provided the opportunities to have discourse and practice new ideas and strategies, self-efficacy increases, and first-year teachers are more apt to implement them once in their classroom (Douglas, 2017; Nelson et al., 2015; Pepper et al., 2012).

Due to the practice that teachers were able to garner during their pre-service wellness and physical activity endorsement coursework, a majority shared that their self-efficacy had increased regarding integrating wellness and physical activity into their daily routines. In alignment with the research, this self-efficacy is critical to the translation of learned best practices in teacher education programs into the field. Johnson and Dabney (2018) note that a lack of self-efficacy can dissuade beginning teachers from implementing innovative pedagogical approaches. All of the teachers shared their self-efficacy of wellness and physical activity integration through the many ways they had turned what they learned into practice. This underpins one of the biggest pre-cursors to first-year teachers' abilities to expand and share their knowledge on integration beyond their classroom through collaboration. Collaboration is noted in the literature as a key support factor for first-year teachers that provides a sense of acceptance and belonging (De Jong et al., 2019, 2022; Sözen, 2018). This sense of belonging through collaboration is at the cornerstone of the development of the wellness and physical activity endorsement courses. As noted by one of the teachers, "I was able to collaborate with my Clinical Instructor instead of just doing the given curriculum." These opportunities assisted the first-year endorsement graduates not only in becoming more self-efficacious, but also knowing "how" to work alongside and with their first-year team of teachers, which can lead to higher levels of job satisfaction (Whalen et al., 2019).

Knowing how to traverse the first year of teaching in the real world can be challenging. Lack of instructional support, mentoring, time constraints, and behavioral management can all impact a first-year teacher's success (Cakmak et al., 2019; Dias-Lacy & Guirguis, 2017; Hornstra, 2021). However, findings during the focus group diverged from the research as teachers noted that they felt very prepared going into their first year of teaching. More specifically, teachers shared that because of the endorsement coursework that asked them to collaborate with their Clinical Instructors, develop and apply management strategies, enact integrated lessons and activities for almost two years, and place ample detail into their lessons while creating units on their own from a trans-disciplinary approach, they did not waver when asked to create and implement lessons or a robust curriculum at their school. Some even mentioned that their *schools didn't require lesson plans*, but because it helped them with their pedagogy they *created them anyways*. The assignments in the endorsement were built to mitigate first-year teacher pitfalls that can prompt beginning teachers to leave the profession, such as exposing them to daily routines, expansive curriculum, assessments, classroom management, and the ability to collaborate with a team of teachers (Chambers Mack et al., 2019; Marshall et al., 2022; Sözen, 2018). Because the courses are scaffolded and provide multiple layers of support as students move from sophomore year into junior year field observations and into their student

teaching, they have a multitude of opportunities to develop and implement integrated and innovative curricula with support and opportunities for reflection and growth. This real-world experience was noted as an indicator of success by several of the participants and serves to reason that more pre-service coursework should mirror real-life elementary classroom environments, routines, and pedagogy to set first-year teachers up for success.

Limitations

This study is not without limitations and the researcher recognizes that the teachers who participated in the focus group were primarily lower elementary teachers. Additionally, the focus group took place during a year when COVID-19 Pandemic measures were still being implemented, which the researcher acknowledges could have played a role in the outcomes of the study due to restrictions placed on teachers (e.g., classroom spacing, limited student interactions, and limited movement throughout the school). Lastly, a limited number of teachers were able to participate in the focus group, as the endorsement is limited to one University and only has a limited number of graduates each year.

Future Research

To address some of the limitations that emerged from the study, future research may seek to include additional upper elementary teachers in data collection. Additionally, to garner patterns in the data over time, a longitudinal study that seeks to gather data from first-year endorsement graduate teachers over a period of time would be helpful. It may also be useful to examine future teachers who graduate with the endorsement outside the state of Mississippi to determine if the results are similar or if teaching in different states elicits any different findings.

CONCLUSION

Teacher attrition for beginning teachers is escalating at an alarming rate. In acknowledging this, it is important to identify ways to mitigate challenges that a first-year teacher encounters during a critical transitional period. Teacher preparation programs play an essential role in cultivating teachers who are prepared for the many trials that the first year of teaching presents. This study identified several ways to provide support mechanisms during teacher preparation coursework that pre-service teachers need both during pre-service coursework and once in their classroom (i.e., collaboration, integrated and detailed curriculum development and implementation, discourse on timely organizational, behavioral, and time management, and innovative strategies and methods). While pre-service teachers were provided with the aforementioned information, what is unique to this study is that they were also given ample opportunities throughout the four-course endorsement to enact and embody the practices they had discourse on during their classes, leading to first-year teachers who were prepared and confident in their abilities to both practice and share their new and innovative ideas during their first year. When provided with such opportunities during pre-service coursework it opens the door for in-service teachers to not only be successful in their classrooms but to also collaborate with peer teachers while developing a sense of belonging and a rewarding year of teaching. Ultimately, leading to teachers who have self-efficacy in the skills needed as a first-year teacher and a desire to return to the classroom year after year.

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Relationship between lifelong learning tendencies and self-directed learning skills of teacher candidates[1]

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ABSTRACT

The aim of the research is to investigate the relationship between teacher candidates' lifelong learning tendencies and self-directed learning skills. The research was conducted by the relational research method. The sample contains 529 teacher candidates who were selected by maximum diversity sampling method. In the research, "Personal Information Form" was used to obtain information about demographic characteristics of teacher candidates. "Lifelong Learning Tendencies (LLT)" scale developed by Diker-Coşkun (2009) was used to determine the lifelong learning tendencies of teacher candidates and "Self-Directed Learning Skills (SDLS)" scale developed by Aşkın Tekkol and Demirel (2018) was used to determine self-directed learning skills. Descriptive statistics, t-test, ANOVA and correlation analyzes were used to find answers to the research questions. As a result of the research, LLT and SDLS of teacher candidates are at high levels. Additionally, it was revealed that the LLT scores of teacher candidates differ significantly according to gender, CGPA (Cumulative Grade Points Average) of teacher candidates and their reasons for choosing departments. When the SDLS of teacher candidates examined, it is found that SDLS of teacher candidates did not differ significantly according to gender. Also, it was revealed that the SDLS scores of teacher candidates differ significantly according to CGPA of teacher candidates and their reasons for choosing departments. Furthermore, the relationships between the sub-dimensions of the variables are examined by Pearson correlation analysis and the analysis revealed generally positive and moderately to highly significant relationships between different dimentions of LLT and SDLS of prospective teachers.

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INTRODUCTION

Changes and developments in science and technology, and therefore in information, affect the lives of society and individuals in every aspect. The most important feature of this age is development, and knowledge is the basic element of this development (Akkoyunlu & Kurbanoğlu, 2003). The learning obtained through formal education is insufficient for individuals to adapt to these developments. Thus, it has revealed that it is necessary to raise individuals to meet the needs of society and that the education of individuals cannot be limited to a certain period. Therefore, it has become mandatory for individuals lifelong learning, which represents a continuous learning process (Fischer & Konomi, 2007).

Lifelong learning as a concept was first expressed by Grundtvig in the 1800s, and Commenius's works formed the basic extents of the concept of lifelong learning (Wain, 2000). John Dewey also expressed his views on education in his book *Democracy and Education*, published in 1916. He stated that "There is no end to education, just as there is no end to any development in real life. It is a fact accepted by everyone that education should continue after school ends." Dewey came to Turkey in 1924 and prepared a report to improve our education system. John Dewey and Eduard Lindeman were the first educators to emphasize that education cannot be limited to certain ages and schools (Miser, 2020). In Eduard Lindeman's book *The Meaning of Adult Education* (1926), one can said that he reconciles education and learning with life based on his expressions: "All life is learning, therefore there is no end to education... If education is life, then life is education." (Lindeman, 1969). In this context, the concept of lifelong learning, which corresponds to educational activities that continue from the cradle to the grave, corresponds to the understanding of education that requires continuity at all ages and everywhere. In this context, the concepts of adult education and public education come to the fore. The concept of lifelong learning, which was described as adult education in the early years, has been given different meanings over time.

The emphasis of continuous education was emphasized in the *Green Bulletin* prepared in 1993, a study called *Towards a Learning Society* was prepared in 1995, and the aims of lifelong learning were revealed in the committie report called *White Bulletin* (Ayaz, 2016). Year 1996 was accepted as the 'European Lifelong Learning Year' by the European Parliament and the European Council (Kılıç, 2015). The importance of lifelong learning was expressed and studies on lifelong learning were reported in the meetings held in Lisbon and Stockholm in the 2000s (Gencel, 2013). Moreover, the *Lifelong Learning Declaration* published in 2000 is an agreement on lifelong learning of the member countries and candidate countries of the European Economic Area (Kılıç, 2015). With the *Bologna Declaration* signed in 1999, lifelong learning was considered an integral part of higher education institutions. Higher education institutions are at an important point in developing individuals' knowledge and skills throughout life. The aim of the Bologna process is to ensure that university students have access to the information they need outside theirenvironment and to actively participate in the lifelong learning process (Güneş, 2012). However, it is considered that lifelong learning will be used to solve many problems in our education system by considering society as a whole. Lifelong learning contains the formal and non-formal learning activities executed by the individual in all areas of his life in order to achieve the greatest development in his personal, family, social and business life (State Planning Organization [DPT], 2001).

In order to popularize the Lifelong Learning approach, the concept of lifelong learning has been included in various development plans of Turkey, in the 1739 Numbered National Education Basic Law and in the document of Lifelong Learning Strategy along with the studies carried out in Turkey. In addition, the General Directorate of Lifelong Learning was established in 2009 in order to raise lifelong learners. The general directorate has contributed to many projects since its establishment (HBÖGM, 2014). Turkey gained the right to become a full member of the EU Education and Youth Programs in 2004. Many lifelong learning programs are carried out within the EU Education and Youth Programs Center, which is responsible for the execution of Education and Youth Programs in Turkey (Kıvrak, 2007).

It is thought that lifelong learning is one of the ways out to raise individuals researching, questioning, creativity, communicating, adapting to innovations and using developing technology who are needed in the

new world order, in order for individuals to cope with the ever-increasing mass of information (Epçaçan, 2013). In a way, lifelong learning is seen as a means of developing individuals' personal and professional knowledge, skills or competencies (Aspin & Chapman, 2000; Gu, Gu & Laffey, 2011). For this reason, Dinevski and Dinevski (2004) defined lifelong learning as learning that occurs outside the school boundaries, in other words, within the informal education process. So, the concept of "lifelong learning", which permits individuals to learn the information they need at any age and place, is gaining importance. Therefore, discovering one's own potential, making career plans for oneself, improving oneself and constantly renewing oneself require lifelong education in globalizing societies (Miser, 2002).

Self-management is the individual's ability to control his own learning, in other words, the learner's ability to manage his own learning (Aşkın Tekkol & Demirel, 2018). Self-directed learning gives an opportunity to individuals to take the initiative about in determining their learning needs, revealing their learning goals, determining the resources they need for learning, choosing/using appropriate learning strategies, and evaluating learning outcomes with or without the help of others (Knowles, 1975). According to Long (2001), self-directed learning is a process in which the student undertakes various stages of initiating, planning, implementing and monitoring his or her own learning.

Iwasiw (1987) suggests that there are five stages of self-directed learning. These stages; (a) students identify their own needs, (b) identify learning goals, (c) identify learning resources, (d) identify learning strategies, and (e) evaluate the learning product. Considering these processes, self-directed learning helps students continuously increase their knowledge and skills. Thus, students will be able to support their lifelong learning and raise awareness about their changing and developing personal-professional needs and opportunities (Loyens, Magda & Rikers, 2008). In our age, developments in the internet and information technologies have ushered in a new era in learning. Self-directed learning skills are supported by opportunities provided by the Internet such as increasing the learner's control, accessing information, storing information and communicating (Bulik & Honor, 2000; Long, 2001; Mathai, 2002). Thus, individuals with self-directed learning skills can carry out learning activities even in an intense work tempo, learn at their own pace, monitor their individual development, test their personal learning efforts, and compensate for the geographical boundaries and restrictions that create disadvantages in learning in rural areas (Candy, 2004; Draves, 2002; Hiemstra, 2006).

In the literature on the subject, there are many studies that aim to define the reality of lifelong learning in the process of globalization (Field, 2001; Kaya, 2014); determine the lifelong learning perceptions and views of teachers and teacher candidates (İzci & Koç, 2012; Kılıç, 2015), lifelong learning competencies (Gencel, 2013; Yıldız Durak & Tekin, 2020), lifelong learning tendencies (Bulaç & Kurt, 2019; Diker-Coşkun, 2009; Gökyer & Türkoğlu, 2018; Tunca, Alkın-Şahin & Aydın, 2015) examine the relationships between lifelong learning competencies and lifelong learning tendencies with different variables (Ayra & Kösterelioğlu, 2015; Demirel & Akkoyunlu, 2010; Karaduman, 2015). There are studies in the literature where the concepts of self-directed learning and lifelong learning are investigated together (Recepoğlu, 2021; Sarıtepeci & Orak, 2019). However, it could not be found that there are studies examining the relationship between lifelong learning tendencies and self-directed skills of education faculty students in different departments and at different grade levels.

Today's scientific and technological developments require change, development, obtaining and using up-to-date information. Pre-service teachers, as individuals who are aware of their own learning, should gain ways of accessing information, as well as being higher-order thinker, will support personal and professional improvement. It is important for teachers to have self-directed learning skills so that students can be aware of their own thoughts, draw a strategic path, be motivated, guide them in achieving goals, and ensure self-directed learning. As teachers serve as role models for their students, it is crucial for them to possess the ability to be self-directed learners. By examining the relationship between lifelong learning tendencies and self-directed learning skills, we can better equip future educators for their roles. In the context of teacher education, the need for lifelong learning and self-directed learning is paramount. This research aims to

explore how these two factors are interconnected, providing insights into how we can better prepare teacher candidates for the complexities of modern education. In this context, it is thought that examining the relationship between lifelong learning tendencies and self-directed learning skills of teacher candidates studying at the faculty of education will contribute to the personal and professional development of teacher candidates. For these reasons, it is aimed to reveal the relationship between teacher candidates' lifelong learning tendencies and self-directed learning skills in the research. The problem of this research is; "Is there a significant relationship between teacher candidates' lifelong learning tendencies and self-directed learning skills?" In this study, answers were sought to the following sub-problems:

1. What is the level of lifelong learning tendencies of teacher candidates?
2. Do teacher candidates' lifelong learning tendencies differ significantly according to gender, CGPA (Cumulative Grade Points Average) and department preference reason?
3. What is the level of self-directed learning skills of teacher candidates?
4. Do teacher candidates' self-directed learning skills differ significantly according to gender, CGPA and department preference reason?
5. Are there significant relationships between prospective teachers' lifelong learning tendencies and self-directed learning skills?

METHOD

This research is a descriptive research and quantitative research methods were used in the research.

Research Design

The research was conducted in accordance with the relational research model, one of the quantitative research methods. Relational research is a research model in which the relationships between two or more variables are examined without any intervention to the variables. More clearly, correlational studies are studies in which possible relationships between variables are revealed and the degree of these relationships is determined (Fraenkel & Wallen, 2006).

Research Sample

The sample of this research was selected with the maximum diversity sampling method (Fraenkel & Wallen, 2006), which is among the purposive sampling methods. Purposeful sampling allows the in-depth study of situations that are thought to have rich information (Patton, 1997). The main purpose of maximum diversity sampling is to reflect the diversity of individuals who may be party to the problem to the maximum extent. In other words, the purpose of creating a sample based on maximum diversity is to try to find out whether there are any common or shared facts among diverse situations and to reveal different dimensions of the problem according to this diversity (Yıldırım & Şimşek, 2011). In the research, maximum diversity was tried to be achieved by working with 529 volunteer teacher candidates who were studying in different departments, at different grade levels. The demographic characteristics of the teacher candidates participating in the research are presented in Table 1.

Table 1. *Demographic Characteristics of the Research Sample*

Variable		n	%
Gender	Female	406	76.7
	Male	123	23.3
Grade Level	1. Grade	149	28.2
	2. Grade	188	35.5
	3. Grade	115	21.7
	4. Grade	77	14.6

Branch	Early Childhood Education	92	17.4
	Primary Education	56	10.6
	Elemantary Math. Ed.	44	8.3
	TurkishLang. Teaching	58	11.0
	Social Studies Education	140	26.5
	EnglishLang. Teaching	50	9.5
	Elementary Science Ed.	13	2.5
	Guidance and Psychological Counseling	76	14.4
Total		529	100

When Table 1 is examined, it is seen that 406 (76.7%) are female and 123 (23.3%) are male of the teacher candidates participating in the research. When we look at the grade levels of the teacher candidates, it is seen that 149 (28.2%) are 1st grade, 188 (35.5%) are 2nd grade, 115 (21.7) are 3rd grade, and 77 (14.6%) are 4th grade. In addition, it is seen that 92 (17.4%) are student of Early Childhood Education students, 56 (10.6%) are student of Primary Education, 44 (8.3%) are student of Elemantary Mathematics Education, 58 (11.0%) arestudent of Turkish Language Teaching, 140 (26.5%) are student of Social Studies Education, 50 (9.5%) arestudent of English Language Teaching, 13 (2.5%) are student of Elemantary Science Education and 76 (14.4%) are student of Guidance and Psychological Counseling Department.

Research Instruments and Processes

In the research, 'Personal Information Form' was used to get information about the demographic characteristics of teacher candidates. The 'Lifelong Learning Tendencies' scale developed by Diker Coşkun (2009) was used to determine the LLT of teacher candidates, and the 'Self-Managed Learning Skills' scale developed by Aşkın Tekkol and Demirel (2018) was used to determine the SDLS.

Lifelong Learning Tendencies Scale

One of the scales used as a data collection tool in this study is the four-dimensional "Lifelong Learning Tendencies (LLT) Scale" developed by Diker-Coşkun (2009). The scale contains 27 items regarding students' lifelong learning tendencies. The dimensions of the LLT scale and the distribution of the items are given below:

1. Dimension: Motivation; 1,2,3,4,5,6 all items are positive
2. Dimension: Perseverance; 7,8,9,10,11,12 all items are positive
3. Dimension: Lack of regulation of learning; 13,14,15, 16,17,18 all items are negative
4. Dimension: Lack of curiosity;19,20,21,22,23,24,25,26,27 all items are negative

The dimensions of the lifelong learning scale are determined as motivation (6 items), perseverance (6 items), lack of learning regulation (6 items) and lack of curiosity (9 items), respectively. There are a total of 27 items in the scale. In the overall average of the scale, the minimum score that can be obtained from the scale is 27(27x1) and the maximum score is 162(27x6). High scores get from the scale indicate positive attitudes towards lifelong learning tendencies, while low scores indicate negative attitudes towards lifelong learning tendencies (Diker-Coşkun, 2009).

Sample items for the dimensions in the scale are as follows: Motivation (Developing new knowledge and skills in different fields to improve myself is perfect for me. I can easily learn all kinds of information if I believe that it will provide my personal development. Even though I have sufficient financial potential, I continue to gain new knowledge and skills for my personal development.), perseverance (I like to spend most of my time doing research in order to learn. I strive to gain new knowledge and skills without any obligation. Even if the subject I learn is difficult and complex, I strive to learn it in the best way.), lack of learning regulation (Gaining new knowledge and skillsto ensure my personal development seems meaningless to me. I do not use knowledge sources related to my profession except for necessity. I think I will have difficulty in learning a new knowledge or skill related to my profession.) and lack of curiosity (I do not want to waste my time doing research if it is not necessary. I prefer to spend the time with my loved onesinstead of my personal development.

The concurrent validity of the scale is 0.89. The reliability coefficient of the scale in terms of score

stability is 0.93, and the internal reliability coefficient (Cronbach Alpha) is 0.86 (Diker-Coşkun, 2009). In this study, as a result of the Cronbach Alpha reliability analysis conducted to test the reliability of the LLT scale, the reliability of the scale was found as follows: α=0.915. These values show that the reliability of the scale is high (Büyüköztürk, 2011). Additionally, as a result of the confirmatory factor analysis conducted in this study for the LLT scale, the RMSEA value was found to be 0.05. This value indicates an "acceptable fit". Since the fit indices are between good and acceptable values (GFI: .89; AGFI: .87; CFI: .98; NFI: .96; NNFI: .97; SRMR: .04), four-factor structure consisting of 27 items of the "Lifelong Learning Tendencies Scale" was confirmed. It was determined that the scale had a perfect fit with a chi-square value of 2.76 (Byrne, 2013). The first two dimensions of the scale are positive items expressing incentive and perseverance for lifelong learning, and the last two dimensions of the scale are negative items expressing the inability to organize lifelong learning and the lack of curiosity. Taking this into consideration when analyzing the scale items, the items of the last two subscales were reversed and scored. Responses to the scale items are 1. "It fits a lot", 2. "It partially fits", 3. "It fits very little", 4. It does not fit very little", 5. "It partially fits", 6. "It does not fit at all"as 6-point Likert typerating scale.

Self-Managed Learning Skills Scale

The second scale used in the research is the "Self-Directed Learning Skills (SDLS) Scale" developed by Aşkın Tekkol and Demirel (2018). The scale consists of 21 items and four dimensions. SDLS scale dimensions and distribution of items are given below:

1. Dimensionincentive: 2,4,6,8,13,17,21 all items are positive
2. Dimensionself-monitoring: 1,3,7,10,18 all items are positive
3. Dimensionself-control: 9,12,14,16,20 all items are positive
4. Dimensionself-confidence: 5,11,15,19 all items are positive

When the distribution of the items regarding the dimensions is examined; it is seen that there are seven items in the incentive dimension, five items in the self-monitoring dimension, five items in the self-control dimension and four items in the self-confidence dimension. The answers to the scale items are 1. "Always", 2. "Usually", 3. "Sometimes", 4. "Rarely", 5. "Never". Sample items for the dimensions in the scale are as follows: İncentive (A new situation is an opportunity for learning. I think that learning is a need), self-monitoring (I clearly state my learning purpose. I evaluate my learning performance.), self-control (I systematically monitor my learning process. I benefit from different learning ways), self-confidence (Criticizing myself helps me learn better. I am responsible for my decisions regarding learning.)

The factors of the scale explain 52.906% of the total variance of the scale. The scale is in the form of a 5-point Likert type rating scale. The lowest score that can be obtained from the scale is 21 and the highest score is 105. A high score from the scale indicates that self-directed learning skills are high, and a low score indicates that self-directed learning skills are low (Aşkın Tekkol & Demirel, 2018). In this study, the RMSEA value was found to be 0.06 as a result of the confirmatory factor analysis conducted for the SDLS scale. This value indicates an "acceptable fit". Since the fit indices are between good fit and acceptable values (GFI: .91; AGFI: .89; CFI: .97; NFI: .96; NNFI: .97; SRMR: .06). The four-factor structure of the "Self-Directed Learning Skills Scale" consisting of 21 items has been validated as a model. It has been determined that the scale has a perfect fit with a chi-square value of 2.96 (Byrne, 2013). Cronbach Alpha reliability analysis was performed to test the reliability of the SDLS scale and the reliability of the scale was found to be α = 0.906. These values show that the reliability of the scale is high (Büyüköztürk, 2011).

Data Analysis

In this study, which was conducted to investigate the lifelong learning tendencies and self-directed learning skills of teacher candidates, the lifelong learning scale and the self-directed learning skills scale were applied to 541 teacher candidates. The acquireddata were transferred to SPSS 22 program and the data cleaning process started. For data cleaning purposes, z scores were first calculated for each item, and data with z scores greater than +4 or less than -4 (Mertler & Vannatta, 2005) were excluded from the analysis process; outlier values were deleted and the analysis process continued with 529 data. The normality of the distribution of the scale was examined with descriptive methods and it was seen that the statistical values of the distribution such as arithmetic mean, mode and median were close to each other. Additionally, it was determined that the skewness and kurtosis coefficients were between -2 and +2 values. In order for the distribution to not differ significantly from the normal distribution, it is considered sufficient for the skewness and kurtosis coefficients to be between -2 and +2 (George & Mallery, 2010). In addition, it was decided that the data showed normal distribution by means of histogram curve, box and Q-Q graphs.

After the normality assumption was met, whether the teacher candidates differed according to gender, which is a two-category variable, was investigated with the t-test for independent groups at the .05 significance level. In order to find answers to the research questions, descriptive statistics (arithmetic mean, standard deviation) were primarily used. Whether the candidates' LLT and SDLS differ according to gender, which is a two-category variable, was investigated with the t-test for independent groups at the .05 significance level. In this process, it was examined whether the equality of variances was achieved (p>.05) or not (p<.05) with the Levene test, and these results were taken into account in the interpretation process (Kuzu, 2022). Since the ANOVA test will be taken into account for variables with three or more categories, it was examined whether the lifelong learning tendencies and self-directed learning skills of the candidates differ according to the CGPA and the reason for choosing the department by ANOVA. In this process, Post-Hoc analysis techniques were used to determine which variables differ in statistically significant results. In cases where homogeneity of variances is ensured (p>.05) with the Levene test, Tukey HSD; in cases where it was not provided (p<0.05)with the Levene test, Games-Howell multiple comparison techniques were used (Kuzu, 2022). On the other hand, correlation analyzes were used in the relationship process between prospective teachers' lifelong learning tendencies and self-directed learning skills.

In interpreting correlation coefficients; correlation coefficients less than .25 are interpreted as insignificant, coefficients between .26 and .49 are weak, coefficients between .50 and .69 are interpreted as moderate, coefficients greater than .70 are strong, and coefficients greater than .90 are interpreted as very strong relationships (Kalaycı, 2009). On the other hand, in this study, the lowest score that can be obtained from the 6-point Likert-type lifelong learning skills scale is 27, while the highest score is 162. In evaluating the score ranges, the evaluation process specified by Kuzu (2021) was taken into account and 27 ≤ score <49.5: Does not fit at all; 49.5≤ points <72: Partially not applicable; 72≤ score < 94.5: Very little does not fit; 94.5≤ score < 117: Fits very little; 117≤ points <139.5: Partially fits; 139.5≤ score < 162: Too much fit. Additionally, in this study, the lowest score that can be obtained from the 5-point Likert-type self-directed learning skills scale is 21, while the highest score is 105. In evaluating the score ranges, the evaluation process specified by Kuzu (2021) was taken into account and scores rated as following:21 ≤ score <37.8: Never; 37.8≤ points <54.6: Rarely; 54.6≤ points <71.4: Sometimes; 71.4≤ points <88.2: Usually; 88.2≤ points <105: Always.

Ethic

"Personal Information Form", "Lifelong Learning Tendencies Scale" and "Self-Directed Learning Skills Scale" were used to obtain the data of the research. Before starting the data collection process, permission was obtained from the authors who carried out the scale adaptation studies and the data collection process was initiated by obtaining the necessary permissions from the Ethics Committee. Data were collected with the approval received from the ethics committee (07.12.2022, GO 2022/1000) in February in the Fall Term of the 2022-2023 academic year. Before the application, prospective teachers were informed about the research, and the application was administered to the prospective teachers who volunteered to participate in the research.

FINDINGS

This section includes the findings of the research and the comments made based on the findings. The findings and comments obtained from the research are presented in line with the sub-problems of the research.

3.1. Findings and Interpretation of the First Sub-Problem

The first sub-problem of the research is expressed as "At what level are teacher candidates' lifelong learning tendencies?" In order to answer this sub-question, descriptive statistics of the data were examined. The findings obtained are given in Table 2.

Table 2. *Lifelong Learning Tendency Levels of Teacher Candidates*

Dimensions	n	Min	Max	$\overline{X}$	Ss
Motivation	529	6	36	31,93	3,99
Perseverance	529	6	36	29,46	4,95
Lack of regulation of learning	529	6	36	25,95	8,46
Lack of curiosity	529	9	54	37,54	11,78
Total	529	27	162	124,88	21,90

As seen in Table 2, when the scores received by teacher candidates from the LLT scale are examined, it is seen that the lowest score (min = 27), the highest score (max = 162) and the scale mean is =124.88, SD=21.90. Considering the scale middle score (94.5) (Diker-Coşkun & Demirel, 2009) regarding the evaluation of the LLT scale and the rating made in this study, it is noteworthy that the lifelong learning tendencies of teacher candidates are at the 'partially fit' level. When the averages of the sub-dimensions of the LLT scale are examined, it is seen that the mean scores of the teacher candidates for the incentive sub-dimension $\bar{x}$ = 31.93, Sd = 3.99, the mean scores for the perseverance sub-dimension $\bar{x}$ = 29.46, Sd = 4.95, the mean scores for the lack of self-regulation sub-dimension $\bar{x}$ = 25.95, Sd = 8.46, and the mean scores for the lack of curiosity sub-dimension is $\bar{x}$ = 37.54, Sd = 11.78. Considering the sub-dimension middle scores of the LLT scale (21, 21, 21, 30) (Diker-Coşkun & Demirel, 2009), respectively, it can be seen the sub-dimension scores of the LLT scale ($\bar{x}$ =31.93, 29.46, 25.95, 37.54) of the teacher candidates are also at high levels. The data obtained shows that the teacher candidates individuals who are willing to continue formal and non-formal education in all areas of their lives and are open to development.

3.2. Findings and Interpretation of the Second Sub-Problem

The other aim of the research is to determine whether LLT of teacher candidatesdiffer according to various variables. The second sub-problem of the research is expressed as "Do teacher candidates' lifelong learning tendencies differ significantly according to gender, CGPA and department preference reason?". In order to determine whether LLT of teacher candidatesdiffer significantly according to gender, the data were analyzed using the t test for independent samples. Table 3 includes independent t-test results comparing the scores obtained from the scale by gender.

Table 3. *T-test Table for Comparison of Teacher Candidates' Lifelong Learning Tendency Dimensions by Gender*

Dimensions	Gender	n	$\overline{X}$	Ss	Sd	t	p
Motivation	Female	406	32.11	3.62	527	1.84	.06
	Male	123	31.35	4.99			
Perseverance	Female	406	29.66	4.54	527	1.75	.08
	Male	123	28.77	6.06			
Lack of regulation of learning	Female	406	26.39	8.31	527	2.22	.02
	Male	123	24.47	8.78			
Lack of curiosity	Female	406	38.57	11.41	527	3.70	.00
	Male	123	34.13	12.39			
Total	Female	406	126,74	21.16	527	3.60	.00
	Male	123	118,73	23.23			

* p<,05

Table 3 shows the level of LLT of prospective teachers in terms of gender, taking into account the sub-dimensions of the scale. When the average scores of the sub-dimensions of the scale are compared in terms of gender, it is seen that female teacher candidates are at higher levels than male teacher candidates in each sub-dimension. As a result of the analysis, it is determined that LLT scale scoresdid not show any significant difference according to gender in sub-dimensions of incentive [t(527)=1.84; p>0.05] and persistence [t(527)=1.75; p>0.05]. However, it is observed to show a significant difference in favor of women according to gender in sub-dimensions of lack of self-regulation [t(527)=2.22; p<0.05], lack of curiosity [t(527)=3.70; p<0.05] and total score [t(527)=3.60; p<0.05]. According to these findings, it can be said that female teacher candidates carry out learning activities more regularly than male teacher candidates and that female teacher candidates are more curious and willing about lifelong learning than male teacher candidates. In the rating made, the LLT of both male and female teacher candidates were evaluated to be at

the 'partially fit' level. This shows that the LLT of both male and female teacher candidates are quite high. In the second sub-problem of the research, single-factor analysis of variance was used for independent samples in order to determine whether the LLT of the teacher candidates differ according to the CGPA of the teacher candidates. The results of variance analysis of teacher candidates' lifelong learning tendencies scores according to CGPA are presented in Table 4.

Table 4. *ANOVA Results of Teacher Candidates' Lifelong Learning Tendency Scores According to CGPA*

		N	$\bar{X}$	Sd		Sum of Squares	df	Mean Square	F	p	Difference
CGPA	**2.50 and below (1)**	38	116.74	26.93	*Between Groups*	5146.779	3	1715.593	3.628	.013*	1-4
	2.51-3.00 (2)	117	121.64	19.32	*Within Groups*	248225.95	525 528	472.811			
	3.01-3.50 (3)	248	126.29	21.66	*Total*	253372.73					
	3.51-4.00 (4)	126	127.57	22.29							
	Total	529	124.88	21.90							

* p<,05

When Table 4 is examined, it is understood that the lifelong learning tendency averages of the teacher candidates show a significant difference according to the candidates' CGPA (F=3.628, p<.05). Tukey test is conducted to determine which CGPA ranges has a significant difference by the lifelong learning tendency scores of teacher candidates. According to the results of the Tukey test, it was found that the LLT scores of candidates with a CGPA of 3.51 and above ($\bar{x}$ =127.57) is higher than the LLT scores of candidates with a CGPA of 2.50 and below ($\bar{x}$ =116.74). In other words, it can be said that the LLT of teacher candidates whose CGPA is 3.51 and above are at a higher level than the LLT of teacher candidates whose CGPA is 2.50 and below, and that they are open to lifelong learning. The analysis results of the changes in teacher candidates' LLT scores according to their department preference reasons are presented in Table 5.

Table 5. *ANOVA Results of Teacher Candidates' Lifelong Learning Tendency Scores According to Department Preference Reasons*

		N	$\bar{X}$	Sd		Sum of Squares	df	Mean Square	F	p
Department Preference Reasons	**Ideal profession**	184	126.23	22.37	Between Groups	7553,14	7	1079,020	2.287	.027*
	Low Score	97	121.14	21.55	Within Groups	255819,59	521	471,823		
	Vacation Opportunity	20	117.35	23.25	Total	253372,73	528			
	Job Opportunity	40	119.35	24.26						
	Reputability	21	118.52	21.51						
	Encouragement in the family	33	126.69	18.41						
	Communication with the child	58	127.63	19.46						
	Love of teaching	76	130.14	21.49						
	Total	529	124.88	21.90						

* p<,05

When Table 5 is examined, it is understood that the averages of prospective teachers' lifelong learning tendencies show a significant difference according to their reasons for department preference (F=2.287, p<.05). However, as a result of the Post-Hoc analysis, no significant difference was found between the two groups. This may be due to the fact that the averages of teacher candidates' reasons for choosing departments are close to each other, according to their lifelong learning tendencies.

3.3. Findings and Interpretation of the Third Sub-Problem

The third sub-problem of the research is stated as "What is the level of self-directed learning skills of teacher candidates?" In order to answer this sub-question, descriptive statistics of the data were examined. The findings obtained are given in Table 6.

Table 6. *Table of Self-Directed Learning Skill Levels of Teacher Candidates*

Dimensions	n	Min	Max	$\overline{X}$	Sd
Incentive	529	20	35	31,24	3,26
Self-monitoring	529	13	25	20,54	2,67
Self-control	529	8	25	19,22	3,30
Confidence	529	11	20	17,42	1,99
Total	529	61	105	88,43	9,51

As seen in Table 6, when the scores received by teacher candidates from the SDLS scale are examined, it is seen that the lowest score (min=61), the highest score (max=105) and the scale mean is $\bar{x}$ =88.43, SD=9.51. Considering the middle score of the scale (63) regarding the evaluation of self-directed learning skills scale, it is noteworthy that the self-directed learning skills of the teacher candidates participating in the research are at a high level. When the averages of the teacher candidates' mean scores related sub-dimensions of the SDLS scale are examined, it is seen that the mean scores for the incentive sub-dimension $\bar{x}$ =31.24, Sd=3.26, the mean scores for the self-monitoring sub-dimension $\bar{x}$ =20.54, Sd = 2.67, the mean scores for the self-control sub-dimension $\bar{x}$ = 19.22, Sd=3.30, the mean score for the self-confidence sub-dimension is $\bar{x}$ =17.42, Sd=1.99. Considering the middle scores of the SDLS scale sub-dimensions (21, 15, 15, 12), respectively, it is seen that the pre-service teachers' sub-dimension scores of the SDLS scale ($\bar{x}$ =31.24, 20.54, 19.22, 17.42) are at high levels. This shows that the teacher candidates who volunteered to participate in the study are individuals who can take responsibility for their own learning.

3.4. Findings and Interpretation of the Fourth Sub-Problem

The fourth sub-problem of the research is expressed as "Do teacher candidates' self-directed learning skills differ significantly according to gender, weighted grade point average (CGPA) and department preference reason?". In order to analyze whether the self-directed learning skills of teacher candidates showed a significant difference according to gender, the data were analyzed using the t test for independent samples. The findings obtained for the four factors in the scale are given in Table 7.

Table7. *T-test Table for Comparison of Self-Directed Learning Skills of Teacher Candidates by Gender*

Dimensions	Gender	n	$\overline{X}$	Sd	df	t	P
Incentive	Female	406	31.38	3.14	527	1.86	.06
	Male	123	30.76	3.61		1.72	
Self-monitoring	Female	406	20.64	2.69	527	1.47	.14
	Male	123	20.23	2.58		1.50	
Confidence	Female	406	17.50	1.91	527	1.63	.10

Self-control	Male	123	17.17	2.24	527	1.50	.94
	Female	406	19.22	3.23		.07	
Total	Male	123	19.20	3.54		.06	
	Female	406	88,75	9.22	527	1.41	.16
	Male	123	87,37	10.37		1.32	

* p<,05

When Table 7 is examined, it was determined that the self-directed learning skills of teacher candidates in the incentive, self-monitoring, self-confidence and self-control dimensions did not show a significant difference according to gender (p>.05). This finding shows that the self-directed learning skill levels of female teacher candidates and male teacher candidates participating in the study are close to each other.Single-factor analysis of variance was used for independent samples to determine whether teacher candidates' self-directed learning skills scores differ according to their CGPA and department preference reasons. The results of variance analysis of teacher candidates' self-directed learning skills scores according to CGPA are presented in Table 8.

Table 8. *ANOVA Results of Teacher Candidates' Self-Directed Learning Skills Scores According to CGPA*

		N	$\bar{X}$	Sd		Sum of Squares	df	Mean Square	F	p	Fark
CGPA	**2.50 and below (1)**	38	88.44	11.45	*Between Groups*	768.185	3	256.062	2.858	.037	4>2
	2.51-3.00 (2)	117	86.28	9.65	*Within Groups*	47041.944	525 528	89.604			
	3.01-3.50 (3)	248	88.83	9.48	*Total*	47810.129					
	3.51-4.00 (4)	126	89.55	8.54							
	Total	529	88.43	9.51							

* p<,05

It is determined that the self-directed learning skills of teacher candidates showed a significant difference according to their general grade point average (F=2.858, p<.05). Tukey test was applied to the data to understand which categories this difference emerged between. It is understood that there is a significant difference according to the GPA between scores of teacher candidates whose CGPA of 2.51-3.00 ($\bar{X}$=86.28) and scores of teacher candidates whose weighted 3.51-4.00 ($\bar{X}$=89.55) and this difference is in favor of the teacher candidates with a GPA of 3.51-4.00. In other words; it can be said that teacher candidates with a high GPA (3.51-4.00) take more responsibility for their own learning processes than teacher candidates with a low GPA (2.51-3.00). The analysis results of teacher candidates' self-directed learning skills scores according to their department preference reasons are given in Table 9.

Table 9. *ANOVA Results of Teacher Candidates' Self-Directed Learning Skills Scores According to Department Choice Reasons*

		N	$\bar{X}$	Sd		Sum of Squares	df	Mean Square	F	p	Fark
Department Preference	**Ideal profession**	184	90.46	9.22	*Between Groups*	2127,848	7	303,978	3.467	.001	1 >2
	Low Score	97	85.55	9.44	*Within Groups*	45682,281	521	87,682			

Vacation Opportunity	20	85.10	10.85	*Total*	47810,129	528
Job Opportunity	40	87.15	9.72			
Reputability	21	89.14	9.04			
Encourage-ment in the family	33	86.15	10.92			
Communication with the child	58	88.43	9.45			
Love of teaching	76	89.56	8.22			
Total	529	88.43	9.51			

* p<,05

As a result of the analyses, a significant difference emerged between the reasons why teacher candidates chose their departments (F=3.467, p<.05). According to the Tukey test results, this difference is between teacher candidates who choose teaching because they see it as the ideal profession $\bar{X} = 90.46$) and teacher candidates who choose teaching because of low scores ($\bar{X} = 85.55$), and it can be said that it is in favour of teacher candidates who choose teaching because it is the ideal profession. This shows that teacher candidates who choose teaching because they see it as the ideal profession have more knowledge about their own learning processes than teacher candidates who choose it because of low scores.

3.5. Findings and Interpretation of the Fifth Sub-Problem

The fifth sub-problem of the research is expressed as "Are there significant relationships between prospective teachers' lifelong learning tendencies and self-directed learning skills?". In order to answer this sub-problem, Pearson correlation analysis is used. While interpreting the correlation coefficients, correlation coefficients less than .25 are considered as insignificant, coefficients between .26 and .49 are considered as weak, coefficients between .50 and .69 areconsidered as medium, coefficients greater than .70 are considered as strong and coefficients greater than 90 are interpreted as very strong relationships (Kalaycı, 2009). The findings obtained for the dimensions included in the scales are given in Table 10.

Table10. *Relationships between teacher candidates' lifelong learning tendencies and self-directed learning skills.*

	Incentive	**Self-monitoring**	**Confidence**	**Self-control**	**Motivation**	**Perseverance**	**Lack of regulation of learning**	**Lack of curiocity**
Incentive	1							
Self-monitoring	.62*	1						
Confidence	.62*	.61*	1					
Self-control	.52*	.77*	.57*	1				
Motivation	.56*	.50*	.46*	.45*	1			
Perseverance	.51*	.54*	.44*	.57*	.76*	1		
Lack of regulation of learning	.23*	.07	.13*	-.08	.07	-.02	1	
Lack of curiosity	.39*	.25*	.25*	.13*	.27*	.26*	.70*	1

*p<.05

According to the results of the Pearson correlation analysis, when the relationships between the sub-dimensions of the variables are examined; it was revealed that there was a positive and moderately significant relationship (.69> r >.50, p<.01) between incentive and self-monitoring (r=.62), self-confidence (r=62), self-control (r=52), motivation (r=56), perseverance (r=51). And it was found that there was a weak and positive relationship (.49> r >.25, p<.01) between incentive and lack of curiosity (r=39). Also, it was determined that there was a positive and highly significant relationship (r >.70, p<.01) between the self-monitoring dimension and self-control (r=77); a positive and moderately significant relationship (.69> r >.50, p<.01) between self-monitoring and self-confidence (r=61), motivation (r=50), perseverance (r=54) and a weak and positive relationship (.49> r >.25, p<.01) between self-monitoring and lack of curiosity (r=25).

It was determined that there was a positive and moderate level significant relationship (.69> r >.50, p<.01) between the confidence dimension and self-control (r=57); a positive and weak level significant relationship (.49 > r >.25, p <.01) between the confidence dimension and motivation (r=46), perseverance (r=44), and a lack of curiosity (r=25). It was found that there was a positive and moderately significant relationship (.69> r >.50, p<.01) between the self-control dimension and perseverance (r=57) and a weak and positive relationship (.49 > r >.25, p <.01) between self-control and motivation (r=45). It was turned out that there was a positive and highly significant relationship (r >.70, p<.01) between motivation and perseverance dimensions (r=76) and also, between lack of self-regulation and lack of curiosity (r=77). Moreover, it was determined that there was a positive and weak level significant relationship (.49 > r >.25, p <.01) between lack of curiosity and motivation (r=27) and also, perseverance (r=26).

CONCLUSION

In the research, the relationship between the lifelong learning skills and self-directed learning skills of the prospective teachers was examined. According to the findings of the research, the LLT total scores and sub-dimension scores of the prospective teachers participating in the research were at a high level than the middle score of the scale (94.5) determined by Diker-Coşkun and Demirel (2009) and according to the rating made for this study, it was determined to be at the 'partially applicable' level. In the relevant literature, Ayra& Köstereliođlu (2015), Bayram (2023), Bulaç & Kurt (2019), Demirel & Akkoyunlu (2010), Erdoğan (2014), Ergün & Cömert Özata (2016), Kılıç (2015), Recepoğlu (2021) revealed that prospective teachers have high LLTin their studies. This shows that the teacher candidates who volunteered to participate in the study have high LLT, therefore they are in a lifelong learning tendency and lifelong learning is a priority among their individual goals. In addition, it can be said that teacher candidates will be open to learning in the later stages of their lives, and they see learning new knowledge and skills as an indispensable feature of their lives. The first two dimensions of the LLT scale (incentive, perseverance) determine the emotional organization related to the desire and effort to learn in life, and the last two dimensions (lack of regulation of learning, lack of curiosity) determine the tendency to regulate the reasons and situations for lifelong learning (Diker-Coşkun & Demirel, 2012). Since the scores received by teacher candidates from the sub-dimensions of the scale are higher than the middle score values, it can be said that their motivation to learn is high, they make an effort and show continuity to participate in relevant learning activities and they show determination in completing optional learning situations. The teaching profession determined by the Ministry of Education (2017), it is stated that teachers should self-evaluate their general competencies and participate in activities aimed at their personal and professional development. It is predicted that teacher candidates are going tocarry the general competencies of the profession since their high LLT scoresare an indication thatthey are open to personal and professional development. In fact, as emphasized by Usta (2023), lifelong learning is a feature that all students should develop throughout their educational lives, and university education is not sufficient to acquire this feature. Furthermore, if it is aimed to raise lifelong learners throughout the education process, teachers must have the knowledge and experience to guide the society, make research and questioning as a duty, improve themselves and have lifelong learning qualities (Kılıç, 2015). Usta (2023) explains the

practices that need to be done in this regard as follows:

> The lifelong philosophy should be based on learning at all levels of education, starting from pre-school education, and 'learning to learn' should be very important. Educational experiences such as 'learning to learn', 'using learning resources effectively', 'adjusting and achieving', 'learning objectives', 'valuing knowledge and personal development' should be part of the basic practices of national education rather than slogans. Lifelong learning should not be perceived as a new teaching method, but should be adopted as the philosophy of all educational environments where learning takes place.

When studies conducted in domestic and abroad were examined in terms of the gender variable of LLT, it was seen that there were different results. It has been noticed that comparisons were mostly made based on the total score without examining the sub-dimensions of the scale in the studies conducted. For this reason, while exemplifying the studies supporting the results obtained in each dimension of the scale, studies conducted on the total score of the scale were also used. In this research, it was observed that there was no significant difference in the incentive and perseverance sub-dimensions of the LLT scale according to gender. Studies have shown that there was no significant difference in the LLT of teacher candidates according to the gender variable (Bayram, 2023; Gödeneli & Aksoy, 2023; Karaduman, 2015; Kılıç, 2015; Oral & Yazar, 2013; Tunca, Alkın-Şahin & Aydın, 2015) supports this finding. The fact that no significant difference was detected in terms of gender in the study can be interpreted as the incentive levels and the level of perseverance they show in learning activities of male and female teachers are at a similar level. However, there is a significant difference in favor of women in terms of the lack of self-regulation, the lack of curiosity sub-dimensions and the total score of the teacher candidates in their lifelong learning levels according to gender. Besides; there are also studies (Bulaç & Kurt, 2019; Çam, 2017; Diker-Coşkun & Demirel, 2012; Orhan, 2023; Yaman & Yazar, 2015) that find thatLLTof teachers are affected by the gender variable and create a significant difference in favor of female teacher candidates. Also, it is found that the average scores of female teachers' LLT were significantly higher than the average scores of male teachers in the perseverance dimension(Tanatar, 2017); in the incentive and perseverance dimensions (Kabal, 2019); and in the incentive, perseverance and deprivation in regulating learning dimensions(Aydın, 2020). According to these findings, it can be said that female teacher candidates do learning activities more regularly than male teacher candidates and that female teacher candidates are more curious about lifelong learning than male teacher candidates.

When the scores they received from the LLT scale were examined according to the CGPA variable, it was determined that score of the LLT of the teacher candidates whose CGPA was 3.51 and above had significantly higher averages than the scores of LLT of the teacher candidates whose CGPA was 2.50 and belowin the research. A lifelong learner is expected to have methodological skills such as learning to learn, learning to create knowledge, and coping with risks and problems, as well as technical skills such as mathematics, science, information and communication technologies, problem solving, analytical skills, and foreign language knowledge (Günüç, Odabaşı & Kuzu, 2012). In this context, it is an expected result that teacher candidates with high academic success have higher LLT. Contrary to this finding; it was revealed that the LLT, incentive and perseverancescores of teacher candidates whose academic success average was between 2.00 and 2.99 were higher than the teacher candidates whose academic success average was between 3.00 and 4.00 in another study conducted with teacher candidates (Tunca, Alkın-Şahin & Aydin, 2015). This situation may have arisen as a result of the fact that achievements aimed at gaining lifelong learner characteristics were not included in undergraduate programs.

Another finding of the research is that the averages of prospective teachers' LLT do not differ significantly according to their reasons for choosing a department. This may be due to the fact that the averages of teacher candidates' reasons for choosing departments are close to each other, according to their LLT. No other research has been found examining the reasons why teacher candidates choose a department (ideal profession, holiday opportunity, love of teaching, etc.). However, Bulaç & Kurt (2019) found in their study that there was a significant difference in the total scores received from the LLT scaleof teacher

candidates, depending on the reasons why teacher candidates chose the program they studied (willingly or unwillingly). As a result of the analysis, the difference was found between the teacher candidates who voluntarily or unwillingly chose the program they studied and it was found that the difference was in favor of the teacher candidates who chose the program they studied willingly. Individuals with lifelong learning skills are defined as people who can solve problems, able to self-regulate and evaluate, see the relationship between events and concepts, collaborate and work in harmony with people from all backgrounds and have developed thinking skills (critical, creative, reflective, etc.) (Billing, 2007; Voogt, & Roblin, 2012). Therefore, they could make logical decisions throughout their life.

When self-directed learning skills were investigated, it was found that SDLS of teacher candidates were at a high level. In support of the research finding, it can be explained that teacher candidates see themselves as competent in terms of being learners with self-directed learning skills, which are a prerequisite for lifelong learning, and that they are individuals who can take responsibility for their own learning. Additionally, it was determined that the sub-dimensions of the scale were at high levels. Accordingly, it can be said that the participating teacher candidates are individuals who have the necessary motivation for learning, can clearly state their learning goals and evaluate their performance, are aware of their learning processes and take responsibility for the learning process. Aşkın (2015), Yılmazsoy & Kahraman (2019) stated that the SDLS of university students and Bayram (2023) stated that the SDLSof Primary teacher candidates were above the middle score of the scale. Self-directed learning includes the individual's ability to manage his/her own learning process, to be willing during the course and education process, to be self-confident, and to supervise and control the learning processes themselves. It will be beneficial for prospective teachers to acquire and develop these skills both for their own learning processes and for their ability to support the learning processes of their students, thus contributing positively to their professional development.

Another research result regarding SDLS is that there is no significant difference between male and female teachers in terms of gender variable in any of the sub-dimensions of the SDLS scale. The results of the research in terms of gender are consistent with many studies. In their studies, Bayram (2023) and Şahin &Küçük Süleymanoğlu (2015) did not find a significant difference between the average scores of the participants on the SDLS scale according to gender. This shows that the self-directed learning skill levels of female teacher candidates and male teacher candidates participating in the study are close to each other. Karagülle and Berkant (2022) found that the scores of university students participating in their study did not differ significantly according to gender in self-monitoring and self-control subscales; however, they concluded that motivation, self-confidence and overall scale scores ofmale students were significantly higher than female students. Artsın, Koçdar & Bozkurt (2020) found that women's self-directed learning skills were higher than men's self-directed learning skills. Yılmazsoy and Kahraman (2019) concluded in their study that there was a significant difference in students' self-directed learning levels in favor of women in the motivation sub-dimension, and that there was no significant difference in the other sub-dimensions and the entire scale. Although there was no significant difference, they found that the self-directed learning levels of female students were higher than the self-directed learning levels of male students, and they thought that the difference in mean scores related to the fact that female students worked more meticulously and disciplined in the course processes and had higher course motivation.

One of the research results is that when SDLS are examined according to their GPA, the SDLS scores of the teacher candidates with a CGPA of 3.51-4.00 are significantly higher than the teacher candidates with a CGPA of 2.51-3.00. Other studies conducted with university students also support this finding. Similarly, Alkan (2012), Aydede & Kesercioğlu (2012), Yılmazsoy & Kahraman (2019), working with university students, found in their studies that the self-directed learning skills scores of students with high GPA were significantly higher than those of students with low GPA. This shows that teacher candidates with high academic success manage their self-directed learning processes better and take more responsibility for their own learning processes.

Another result obtained regarding self-directed learning skill is whether teacher candidates' self-directed learning skill scores differ significantly according to their reasons for department choice. As a result of the analysis, it was revealed that the SDLS scores of the teacher candidates who chose Education Faculty because they saw teaching as the ideal profession were higher than the SDLS scores of the teacher candidates who chose Education Faculty because of their low scores. This situation shows that teacher candidates who choose teaching because they see it as the ideal profession have more knowledge about their own learning processes than teacher candidates who choose it because of low scores. No other studies on the subject could be found in the literature.

The last finding of the research is on the relationship between teachers' lifelong learning skills and self-management learning skills. According to the results, there is a positive and moderate relationship between teachers' lifelong learning tendencies and their self-directed learning skill levels. Within the scope of the research, it was revealed that there are different levels, mostly positive relationships, between the sub-dimensions of the LLT scale and the SDLS scales. According to the analysis results, examining the relationships, especially at medium and high levels, will help to make healthier decisions. It has been turned out that there is a positive and moderately significant relationship between incentive, one of the SDLS sub-dimensions, and motivation and perseverance, the sub-dimensions of the LLT scale. It was determined that there was a positive and moderately significant relationship between the self-monitoring dimension of the SDLS scale and the motivation and perseverance of the LLT scale. It was determined that there was a positive and moderately significant relationship between the self-control dimension of the SDLS scale and the perseverance of the LLT scale. In addition, positive medium and high level relationships were determined among the sub-dimensions of the LLT and SDLS scales. According to these results, it can be said that teacher candidates with self-directed learning skills are also individuals who tend to be lifelong learners. When the literature is examined, it can be said that there is a strong relationship between lifelong learning and self-directed learning. Ay (2023) found that there is a positive, moderate relationship between lifelong learning competencies and self-directed learning skills and stated that lifelong learning competencies and self-directed learning skills interact with each other. He emphasized that they are concepts that effects eachother. Similarly, Arslan (2019) and Teke (2020) argued in their research that self-directed learning is one of the prerequisites for lifelong learning and that students must be raised as self-directed individuals. In his study where Recepoğlu (2021) examined the relationship between teacher candidates' LLT and SDLS, he concluded that as the self-directed learning levels of teacher candidates increase, their LLT also increase. Candy (1990) in his study emphasized that "self-directed learning is the means and endof lifelong education." In their research, Mocker and Spear (1982) stated that self-directed learning is a dimension of lifelong learning. Greveson and Spencer (2005) also state that self-directed learning is a prerequisite for lifelong learning. Lifelong learners are individuals who learn to learn, ask questions, and are open to collaborative learning (Demirel & Akkoyunlu, 2010). Knapper and Kropley (2000) expressed that lifelong learners use different learning methods for possible situations by collecting information from different fields in educational environments or outside educational environments. These statements embody the relationship between lifelong learning and self-directed learning.

RECOMMENDATIONS

Recommendations for Practitioners

The following suggestions have been developed to support teacher candidates in developing their LLT and self-directed learning skills:

1. During the education process, teacher candidates should be provided with an environment and time that will allow them to learn on their own and develop themselves in line with their fields of interest.

2. Assignments can be made to ensure that teacher candidates have knowledge about self-directedlearning and lifelong learning.

3. During the education process, the skills of teacher candidates can be discovered and directed to courses suitable for their skills in order to contribute to their lifelong learning and self-directed learning skills.

4. Activities that prospective teachers can participate in in line with their interests and needs can be increased at universities.

5. Teacher candidates can be directed to lifelong learning by supporting the social responsibility projects they carry out within the scope of the 'Community service' course they take during their undergraduate education.

6. Teacher candidates can be informed and encouraged about postgraduate education during their undergraduate education.

Recommendations for Researchers

1. Lifelong learning tendencies and self-directed learning skills of university students in different branches or levels can be examined regarding the educational process.

2. Lifelong learning tendencies and self-directed learning skills of students at different levels (primary school, secondary school, high school) regarding the educational process can be examined.

3. Qualitative and mixed research can be conducted to determine the lifelong learning tendencies and self-directed learning skills of teachers and students at different education levels.

4. By preparing a distance education program that will enable teacher candidates to take responsibility in determining their learning needs and to increase their interest in personal and professional development, these skills of teacher candidates can be examined through experimental studies.

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Content Analysis of an Educational YouTube Channel for Secondary School Students in Terms of Design and Program Elements[1]

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ABSTRACT

This study employed a qualitative research methodology to examine the design features and program elements utilized in the videos of a popular educational YouTube channel called "Basfi ile Deneysel Bilim" (Experimental Science with Basfi). The primary objective was to identify these features and elements by analysing the top ten videos on the channel, based on view counts, likes, and comments. Data collection was conducted using a thematic analysis matrix as the instrument. During the initial phase of data analysis, a descriptive examination of the videos was performed in terms of Mayer's principles of multimedia learning. Subsequently, content analysis was conducted to analyse the program elements present in the videos. The findings of this research revealed that the educational videos on the YouTube channel partially adhered to Mayer's multimedia design principles and incorporated some program elements. Therefore, it is recommended that multimedia design principles and program elements be taken into account when creating educational content for YouTube. Additionally, it is suggested that elements tailored to the nature of the YouTube platform should be included. Finally, the study provides recommendations to content developers regarding factors to consider in video production. This research holds significance for individuals involved in producing educational content for YouTube, as well as researchers working in the domains of content production processes and content design.

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INTRODUCTION

The rapid development of technology brings about significant changes in our social lives. It enables us to accomplish a wide range of tasks, from the most mundane to the most essential, through digital platforms. Moreover, this transformation has also had a profound impact on learning habits. Nowadays, accessing digital content has become almost necessary when seeking information on a subject, preparing for exams, or observing the application phase of a practical subject. Expressions like "I watched this question" are now more frequently encountered than "I saw this question", indicating a growing preference for video content in this context. Consequently, there is an arising need to restructure educational tools and content in instructional environments in a way that can address the requirements of the digital age. In this process of change, videos are considered to be one of the preferred tools among the new generation. Given the younger generation's interest and inclination towards digital technologies, it is crucial to examine their reasons and opinions for choosing these learning environments during the process of designing effective learning environments (Ata & Atik, 2016: 314). When the affinity of individuals at secondary school level with digital technologies is examined, the following statements can be made.

- A total number of 94.2% of children in the age group of 6 to 15 in Türkiye, who use internet regularly, spend about three hours a day on social media (TÜİK, 2021).
- The majority of secondary school students begin to use social media in the third and fourth grades of primary school, the ages of whom are 8 or 9 (Altayef & Karacı, 2019). Their most preferred social media platform is YouTube (Tutgun Ünal, 2020).
- Secondary school students, who spend almost all their time on the internet for YouTube, take YouTubers as role models (Ergen, 2018: 132-144).
- It is widely recognized that a majority of primary school children, aged 9 to 13, have been avid viewers of YouTube from a very young age, resulting in a profound and intimate bond with YouTubers, who hold a significant role in the lives of these children (Özuz, 2018).
- Children are at the forefront of YouTube's most loyal users, and there is YouTube content on numerous topics that interest children (Atalay, 2019: 184).

As in different subject areas, the number of channels established for teaching purposes and appealing to users from all levels is increasing on the YouTube platform (Ceylan, 2023:2). On the platform, there are many educational channels with high number of subscribers, such as "Rüştü Hoca ile Türkçe", "Hocalara Geldik", "Tunç Kurt Matematik", "Tonguç Akademi", "LGS & Lise Hocam". However, the majority of these channels predominantly cater to subjects pertaining to school exams or directly align with the school curriculum. Consequently, it is widely believed that these channels are primarily sought after for exam preparation purposes. Nevertheless, there has been notable scholarly interest in YouTube channels that can captivate viewers for educational intent beyond explicit exam preparation. Hence, this study is motivated by the following inquiry: "What distinguishing characteristics can a YouTube channel possess to attract a substantial audience without specifically focusing on facilitating exam preparation?" To address this question, the researchers opted to scrutinize the content and design elements of a YouTube channel exhibiting the aforementioned characteristics.

Presently, the notion of content has evolved beyond plain text and is now perceived as a multifaceted phenomenon. For instance, Khan Academy, a renowned YouTube channel recognized as the world's largest free online learning platform, boasts 7.2 million subscribers (as of 20.03.2023). Similarly, the Türkiye-based Tonguç Akademi YouTube channel has amassed 3.71 million subscribers (as of 20.03.2023). These figures indicate a preference for video-based content among a significant audience. Consequently, there arises a need to examine the educational content presented in these videos. However, there is a lack of sufficient criteria to evaluate the quality of such educational content

on YouTube (Shoufan, 2019). The absence of clear evaluation criteria further contributes to the uncertainty surrounding the quality of content available on the platform. This situation renders preteen users, who are still developing their ability to discern right from wrong, particularly vulnerable. Moreover, YouTube has been observed to have significant effects on children (Özuz, 2018). Considering the foresight that YouTube will increasingly become a substantial part of children's lives in the near future (İlhan & Aydoğdu, 2019), it becomes evident that this domain warrants serious attention. In summary, the escalating preference for YouTube as a learning environment, the uncertainty surrounding content quality, and the significant impact on children, who represent a key target audience, have prompted researchers to investigate YouTube as a learning platform (Erdoğan, 2020). Despite the uncertainty surrounding evaluation criteria for YouTube content in terms of educational value, YouTube remains an effective medium for enhancing learning experiences (Taşdelen, 2019), facilitating effective concept attainment in children (Gülmez, 2019), supporting foreign language education (Küçükyılmaz, 2016), and even serving as a primary teaching resource in higher education (Ata, 2017). All these factors emphasize the profound influence of the widely accessible YouTube platform, which cannot be overlooked. This pervasive platform necessitates examination from various perspectives, including practical environments, user opinions, and producer viewpoints. Numerous studies in the literature have conducted content analyses of YouTube videos (e.g., Aksu, 2020; Ergün Özdel, 2019; İç, 2017; Kaynak, 2020; Ökmen, 2021; Öztürk, 2020; Saurabh & Gautam, 2019; Shoufan, 2019; Salkaya, 2020). However, no study has specifically focused on content analysis of educational videos on YouTube with regard to Mayer's multimedia design principles. Therefore, this research makes a valuable contribution to the literature in this regard.

This study aimed to investigate the design features and program elements employed in the videos of a highly viewed educational YouTube channel. To fulfil the research objective, the study sought answers to the following questions.

RQ1. What are the design features of the educational videos on the "Experimental Science with Basfi" YouTube channel?

RQ2. What are the program elements of the educational videos on the "Experimental Science with Basfi" YouTube channel?

RQ2.1. How is the intro editing of videos?

RQ2.2. How are the learning outcomes presented in the videos?

RQ2.3. What is the video content like? Is it theoretical or applied (i.e., base field)?

RQ2.4. What are the instructional strategies and methods in the videos?

RQ2.5. How is the process of assessment and evaluation undertaken in videos?

RQ2.6. What are the video durations?

RQ2.7. How are the closing edits of the videos?

METHOD

In this section, information was provided about the design of the research, the study group, data collection tools, and the procedures for data collection and analysis.

Research Design

This research, which examined the video contents of an educational channel that stands out on the YouTube platform, was carried out using the descriptive analysis method, one of the qualitative research approaches in terms of the subject and the process followed. Descriptive analysis, in this regard, is a type of qualitative data analysis that includes summarizing and interpreting the data

obtained by various data collection techniques according to predetermined themes (Yıldırım & Şimşek, 2003).

Study Group

The YouTube platform awards the silver reward level to channels that surpass 100,000 subscribers, indicating their popularity. For this research, it was assumed that exceeding 100,000 subscribers serves as a criterion for popularity on YouTube. Therefore, the selected channel for investigation in this study showcased numerous educational videos with a substantial number of views, likes, and comments. This particular channel consistently shared broadcasts and educational content centred around scientific experiments that appealed to children.

To analyse the video contents, a total of 10 videos from the YouTube channel "Experimental Science with Basfi" with the highest number of views, comments, and likes were chosen. The videos for analysis were selected using the criterion sampling method, the selection process of which relied on the rankings of the channel's video contents on the website Socialblade.com (SocialBlade, 2022). The number of likes, comments, and views of the videos guided the selection of suitable videos for the research. From the top 50 most viewed videos of the channel, the first 10 videos that achieved the highest number of views, comments, and likes in the shortest period were chosen for analysis. Table 1 presents the interface information of the analysed videos.

Table 1. *Interface information of the analysed videos*

Video Content Title (Translated)	Upload Date	Duration	Views	Likes	Comments	URL	Video's Monthly Income
Hydrophobic Material (V1)	November 13, 2020, Friday	12 minutes 50 seconds	718,818	26k	1,335	https://www.youtube.com/watch?v=fI1p2ahrIbI	239.67-1963.43 $
I Made a Giant Plastic with Just 2 Materials (V2)	May 17, 2019, Friday	13 minutes 05 seconds	961,570	22k	1,457	https://www.youtube.com/watch?v=w4R9OnsjjNw	325,66-2572.77 $
The Fastest Foaming Soap Experiment – With the Audio Support of Barış Özcan (V3)	March 21, 2017, Tuesday	06 minutes 50 seconds	845,570	38k	2,551	https://www.youtube.com/watch?v=_Sle2LW8uGM	286.44-2302.33 $
Today's Menu: Green Egg (Try it at home!) (V4)	September 20, 2019, Sunday	12 minutes 48 seconds	694,173	17k	1,493	https://www.youtube.com/watch?v=wdtpjNzGQ88	234.97-1896.03 $
I Experimented with the World's Hardest Liquid (Try it at Home!) (V5)	September 18, 2020, Friday	12 minutes 40 seconds	587,084	15k	972	https://www.youtube.com/watch?v=upi_8yFTPEc	199.08-1557,46 $
5 Accidentally Discovered Inventions You'd Be Surprised By (V6)	December 25, 2020, Friday	12 minutes 15 seconds	504,027	16k	1,529	https://www.youtube.com/watch?v=vnzEFWdFzDo	170.64-1354.31 $
What Happens If Ink Is Dropped into Cold Water? (Try it at Home!) (V7)	June 12, 2020, Friday	11 minutes 42 seconds	341,664	12k	1,092	https://www.youtube.com/watch?v=FCq38QisqPo	115.79-948.02 $
Why Are Jeans Blue? (V8)	September 28, 2017, Thursday	03 minutes 50 seconds	1,066,696	8,8k	1,361	https://www.youtube.com/watch?v=Drq5yI8Rkc4	360.92-2911.77 $
Why Are Coins Round? (V9)	December 05, 2017, Tuesday	02 minutes 56 seconds	908,098	6,9k	225	https://www.youtube.com/watch?v=aHlGkp5_i3I	307.43-2437.76 $
Why Is There a Statue of Nikola Tesla in Front of Niagara Falls? (V10)	October 25, 2017, Wednesday	03 minutes	725,650	4,7k	154	https://www.youtube.com/watch?v=spXzXehEmn4	245.81-1963.75 $

The selection of videos for analysis involved three stages. In the first stage, the top 50 most viewed videos of the channel were identified based on data from SocialBlade. In the second stage, among these highly viewed videos, the ones that received the highest number of comments and likes were selected. Lastly, the most recently published video was chosen from the videos with a similar number of views and a significant number of comments. To further refine the selection process, the number of views for each video was divided by its duration. This calculation allowed for the

identification of videos that achieved the highest number of views, comments, and likes within the shortest timeframe. It was assumed that a high number of comments and likes indicated a high level of interaction with the videos. Therefore, the video selection process involved considering both the overall popularity of the videos (views) and the level of engagement (comments and likes) to ensure a comprehensive analysis.

Data Collection and Analysis

The thematic analysis matrix developed by the researcher was used for the content analysis to be conducted in the research. The use of the thematic analysis matrix enabled the data to be processed within a logical framework according to the themes used in descriptive analysis and content analysis. The thematic analysis matrix is provided in Table 2.

Table 2. *Thematic analysis matrix*

Themes	Codes	Descriptions
General Features	YouTube Platform Interface Units	Video content title
		Upload Date
		Duration
		Views
		Likes
		Comments
		URL
		Video's Monthly Income
Content Features	Design features (Mayer's design principles)	Multimedia Principle
		The Coherence Principle
		Signalling Principle
		Redundancy Principle
		Spatial Contiguity Principle
		Temporal Contiguity Principle
		Segmenting Principle
		Pretraining Principle
		Modality Principle
		Personalization Principle
		Voice Principle
		Image Principle
		Embodiment Principle
		Generative Activity Principle
	Program elements	Intro Editing
		Presentation of Learning Outcomes
		Base Field (Theoretical or Applied)
		Instructional Strategies and Methods
		Assessment and Evaluation
		Video Durations
		Closing Edits

The general properties section of the matrix was constructed based on the analysis conducted by Çomu and Halaiqa (2014). It encompasses the interface elements of video content on the YouTube platform. The content features section of the matrix comprises two categories: design features and program elements. The design features category incorporates Mayer's (2021) multimedia design principles. The program elements category was developed using the "Educational Features" section of the Electronic Educational Contents Guide, created by the Board of Education and Discipline to provide guidance to content developers. Additionally, the items of Intro Editing, Video Durations, and Closing Edits were added to this category after analysing the videos of the channel and identifying common characteristics.

For data analysis, a combination of descriptive analysis and content analysis methods was employed. Qualitative research allows for flexibility, enabling researchers to develop new methods and approaches as needed throughout the research process and make adjustments to the setup (Creswell & Plano-Clark, 2007; Karataş, 2015: 66). In this context, Table 3 presents the data collection tools and analysis techniques utilized to address the research questions.

Table 3. *Pairing of the research questions with data collection tools and analysis techniques*

Research Question	Data Collection Tool	Data Analysis
What are the design features of the educational videos on the "Experimental Science with Basfi" YouTube channel?	Thematic Analysis Matrix	Descriptive Analysis
What are the program elements of the educational videos on the "Experimental Science with Basfi" YouTube channel?	Thematic Analysis Matrix	Content Analysis

In the study, the videos selected from the contents of the "Experimental Science with Basfi" channel were analysed. In the first research question, the study aimed to determine the design features of videos according to Mayer's principles. The second research question aimed to determine the program elements of the videos.

FINDINGS

In this section, the findings obtained from the content analysis of the videos of the YouTube channel "Experimental Science with Basfi" are presented. The findings of the research were examined under two headings: "Design features of the educational videos on the YouTube channel" and "Program Elements of the Educational Videos on the YouTube Channel".

Design Features of the Educational Videos on the YouTube Channel

In the study, an initial analysis was conducted on a total of 10 YouTube videos, examining their compatibility with multimedia design principles. Table 4 presents the evaluation of each video based on the four-point scale: compatible, partially compatible, incompatible, and not evaluated. The table indicates which design principles each video aligns with or, in cases where evaluation was not possible, the videos were marked as not evaluated.

Table 4. *The compatibility of the videos with the multimedia design principles*

	Videos									
Principles	**V1**	**V2**	**V3**	**V4**	**V5**	**V6**	**V7**	**V8**	**V9**	**V10**
Multimedia										
Coherence										
Temporality										
Spatiality										
Redundancy										
Signalling										
Pretraining										
Modality										
Segmenting										
Personalization										
Image										
Voice										
Embodiment										
Generative Activity										

Compatible Partially compatible Incompatible Not evaluated

The analysis revealed that the videos demonstrated successful compliance with several

multimedia design principles, including multimedia, signalling, redundancy, spatial and temporal proximities, pretraining, personalization, voice, modality, image, and embodiment. However, partial compliance was observed regarding the principle of consistency, and non-compliance was noted for the principles of segmentation and generative activity. It is important to note that the embodiment principle could not be evaluated since the animated videos lacked a physical narrator.

The analysis indicates that the analysed videos align with the multimedia principle. These videos effectively incorporate visual elements, such as animations and pictures, to enhance the content, while also utilizing sound elements in an impactful manner. Additionally, the principle of spatial proximity is observed as the videos present text and images in close proximity to each other, ensuring that relevant information is visually connected. Furthermore, the simultaneous presentation of text and visuals during narration and animation demonstrates adherence to the principle of temporal proximity.

In the animation sections of the videos, the integration of visuals and audio narration is observed, while written narratives are not presented. This approach ensures compliance with the principle of redundancy, as information is conveyed through both visual and auditory channels simultaneously. The videos also follow the pretraining principle, as they initially focus on introducing the main subject and its key features rather than directly presenting information or conducting experiments. Additionally, the character Basfi captures the audience's attention by showcasing the experimental materials using his hand, while important points are emphasized through visual effects in the animation or visuals. This demonstrates the utilization of the signalling principle to draw attention to significant aspects of the content.

The videos feature oral narration delivered by the main character, Basfi, and do not incorporate written expressions. This adherence to oral narration without written presentation indicates compliance with the modality principle. Additionally, Basfi plays an active role in the videos by conducting experiments, maintaining eye contact with the audience during narration, engaging in humorous interactions with the shooting crew, and utilizing gestures and facial expressions that convey emotional states such as surprise, curiosity, and amusement. However, it should be noted that the embodiment principle could not be evaluated in the analysis of videos consisting solely of animation, as there was no visually active narrator or instructor. Nevertheless, it was observed that the principle of embodiment was employed in the experimental videos.

Basfi communicates with the audience using colloquial language instead of academic terminology. He addresses the audience as "friends" and uses singular pronouns like "me" and "you" during his interactions with the shooting crew. This approach demonstrates the utilization of the personalization principle, aiming to establish a more relatable and friendly connection with the viewers. Furthermore, Basfi narrates the entire video using his own voice, and real human voice is employed throughout, indicating compliance with the voice principle. In the animation or visual sections, only Basfi's voice is utilized, and there is no inclusion of the narrator's image as a picture or video. Therefore, it can be concluded that the videos adhere to the image principle.

Based on the analysis of the videos, it is observed that the animated videos comply with the principle of coherence, while the experimental videos only partially adhere to it. The animated sections effectively present the experiment by including only the necessary materials in the environment and incorporating relevant texts and images that explain the concepts. The background music also harmonizes with the flow of events, contributing to the coherence of the content. However, in the experimental videos, the presence of decorative elements and visuals in the background decor, which are unrelated to the subject, hinders full compliance with the principle of coherence. Furthermore, while Basfi suggests conducting experiments suitable for home settings probably due to safety concerns, the inclusion of a test question with two options in the experimental videos contradicts the principle of generative activity in that although the audience is encouraged to write their answers in the comments

section, they are not directed towards engaging and productive educational activities. Lastly, the videos maintain an uninterrupted narrative and image format throughout without employing strict segmentation through titles or images, so there is no compliance with the segmenting principle, as the content lacks clear divisions or sections.

Program Elements of the Educational Videos on the YouTube Channel

The study also involved analysing the program elements present in the 10 YouTube videos from Basfi's channel. The analysis yielded the identification of specific program elements, which are presented in Figure 1 as the outcome of the analysis.

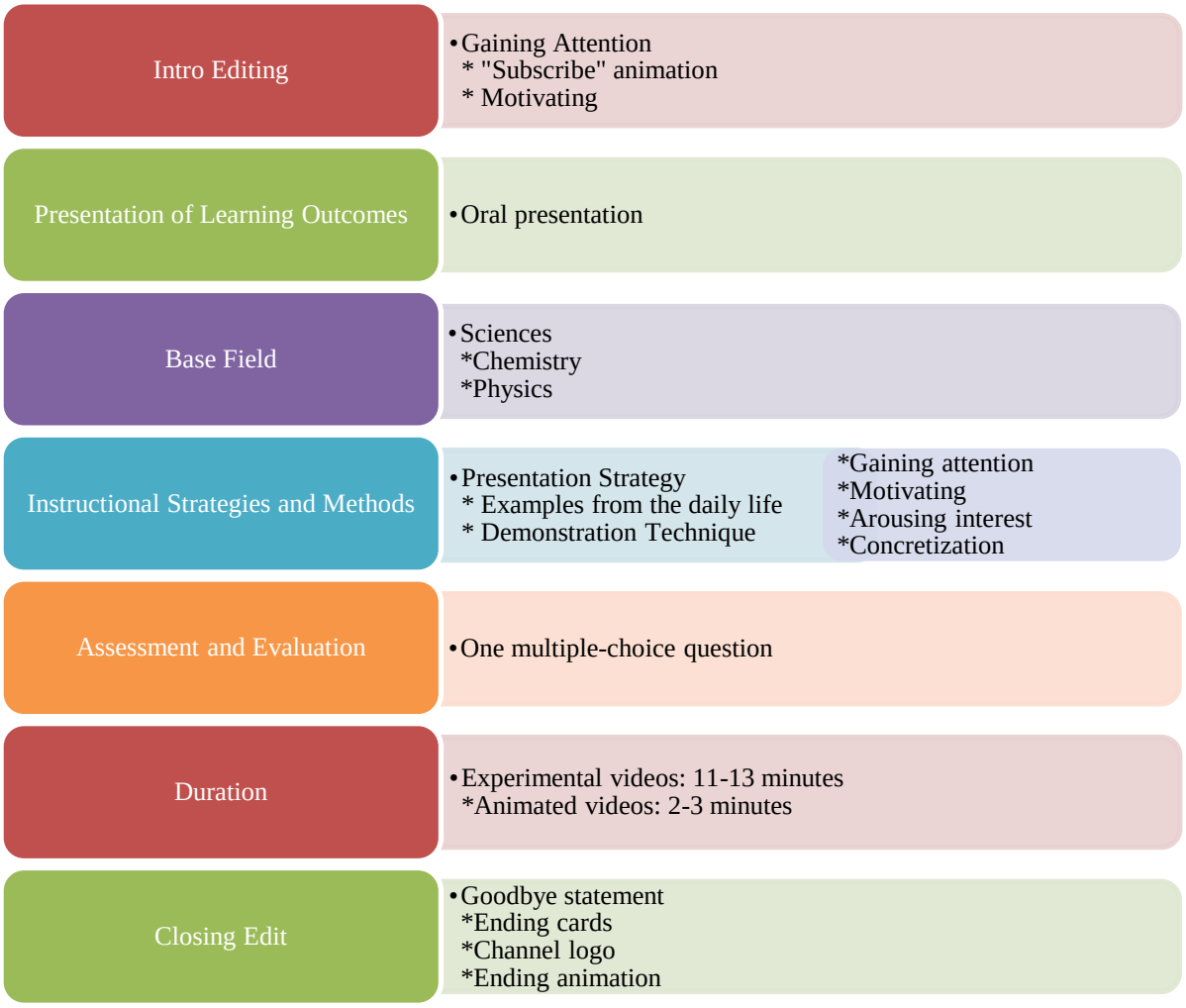

Figure 1. *Program elements contained in the YouTube videos*

As seen in Figure 1, introductory arrangements, outcome presentations, base field contents, instructional strategies and methods, assessment and evaluation, duration, and video completion elements were determined in YouTube videos. The findings regarding which program elements each YouTube video has are exhibited in Table 5.

Table 5. *The presence of program elements in the YouTube videos*

Program Elements	Videos									
	V1	V2	V3	V4	V5	V6	V7	V8	V9	V10
Attention	+	+	+	+	+	+	+	+	+	+

grabbing										
Oral presentation	+	+	+	+	+	+	+	-	-	-
Sciences field	Phys	Chem	Chem	Chem	Phys	Chem	Chem	Chem	Phys	Phys
Presentation strategy	DT	DT	DT	DT	DT	DT	DT	LT	LT	LT
Assessment and evaluation	MCQ	MCQ	MCQ	MCQ	MCQ	MCQ	MCQ	-	-	-
Video type and duration	Exp. 12 mins	Exp. 13 mins	Exp. 6 mins	Exp. 12 mins	Exp. 12 mins	Exp. 12 mins	Exp. 11 mins	Anim. 3 mins	Anim. 3 mins	Anim. 3 mins
Goodbye statement	+	+	+	+	+	+	+	-	-	-

Note. Phys = Physics. Chem = Chemistry. DT = Demonstration Technique. LT = Lecturing Technique. MCQ = Multiple-choice Question. Exp = Experimental. Anim = Animated. "+" = Present. "-" = Absent.

Table 5 provides an overview of the program elements identified in the YouTube videos. It indicates that there is an oral presentation of outcomes in the videos, typically presented after the experimental phase, within the theoretical section accompanied by real-life examples. The base field of the videos revolves around science, with a focus on experiments in the fields of chemistry and physics, although there appears to be a greater emphasis on the former. The videos encompass both theoretical explanations and practical demonstrations. Theoretical presentations discuss the properties of substances or events under investigation, their corresponding chemical or physical states, and the practical applications of this conceptual knowledge in daily life. The instructional methods employed in the videos include lecturing and demonstration techniques, utilizing an expository teaching strategy. During the lectures, elements such as attention-grabbing, curiosity stimulation, motivation, real-life examples, and concretization are incorporated. Animations and visuals are also employed throughout the presentations. In terms of assessment and evaluation, towards the end of the videos, a single multiple-choice question with two options is posed, and viewers are encouraged to write their answers in the comments section.

The intro edits of the videos do not have a special introductory animation or image. From the analysed videos, introductory animation is used in older videos, while the content is started instantly without animation in subsequent videos. The videos begin directly with Basfi's remarkable introduction. The character starts the video lively and energetically, making statements and using materials that arouse interest in the subject, employing a humorous language, and joking with the filming crew. Depending on the situation, suitable background music is occasionally used. Throughout the videos, the channel-specific "subscribe" logo stands out in the lower right corner. Then, usually a minute or two after the start of the video, there is a small animation showing the subscribe button in the lower left corner. Finally, when the content is considered in terms of average duration, experimental videos take between 11 and 13 minutes, while animated videos last between 2 and 3 minutes.

DISCUSSION AND CONCLUSION

The aim of this research was to analyse the design features and program elements utilized in the videos of an educational YouTube channel that is popular on the platform. The findings from the analysis of the videos revealed that they generally align with Mayer's multimedia design principles. The videos demonstrate compatibility with principles such as multimedia, signalling, redundancy, spatial proximity, temporal proximity, pretraining, personalization, voice, modality, image, and embodiment. However, they do not adhere to the segmentation and generative activity principles. In terms of coherence, the videos show partial compliance. This study provides insights into the extent to which educational content on the YouTube platform adheres to multimedia design principles. Similar research exists, including this study, that examines the level of compliance with multimedia design principles in educational content across different digital platforms (Bulduk, 2015; İşbulan et al. 2020; Kaleli 2022; Özerbaş et al., 2021; Taş Alicenap & San, 2019; Ülker 2021). Furthermore, Mayer, the creator of the

multimedia principles, continues to research and develop design principles for effective educational videos (Mayer, 2021). Therefore, there is an ongoing interest in exploring the applicability of multimedia design principles to educational videos across various digital platforms. By analysing a prominent educational channel's videos on YouTube, which has a large audience, this study aimed to determine the compatibility of these videos with multimedia design principles. The findings of this research can serve as a guide for other educational video content creators who intend to publish their content on digital platforms.

Numerous studies have highlighted the positive impact of instructional activities based on multimedia design principles on students' academic success and learning (Akyol & Çiftçi, 2020; Coşğun & Seller, 2017; Eitel et al., 2013; Issa et al., 2011; Özerbaş & Yalçınkaya, 2018; Rey & Steib, 2013; Taş Alicenap & San, 2019; Yünkül, 2019). Therefore, it is recommended to develop educational materials in digital learning environments while considering the principles of multimedia design (Taş Alicenap & San, 2019; Yünkül, 2019). Experts are encouraged to evaluate these learning environments based on multimedia design principles, and application developers are advised to incorporate these principles into their educational content production processes (Özerbaş et al., 2021). In accordance with these statements, although the importance of multimedia design principles in designing educational materials for digital media is widely acknowledged, the exact impact of these principles on the production, evaluation, and effectiveness of educational videos is not fully understood. In light of the current research conducted to address this research gap, it has been observed that the design features of the videos from a prominent educational channel on YouTube are mostly compatible with multimedia design principles.

In the YouTube videos of the analysed channel, the outcome presentation is delivered orally, typically following a theoretical section that includes examples from daily life after the experimental phase. Presenting the learning outcomes of a course, as determined by the program evaluation of educational software such as Vitamin, positively impacts students' understanding of their purpose and their engagement in the course (Yıldız & Sarıtepeci, 2013: 524). The primary field explored in the YouTube videos of this research is science, specifically focusing on experiments in the fields of chemistry and physics. It is evident that there are more videos related to the field of chemistry, aligning with the channel's objective of fostering a love for chemistry among children. Additionally, physics experiments are included in relation to the field of chemistry. This situation reflects the idea that objectives and achievements can be interconnected across multiple learning areas, facilitating transferability (Ateş et al., 2015: 112). Both theoretical and practical explanations are included in the videos, in which content at the level of knowledge and comprehension and the place thereof in daily life are presented in the theoretical part, whereas practical demonstrations showcase the execution of experiments.

The teaching techniques employed in the analysed videos involved lecturing and demonstrating, with the content delivered through expository teaching. During the lecturing segments, various elements were utilized to engage the audience, such as attracting attention, arousing curiosity, motivating the viewers, providing examples from daily life, and offering concrete explanations. The presentations also incorporated animations and visuals to enhance the learning experience. It is worth noting that including real-life activities in educational videos, rather than relying solely on animations, has been found to increase student motivation. As a result, the expectation is for the videos to cover both the knowledge and experiences that students will require in real-life situations (Şentürk & Kurşun, 2021: 176).

Including authentic examples in educational materials promotes long-term learning and the transfer of knowledge to new problem situations (Yıldız & Sarıtepeci, 2013: 503). Similarly, the fact that the videos are visually rich allows pupils to like and be driven by them (Bakırcı & Kılıç, 2021: 697). However, the incorporation of pictures in learning materials is also useful in boosting learning

persistence (Kana & Saygılı, 2016: 21). It can be noted that the program elements chosen to be employed in the YouTube videos analysed within the scope of the research are consistent with the literature.

A single multiple-choice question is asked near the end of the videos to address assessment and evaluation, and the audience is requested to post the answer in the comments section. While a limited assessment of learning is made in this context, requesting the audience to write their answers in the comments section ensures interaction and audience participation. According to some studies that examine the video content for various EBA courses in the literature, there is no assessment and evaluation stage in Turkish course videos, and the efficiency of including the teaching stages in the videos for this situation can be increased (Ateş et al., 2015: 114). Furthermore, an examination of the science video lectures in EBA reveals that science instruction is shallow, and no feedback is provided for solving the questions asked in the courses (Bakırcı & Kılıç, 2021: 697).

The video intro edits do not include any special beginning animation or images. According to the videos that were analysed, the material starts out immediately without animation in later videos, whereas older videos use animation for the opening. The videos begin immediately with Basfi's outstanding introduction, who begins the video in a vibrant and energetic manner, makes remarks and uses materials that will raise the viewer's interest in the issue, employs witty language, and shares jokes with the shooting crew. Depending on the occasion, appropriate background music is also played. The channel-specific "subscribe" logo appears in the lower right corner throughout the videos. Then, generally a minute or two after the movie begins, a small animation displays with the subscribe button in the lower left corner. When looked at a study on university lecture videos on the YouTube platform, introductory credits, end credits, and movie credits are observed to be effectively used (Ata, 2017: 437), indicating a partial congruence of the present study with the literature in that the videos analysed in this research have a closing animation, but most lack introductory credits.

The videos last from 11 to 13 minutes if they are experimental and from 2 to 3 minutes if animated. According to a study on Turkish lesson videos in EBA, it is known that 83% of the lesson videos are under 11 minutes, which is stated to be an insufficient duration considering the intended learning outcomes and course procedures (Ateş et al., 2015: 110). Similarly, it was reported that there was a disunity in the lessons due to the shortness of the sciences videos in EBA (Bakırcı & Kılıç, 2021: 697). Contrary to these statements, when teachers were asked about their video preferences, it was revealed that videos longer than 5 minutes were not watched enough by students (Şentürk & Kurşun, 2021: 180). Similarly, in some studies on the process of developing educational videos, it is emphasized that the videos should be as short as possible due to the negative impact of long video duration on the learners in that they get lost in the subject (Ozan, 2015: 70) and be distracted (Aydemir, 2018; Thiele et al., 2017). It is observed that the duration of the lecture videos uploaded by universities to the YouTube platform varies between 02:00-05:00 and 05:01-10:00 (Ata, 2017: 310). Also, in enriching the e-books developed for tablet computers with audio visual materials, videos between 2 and 12 minutes are more accepted by the general audience, who stated that they cannot concentrate on the lesson in shorter videos and break away from the lesson in longer videos (Yıldırım, 2014: 225). At this point, the finding that the average video duration of this research is 3 minutes for animation videos and 12 minutes for experimental videos is in line with the literature.

This study aimed to determine the design features and program elements adopted in the videos of an educational YouTube channel that has reached a high number of views. The design elements of the videos of a prominent educational channel on the YouTube platform were determined according to the multimedia principles and program elements. Determining the design elements and program elements adopted in educational videos, which can be used as an effective learning material in learning environments, holds significance for overall instructional processes. In this study, it is recommended to

consider multimedia design principles and program elements in the production process of YouTube educational video contents. In addition, elements such as an attention-grabbing introduction, maintaining interaction with the audience, presence of a channel logo, and a striking ending animation that can adapt to the nature of the YouTube platform should also be included. It can be suggested that the use of these elements contributes positively to the interaction of the viewers with the video and to keeping the viewers in the video. In this respect, the research is important for content producers. In this context, the research has a characteristic that will guide future research for educational video designs on digital platforms.

IMPLICATIONS

In the process of producing educational videos for the YouTube platform, multimedia design principles should be considered, and program elements should be included. In addition, the educational videos to be prepared should be compatible with the nature of the YouTube platform. In this context, the recommendations for educational video design are listed below, taking into account the multimedia principles, program elements, and the nature of sharing on the YouTube platform.

- The video should start directly with the attention-grabbing introduction. At the end of the video, a closing statement, a short channel-specific ending animation, ending cards, and the channel logo can be used.
- Narration in videos can be supported by visuals, animation, text, and sound elements related to the subject. In addition, important places should be highlighted with audiovisual effects.
- When deemed necessary, smooth and non-verbal background music can be used in light tones that do not interfere with the video subject content.
- The outcome presentation should be included in the videos. Theoretical and practical explanations should also be given. Preliminary information about the subject should be provided in the videos, which are to be supported with examples from daily life and the elements of concretization and motivation.
- In order to ensure interaction, questions can be asked to the audience in the video to be answered in the comments section.
- Supporting the findings of the literature, the duration of the videos can be between 11 and 13 minutes on average, while the videos consisting only of animation can be between 2 and 4 minutes on average.
- By examining more educational content channels on YouTube, scale development studies can be carried out to examine educational videos.
- On the YouTube platform, the impact of channels that produce educational content for exam preparation on academic success and motivation variables can be investigated in terms of their effectiveness.

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Determining the Professional Development Needs of Primary School Teachers Working in Science and Art Centers [1]

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ABSTRACT

Science and Art Centers (SACs) are educational institutions affiliated with the Ministry of National Education that focus on the education of gifted individuals. In SACs, primary school teachers are responsible for implementing specialized and enriched curricula designed for gifted students in 2nd, 3rd, and 4th grades. The professional development needs of primary school teachers at SACs differ from those in regular primary schools.. However, it is essential for teachers to continue their professional development throughout their tenure and actively participate in in-service training activities. Recognizing the significance of continuous professional development in the teaching profession, this study aims to identify the areas where primary school teachers at SACs require professional development and provide recommendations for incorporating these needs into future professional development activities. The research data for this study were collected using the Classical Delphi Technique. Academicians working in the field of Classroom Education or Special Abilities, who conduct research on gifted individuals, and primary school teachers who work with gifted students participated in this data collection process. The data obtained were analyzed through descriptive analysis and content analysis. The study revealed that primary school teachers working at SACs require professional development training in various content areas, including recognizing gifted students, understanding relevant legislation, implementing enriched and differentiated education for gifted individuals, exploring education-teaching models, and fostering family involvement in the educational process. Based on these identified needs, it is strongly recommended that policy makers develop and implement professional development programs specifically tailored to primary school teachers employed at SACs.

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[1] This study was presented at USOS 2022.

INTRODUCTION

Gifted students are widely acknowledged to possess superior intellectual, social, emotional, and creative abilities, necessitating environments that foster their growth. These students demonstrate advanced learning potential and problem-solving capabilities beyond their peers in the same age group. The education of gifted individuals should strive to surpass the constraints of conventional teaching approaches and unleash the full potential of these students. As a result, the professional development of teachers engaged in the education of gifted students assumes paramount significance (Gourgiotou, Katsavria & Basagianni, 2019; Rowley, 2012).

The learning and development processes of gifted students often diverge from those of their peers. Conventional curricula and teaching methods may not be sufficient to fully unleash the potential of these students, leading to challenges in sustaining their interest and motivation. Consequently, educators must provide specially tailored and enriched learning experiences to cater to the unique needs of gifted students. This necessitates continuous development of teachers' knowledge and skills to effectively address the learning requirements of gifted students (Rowley, 2012). The professional development of teachers engaged in the education of gifted students plays a pivotal role in establishing an effective learning environment, unlocking the full potential of these students, and meeting their distinct learning needs. At this juncture, well-planned and implemented teacher training programs contribute significantly to enhancing the quality of education provided to gifted students.

In order to be effective teachers of gifted students, educators must possess specific competencies. Achieving maximum efficiency for gifted students necessitates professional development and positive experiences to develop these competencies (Wycoff, Nash, Juntune & Mackay, 2003). These competencies encompass a wide range of knowledge, skills, and qualities essential for understanding and supporting the diverse learning needs of students and unlocking their full potential. Alongside academic expertise, traits like emotional intelligence, flexibility, creativity, and collaboration are also crucial for effectively working with gifted students. Teachers of gifted students should demonstrate a comprehensive range of academic knowledge and skills. They need to be well-versed in their students' individual interests and abilities, providing them with stimulating and enriched course content across various disciplines. Furthermore, teachers should possess mastery in strategies such as thought-provoking techniques, adept questioning skills, and creative thinking methods to sustain and enhance the intellectual stimulation of gifted students. Adequate knowledge of education programs tailored for gifted individuals and their enrichment is equally important for teachers (Darga, 2010). As Akar and Şengil Akar (2012) pointed out, insufficient or incorrect knowledge about gifted students and appropriate educational programs can lead to various issues. Moreover, teachers' inadequate understanding of the education of gifted children in need of special attention may result in their students facing challenges across multiple areas (Kontaş & Yağcı, 2016).

In Türkiye, the education of gifted individuals is conducted through Science and Art Centers (SAC), which operate under the Ministry of National Education. SACs serve as institutions dedicated to providing support and educational services to students gifted in general mental abilities, visual arts, or music talents. Their primary objective is to nurture and enhance these students' talents, enabling them to reach their full potential. SAC students are typically enrolled from the 1st, 2nd, and 3rd grades of primary school, and their education continues until the 12th grade. The curriculum at SAC is structured to encompass adaptation, support education, identification of individual talents, development of special talents, and project production and management training programs, respectively. Educational programs at SACs are meticulously crafted by class/branch teachers, following a student-centered and interdisciplinary approach. These programs are designed to cater to individual learning styles, differentiated to suit each student's interests, abilities, and potential. The ultimate goal is to equip students with high-level mental, social, personal, and academic skills essential for adulthood, including effective problem-solving, decision-making, and creativity. Throughout the planning, implementation,

and evaluation phases, SAC emphasizes experiential learning, encouraging students to learn by doing and experiencing real-life situations. Students are encouraged to think creatively, engage with their surroundings, conduct scientific research, and make discoveries. Special talent development programs are designed to offer comprehensive and advanced knowledge, skills, and behaviors in various disciplines, incorporating both disciplinary and interdisciplinary approaches. Values education is an integral part of SAC's educational programs, with a focus on instilling ethical principles at every stage of the students' development. Moreover, project generation and development activities serve as the foundation for all activities carried out in SAC (MoE, 2022).

The specific roles and responsibilities of teachers working at SACs are thoroughly outlined in the SAC directive (MoE, 2022). Primary school teachers hold a vital position as the first educators students encounter when they enter SAC. They play a crucial role in effectively implementing the specialized differentiated and enriched education programs designed to cater to the unique needs of gifted students in 2nd, 3rd, and 4th grades. Consequently, the professional development needs of primary school teachers at SACs may differ from those of their counterparts in regular primary schools. Primary school teachers seeking to work at SAC must undergo necessary teacher recruitment processes and require specialized training on the education of gifted individuals when they commence their duties. During their undergraduate education, these teachers typically receive minimal or no specialized courses dedicated to the education of gifted individuals, apart from those pursued based on their personal interests. While an orientation program is annually conducted by the Department for the Development of Special Abilities under the General Directorate of Special Education and Guidance Services of the Ministry of National Education for teachers appointed to SACs, there is no formal assessment by the ministry to determine whether new SAC teachers possess the necessary competencies or if additional professional development is required in this regard. Dağlıoğlu (2010) emphasizes that, in addition to pre-service university education, it is of utmost importance to ensure the effectiveness and success of teachers' educational and training endeavors by offering specialized training during their service tenure. Continuous professional development plays a critical role in equipping teachers with the necessary expertise to effectively address the distinctive needs of gifted students.

As per Article 25 of the SAC Directive, the education program for gifted children should be developed to cater to individual learning needs, guided by teachers. Additionally, Article 39 of the same directive mandates that teachers must prepare education programs in line with the center's education model and objectives (MoE, 2022). Within the framework of this directive, teachers working in SACs are required to adhere to the existing education and training programs related to gifted children's education. They are also expected to be familiar with the studies conducted with these children on both national and international levels. Moreover, teachers should implement educational practices and instructional designs that cater to the students' needs by conducting differentiation and enrichment activities, incorporating all the acquired knowledge and expertise.

Amidst numerous national and international studies on the education of gifted students, scant attention has been directed towards exploring the professional development needs of teachers who undertake the educational responsibilities of these gifted learners (Fraser-Seeto, Howard & Woodcock, 2014). Teachers involved in gifted education are expected to stand out positively compared to their peers, demonstrating superior knowledge, abilities, and competencies (Chan, 2001). In our country, there appears to be a lack of emphasis on addressing the educational and professional development needs of teachers working with gifted children (Gökdere & Çepni, 2004). Remarkably, teachers at SACs often graduate without undergoing comprehensive training, except for graduate education, on the education and characteristics of gifted children during their pre-service education (Gökdere & Çepni, 2004). Furthermore, research reveals that teachers in these centers exhibit deficiencies in areas like project-based teaching, special education, and the evaluation of gifted students (Altun & Vural, 2012; Gökdere & Küçük, 2003). Moreover, the dearth of effective and adequate professional development

opportunities for teachers working at SACs is well-documented, with prepared professional development programs being deemed insufficient (Şahin et al., 2023). The findings of this study carry significant importance, as they have the potential to provide invaluable insights for both practitioners and policymakers regarding the content that should be incorporated into the professional development of primary school teachers at SACs.

METHOD

The problem in question is based on the lack of continuous professional development opportunities for primary school teachers working in Science and Art Centres (BİLSEM) and their inability to meet the special educational needs of gifted students effectively. This study employed the classic Delphi technique to identify the professional development needs of teachers working at SACs. The Delphi technique is a method that utilizes questionnaires to seek consensus among experts with diverse viewpoints. The primary objective of the Delphi technique is to achieve a collective agreement among experts on a specific topic. However, the unique aspect of this technique is that the experts involved do not convene in person during the process. Instead, their opinions are gathered and exchanged through Delphi questionnaires, facilitated by a moderator who guides the discussion.

The classification of the Delphi technique within the realm of research designs is a subject of debate among scholars (Kart, 2022). While some researchers assert that the Delphi technique possesses distinct characteristics of its own (Wellington, 2015), others argue that it can be classified as a quantitative, qualitative, or mixed design (Avella, 2016). Furthermore, there are divergent views on the optimal number of rounds of sequential questionnaires to be sent to panelists and answered in order to achieve consensus through the Delphi technique. Nevertheless, existing research suggests that conducting two or three rounds would be adequate for attaining consensus (Hasson, Keeney & McKenna, 2000).

Important limitations and assumptions should be taken into account during the research. In particular, the results of our research were influenced by the selection of the sample, the level of experience of the panellists and their impact on the level of cooperation. This may lead to potential limitations in generalising and validating the results. There are also assumptions inherent in the Delphi technique as it assumes consensus among experts, which is not always guaranteed. The use of more rounds may lead to a greater degree of consensus among the panellists, but this may have an impact on the ability of the research to overcome time and resource constraints.

The Delphi technique is a research technique used to elicit expert opinions and consensus building. There have been no evaluations of the validity and reliability of this technique in the traditional sense, but there have been a number of improvements.

First, the panel of experts was selected carefully, and the level of experience and expertise of the experts was considered. More than one round was used in the research. At the end of each round, the panellists were provided with feedback from the previous round. Anonymity was maintained and the panellists were encouraged to be open.

Participants

The study utilized the classic Delphi technique, conducting data collection through two rounds. The participants encompassed both academics engaged in research on gifted education and school education, as well as primary school teachers working with gifted students. To identify the academic participants, emails were sent to scholars listed in YÖK's (Higher Education Council) academic database, with a focus on those specializing in the education of special talents and gifted students in school education. The academics who willingly volunteered to participate constituted Expert Group I, forming the panel list group. Similarly, emails were sent to teachers employed in institutions where the researchers were based to identify teachers working at SACs. Those teachers who expressed their willingness to participate comprised Expert Group II, serving as panelists. The study group consisted of

a total of 16 participants, comprising 2 academics from Expert Group I specialized in classroom pedagogy, 4 academics from Expert Group I involved in gifted education, and 10 primary school teachers from Expert Group II actively working at SAC. Detailed information about the panellists is provided in the table below:

Table 1: Pannellists Detailed Information

Panelist Name	Area of Expertise	Institution (University/MoNE)
CEA1	Primary School Education	University
CEA2	Primary School Education	University
SGEA1	Gifted Education	University
SGEA2	Gifted Education	University
SGEA3	Gifted Education	University
SGEA4	Gifted Education	University
T1, T2, T3, T4, T5, T6, T7, T8, T9, T10	Primary School Teacher	MoNE

Research Instruments and Processes

The data collection tool employed in the study was derived from Akar's (2015) thesis, which explored the competencies of primary school teachers supporting gifted students in regular education classrooms. This data collection tool, named the professional development needs assessment form, comprises five sections and 14 questions. These sections are structured around field-specific basic knowledge, professional principles and ethics, collaboration and support, regulations and measures, as well as classroom management and atmosphere. Each question was rated on a scale of 1 to 7, with 1 indicating strong disagreement about the necessity of professional development activities for SAC primary school teachers on the subject, and 7 signifying strong agreement regarding the importance of participating in such activities. After grading the 14 statements, participants were invited to propose topics or fields of study for professional development activities corresponding to each item.

The validity of the data collection instrument was ensured through a review by experts and academics. Contextual validity was ensured by expert review of the tool. The data collection tool was subjected to a rigorous review by experts in the field and was revised where necessary. To increase the reliability of the data collection tool, a pilot study was conducted and the feedback received from the participants was considered. The feedback received from the participants confirmed that the measurement tool was clear and consistent in its use.

A detailed process was used to analyse the datad. The data collected in the first round was processed using analytical methods. This was done to assess the views of the participants and identify specific training needs. This process involved categorising the data, identifying similar themes and making sense of these themes. The data from second round was updated based on the results of the first round and included additional views of the participants. The second round data was compared with the first round data, allowing additional information to be extracted, thus providing a richer and more comprehensive analysis of the results. This detailed analysis of the data increases the reliability and validity of the research findings.

The data collection was the subject of a detailed analysis process. In the first stage, the collected

data were analysed in detail and divided into thematic categories. These categories were chosen carefully to reflect the main themes contained in the data. As part of the categorisation process, appropriate codes were created that reflected the research model and purpose. For example, academics working in the field of classroom education were represented by specialised codes such as 'CEA1' and 'CEA2'. Similarly, experts in the field of gifted education were identified by codes such as 'SGEA1', 'SGEA2', and primary teachers working in SACs were represented by codes such as 'T1', 'T2', etc. This coding system allowed us to categorise the data in a more meaningful and organised manner.

These codes and categories were then used to further analyse the data. This stage involved breaking down the data within each category into more detailed sub-categories. This gave us a better understanding of the data and the opportunity to explore participants' views in more depth. The research findings became richer and more comprehensive as a result of these analyses. Conducting the data analysis process in such a detailed and systematic way strengthened the reliability and validity of the research.

FINDINGS / RESULTS

Below are the findings obtained from the data collected in the study, listed in order.

The answers to the first research question, *"Which training do you think a primary school teacher working in a Science and Art Center should receive about understanding special talent and being gifted?"* are presented in Table 1.

Table 1. *The answers to the question "What training do you think a primary school teacher working in a Science and Art Center should receive about understanding special talent and being gifted?"*

Categories	Descriptions
Interactive/Applied Education of Specially Gifted Individuals	• It is essential to provide education specifically tailored for specially gifted individuals. This education should encompass various aspects, such as defining giftedness, methods for identification, and a comparison of practices in both national and international contexts (T1). • Although the training courses offered under the umbrella of gifted education do cover the subject of giftedness and understanding it, they could benefit from being more comprehensive. The inclusion of case studies could be an effective way to delve deeper into the topic (T10). • The importance of going beyond basic introductory level training and offering students opportunities for practical application through case studies (SGEA2). • The provision of interactive training enriched with real-life experiences to facilitate the discovery of gifted students within formal education classrooms (SGEA4).
Giftedness and Intelligence Theories Education	• Theories of intelligence and giftedness should be interconnected with the specific traits of gifted individuals, allowing for a more comprehensive understanding of their giftedness (SGEA1). • Offering trainings dedicated to comprehending the concept of giftedness and its distinctive characteristics (T4). • SAC primary school teachers whose training on giftedness might be limited. As a result, these teachers may perceive all diagnosed students as uniform and find it challenging to analyze individual differences, both positive and negative aspects of giftedness. Consequently, it might be difficult for them to identify which characteristics are displayed by each individual gifted student (T2).
Activity preparation training tailored to grades	• Trainings could be beneficial in addressing strategies for handling failure, ways to boost motivation, and ensuring attendance. Additionally, the training could encompass techniques for designing activities tailored to different levels of students' abilities (T5).
Psychology of the Specially Gifted	• It is crucial for primary school teachers working with gifted students to receive training from experts in the field of psychology of gifted students. Additionally, they should be provided with moderator support during the training process. Access to relevant resources on the subject should also be made available to them (T8).
Training of Twice Exceptional Students	• The inclusion of case studies in the training. Additionally, conducting in-depth evaluations based on examples for twice exceptional students could enhance the effectiveness of the training (T7).
Creativity Training	• Training centered around fostering creativity could be highly effective in

	addressing the needs of gifted students (T9).

According to Table 1, the participants emphasized that a primary school teacher employed at a SAC should undergo comprehensive training to effectively cater to gifted students' needs. This training includes interactive and practical approaches to gifted education, instruction on giftedness and intelligence theories, preparation of activities suitable for different proficiency levels, understanding the psychology of gifted students, handling the education of twice-exceptional learners, and fostering creativity.

Furthermore, the descriptions suggest that social support training would be beneficial to identify gifted students and enhance their motivation.

The answers to the second question of the study, *"What training do you think a primary school teacher working in a Science and Art Center should receive about understanding special talent and being gifted?"* are presented in Table 2.

Table 2. *The answers to the question "What training do you think a primary school teacher working in a Science and Art Center should receive about understanding special talent and being gifted?"*

Categories	***Descriptions***
Recognizing Gifted Students	• In order to understand the characteristics of gifted students it is crucial to observe them through training sessions that include situational scenarios and videos (SGEA4). • Student recognition cards can be devised for practical use. Each card can detail the specific behaviors and characteristics exhibited by a student on one side, with explanations of suitable approaches and interventions on the other side (T2). • Teachers can be encouraged to analyze academic studies on the characteristics of gifted children and provide their own reports based on these studies (SGEA3).
Cognitive / Affective / Social Development Training	• Research theses that delve into the cognitive, affective, and social aspects of gifted children's developmental stages can be presented (T1). • Comprehensive training sessions can be conducted to explore the characteristics, needs, and social as well as personality development of gifted children (T4).
Case Study	• Various activities centered around brainstorming and problem-solving can be implemented. However, I believe the key aspect is the ability to engage in case studies (SGEA3).
Field Visits	• Teachers can gain direct insights into student characteristics by conducting focus group interviews with their peers during field visits, utilizing the information provided by fellow teachers (T6).
Portfolio Training	• Portfolio training is essential. It involves gathering comprehensive information about the child's self-expression in various aspects, establishing communication with relevant departments to obtain detailed data, and determining the portfolio content with a global perspective and purposeful approach (T1).

According to Table 2, the participants emphasized that a primary school teacher working in a SAC should undergo training in recognizing gifted students, cognitive/affective/social development, case studies, field visits, and portfolio preparation.

The answers to the third question of the research, regarding the necessary training to ensure a primary school teacher's command of the legislation on SAC processes, are presented in Table 3.

Table 3. *The answers to the question "What training should a primary school teacher working in a Science and Art Center receive to ensure their command of the legislation on Science and Art Center processes?"*

Categories	***Descriptions***
SAC Legislation / SAC Processes	• New teachers joining SAC can receive introductory training regarding the legislation to familiarize themselves with the subject (T4). • It is crucial to provide comprehensive training to ensure that teachers have a strong

	command of the legislation (T5). • Organizing a series of seminars that extensively cover the legislation can be beneficial; nevertheless, I believe that hands-on experience and guidance from more experienced teachers will be the key to enhancing the teachers' understanding and implementation of the processes effectively (T6).
Involvement in Diagnostic Processes	• Considering that some SAC primary school teachers are excluded from the system during the student selection exams for SAC, I have significant concerns about the effectiveness of this practice in our country. To address this issue, it is crucial for exam practitioners in Guidance and Research Centers and SAC primary school teachers to collaborate, meet, and exchange information (T2).
E SAC Module	• To enhance accessibility and flexibility, this training can be designed to be available online and accessible at any time. The E-SAC platform can serve as a perpetual resource for teachers to access the training materials (T8).
Not Required	• Considering the existing inadequacies in the legislation regarding the education of gifted children, I think that providing training is unnecessary. The concern is that such training could lead to criticism of the current legislation if teachers become aware of its limitations (SGEA3)

According to Table 3, the participants had varying opinions on the training courses that a primary school teacher working in a SAC should receive. While some emphasized the importance of training on SAC legislation, SAC processes, involvement in diagnostic processes, and utilizing the E-SAC Module, there were also participants who expressed that such training may not be necessary.

The answers to the fourth question of the research, "*What training should a primary school teacher working in a Science and Art Center receive about supporting talents within the framework of individual differences and adopting an understanding that meets the needs?"* are presented in Table 4.

Table 4. *The answers to the question "What training should a primary school teacher working in a a Science and Art Center receive about supporting talents within the framework of individual differences and adopting an understanding that meets the needs?"*

Categories	Descriptions
Enriched / Differentiated Education and Current Teaching Strategies Training	• Enriched and differentiated education practices are essential in this context. To achieve this, teachers should first establish a deep understanding of each student and be capable of tailoring educational interventions based on what the student should know, understand, and achieve (T3).
Training on Discovering Differences	• Exploring topics such as "Individualized Education: Differentiation and Enrichment in the Curriculum" would be beneficial (SGEA2).
Scenario / Case Study Training	• Teachers should consider taking courses on current education and teaching strategies (SGEA1).
Digital Competence and Research Skills Training	• Organizing trainings on "Designing Activities to Recognize Individual Differences and Evaluating Them" is recommended (CEA1).
Student Performance Evaluation Training	• Acquiring skills to analyze student profiles can be facilitated through appropriate training (SGEA2).
Inclusive Education	• Employing impactful training methods, such as real-life scenarios and case studies, as described in the first item, can be highly beneficial (T2).

According to Table 4, the participants highlighted that a primary school teacher working in a SAC should receive various training courses to effectively support talents within the framework of individual differences and meet the needs of gifted students. These training courses include enriched/differentiated education and current teaching strategies training, training on discovering differences, scenario/case study training, digital competence and research skills training, student performance evaluation, and inclusion training.

The answers to the fifth question of the research, "*What training should a primary school teacher working in a Science and Art Center receive about being aware of his/her own professional needs (differentiation, enrichment, acceleration, etc.) regarding the education processes of gifted students in Science and Art Centers?"* are presented in Table 5.

Table 5. *The answers to the question "What training should a primary school teacher working in a Science and Art Center receive about being aware of his/her own professional needs (differentiation, enrichment, acceleration, etc.) regarding the education processes of gifted students in a Science and Art Centers?"*

Categories	*Descriptions*
Enrichment/ Differentiation/ Acceleration Training	• Teachers should attend courses focused on adaptation, acceleration, and enrichment (SGEA1). • They should receive training on differentiated and enriched education (CEA1). • It is crucial for teachers to undergo training on differentiation and enrichment, enabling them to create personalized lesson plans based on the support book activities (T7). • Application of differentiation and enrichment training is highly essential. Every teacher who undergoes this training should become competent in designing activities that embrace differentiation. This could include workshops on preparing sample lesson plans and modules (T8). • Regular and periodic training on differentiated and enriched education is necessary (T9). • Teachers can collaboratively plan differentiation and enrichment activities in workshops, discussing and refining the resulting plans as a group (T10). • Regional mini-workshops could be organized periodically, where teachers come together to develop new content through the application of differentiation strategies (SGEA2).
Micro Instruction	• Micro-teaching practices should be an integral part of these training processes. Teachers should engage in micro-teaching activities, watch videos of these sessions, and receive constructive feedback. Based on this feedback, they can work on new situations and enrich the teaching environment to meet students' needs (CEA2). • Micro-teaching is considered to be a highly effective method (SGEA4).
Professional Sharing with Experienced Educators	• Instructors with extensive experience and practical expertise, who have a real impact in the field, should share their own experiences. It is important that they have hands-on experience working with students rather than purely academic backgrounds (SGEA4). • There should be opportunities for teachers to share and transfer their professional activities with colleagues, either online or through face-to-face interactions. This training could be named "Every teacher has something to teach each other" (SGEA2).
Interdisciplinary Integrated Curriculum Model Training	• Interdisciplinary Integrated Curriculum Model (Reaps, Williams, etc.) training should definitely be taken by teachers working with gifted students (SGEA3).
Current Training Courses	• Training such as Arduino, basic electricity, intelligence games, drama, Web 2.0, and STEM are considered essential for primary school teachers at SAC (T1).
Training on Guiding Students with Special Talents	• We need training on how to guide a gifted student (T10).

According to Table 5, the participants highlighted that a primary school teacher working in a SAC should receive various training courses to be aware of their own professional needs regarding the education processes of gifted students. These training courses include enrichment/differentiation/acceleration training, micro-teaching, interdisciplinary integrated curriculum models (such as Reaps, Williams, etc.), professional sharing with experienced educators, current training courses like arduino, basic electricity, intelligence games, drama, web 2.0, STEM, and guidance of gifted students.

The answers to the sixth question of the research, *"What training should teachers receive in order to adopt the understanding of continuing the process of inclusion in a Science and Art Center education processes by working in a planned and programmed manner?"* are presented in Table 6.

Table 6. *The answers to the question "What training should teachers receive in order to adopt the understanding of continuing the process of inclusion in a Science and Art Center education processes by working in a planned and programmed manner?"*

Categories	Descriptions
SAC Sharing among the Community	• To foster collaboration and sharing of experiences, SAC departments should convene regularly at specified intervals (T1). • Enhancing the effectiveness of CIS meetings and collaborative projects is crucial (T8). • Organizing monthly province-based remote department meetings and periodic Turkey-wide department meetings can facilitate idea exchange and the sharing of implemented activities (T10).
Mentoring by Experienced Academics	• The guidance of experienced teachers is invaluable, and regular interactions with academics in the field can be beneficial (T9). • Implementing a mentoring program led by experienced teachers can be beneficial in providing support and guidance (T10). • Training sessions conducted by academics specialized in gifted education, who will lead the groups, can offer valuable support (T7). • Involving experienced academics in the field can significantly improve the efficiency of the process (T5).
SAC Teacher-School Teacher Sharing	• Facilitating joint training sessions for teachers from the same class across a city and SAC teachers can be beneficial (T1).

According to Table 6, the participants emphasized the importance of providing specific training courses to ensure the inclusion of a primary school teacher in SAC education processes. These training courses include mentorship from experienced academicians, fostering teacher-school teacher sharing, and adopting a planned and programmed approach for effective inclusion in SAC education processes.

The answers to the seventh question of the research, *"What training should a primary school teacher working in a Science and Art Center receive to facilitate coherence between a Science and Art Center education and external educational environments and programs where gifted students are involved or will participate?"* are outlined in Table 7.

Table 7. *The answers to the question "What training should teachers receive to facilitate coherence between a Science and Art Center education and external educational environments and programs where gifted students are involved or will participate?"*

Categories	***Descriptions***
Cooperation with Institutions - Collaboration Training	• Engaging in collaborative studies and joint projects with educational institutions beyond SAC is highly recommended (T8). • Establishing partnerships and conducting joint studies with other institutions that cater to gifted children, such as science high schools, can be beneficial (SGEA3). • Organization and cooperation trainings should be conducted to facilitate effective communication with experts in various fields and foster an eclectic approach to learning and research (CEA1). • A training program covering both teachers and students, similar to "Try and Do Workshops" for students, can be developed. Protocols should be established to address potential concerns and challenges faced by teachers during their participation (T2). • Participants expressed the need for greater collaboration with educational environments and programs outside SAC. While training can be beneficial, it is also important to consider this as an administrative process, and providing support to SAC administrators in this regard would be beneficial (T7).
Communication-Harmony Training Courses	• It appears that SACs in provinces other than Istanbul and Ankara encounter challenges in this aspect. For regions with limited cooperation opportunities, trainings on effective communication and establishing connections with different institutions and organizations could be provided (SGEA4). • Organizing trainings focused on teamwork, fostering harmony, and promoting a culture of sharing is essential (CEA2). • Providing trainings to enhance communication skills can be highly beneficial (SGEA2). • Implementation of consultancy and moderation activities can facilitate better collaboration and coordination (T8).
Doing Needs	• I wholeheartedly agree that conducting a needs analysis and adopting an eclectic

Analysis	approach is crucial in this process. It resembles a research study, where we seek answers to questions like "What are the requirements for students' education? Who should we collaborate with in the educational process? Who are our stakeholders?" By gathering these answers, we can employ an eclectic approach to address the challenges in the education process and fulfill the students' needs effectively (CEA1). • Starting with a needs analysis and subsequently providing academic support based on the findings is vital (SGEA3). This ensures that the support and interventions are tailored to meet the specific needs of the gifted students in SAC.
School-Family Cooperation Training	• Teachers should receive training in activity management and school-family co-operation (T5).

According to Table 7, the participants emphasized that a primary school teacher working in a SAC should receive specific training to ensure harmony between SAC education and external educational environments and programs where gifted students are involved or will participate. These include cooperation-collaboration with related institutions, communication-compliance skills, needs analysis, and school-family cooperation.

The answers to the eighth question of the research, *"What training should a primary school teacher working in a Science and Art Center receive in order to involve the family of a gifted student in the process?"* are presented in Table 8.

Table 8. *The answers to the question "What training should a primary school teacher working in a Science and Art Center receive in order to involve the family of a gifted student in the process?"*

Categories	***Descriptions***
SAC-Family Collaboration Joint Efforts	• The family constitutes one of the fundamental pillars of education. Hence, conducting family matching programs can be beneficial. For this, a SAC teacher, an academician, a counselor, and five families with 3rd-grade students are matched with a family having a 4th-grade student. Throughout the process, experts provide guidance and address challenges faced by both sets of families while sharing experiences, ultimately alleviating the feeling of isolation and fostering a sense of community (T1). • I believe that the expected level of involvement in the process has not been achieved. Offering training on collaborative activities that families can undertake together may prove valuable (T7). • It is essential to organize trainings that enhance school-family cooperation and actively involve families in assigned tasks (T7).
Family Education Program Training	• Family education programs should be implemented, providing regular training intervals to equip families with knowledge on how to offer support at home (SGEA2). • Regular family education programs can be organized to ensure continuous training and support (SGEA4).
Family-Teacher Communication Skills Training	• Teachers can be given training on communication and body language. When good communication is established with the parents, it will be easy to involve them in the process (T4).
Training for Families of Children with Special Talents	• Family training sessions should be organized under the title "Training for Families of Children with Special Talents." These training sessions should encompass not only theoretical knowledge but also practical exercises. The focus should not solely be didactic; rather, the training must be designed to foster positive attitudes, encouraging collaborative reflections that yield fruitful outcomes when we work together through the process (T6).

According to Table 8, the participants emphasized that a primary school teacher working in a SAC should undergo various training courses. These include joint efforts to be conducted in collaboration with SAC-families, training on family education programs, improving family-teacher communication skills, and receiving specific training aimed at the families of gifted children.

The answers to the ninth question of the research, *"What training should a primary school teacher working in a Science and Art Center receive about developing research skills in collaboration with researchers working with gifted students?"* are provided in Table 9.

Table 9. *The answers to the question "What training should a primary school teacher working in a Science and Art Center receive about developing research skills in collaboration with researchers working with gifted students?"*

Categories	*Descriptions*
Scientific Research Methods Training	• An extensive training on research method techniques should be implemented (T4). • There should be specific training on scientific research and examination techniques (T5). • Emphasizing the importance of skill development in scientific research methods (T10).
Postgraduate Education	• I firmly believe that all teachers, especially those in SAC, should pursue postgraduate education to specialize in this field. Therefore, our teachers should be encouraged and directed towards the postgraduate education process to enhance their expertise in gifted education (CEA1). • Teachers who are already pursuing postgraduate education can mentor their peers, involving them in research processes, and guiding them to initiate postgraduate studies. This cycle of support and mentorship should be encouraged (SGEA1).
Project Writing Training	• It is essential to provide training in project writing (T1).
Scientific Process Skills Training	• Seeking academic support in studies aimed at improving scientific process skills is crucial (T8).
R&D Training	• Including R&D (Research and Development) training would be beneficial (SGEA4).

As per the findings presented in Table 9, the respondents emphasized the necessity for primary school teachers employed within SAC to undergo comprehensive training encompassing scientific research methods, postgraduate education, project writing, scientific process skills, and research and development (R&D) programs that are specifically oriented towards enhancing research competencies alongside researchers catering to the needs of gifted students.

The answers to the tenth research question, *"What training should a primary school teacher in a Science and Art Center proactively address in-class situations that may detrimentally affect the development of gifted students' talents?"* are presented in Table 10.

Table 10. *The answers to the question "What training should a primary school teacher in a Science and Art Center proactively address in-class situations that may detrimentally affect the development of gifted students' talents?"*

Categories	Descriptions
Integrated/ Differentiated Program Training	• In the pursuit of addressing individual student needs, the implementation of a tailored curriculum (T3) becomes paramount. • The mitigation of this issue can be achieved through differentiated education, exemplified by models like the integrated curriculum and the Reaps model (SGEA3). • By offering suitable and targeted training in differentiation studies, teachers can be incentivized to actively engage in educational processes, leading to the establishment of conducive teaching environments. As a result, it is expected that potential problems causing the regression of gifted students' talents will be effectively preempted (CEA1).
Motivational Training	• Gifted individuals, accustomed to effortlessly excelling in their respective schools or classes, might harbor unrealistic expectations of similar success in SAC. Consequently, they may encounter challenges in reconciling with the actual demands of the environment. Instances of resistance to this reality could manifest as disengagement from SAC, loss of enthusiasm, discontinuation of participation, and other related issues (T2). • The effective management of gifted students' needs at SAC hinges upon the perceptive understanding of their distinctive traits by the responsible teacher. By tailoring instruction to cater specifically to their requirements, the teacher can cultivate a heightened sense of motivation within the student. Moreover, recognizing areas where the student lacks expertise, the teacher should encourage seeking guidance from appropriate subject experts rather than overlooking the student's needs (T8).
New Approaches in Classroom Management Training	• In order to enhance the quality of classroom management, it is imperative to provide training in novel and effective approaches, such as the "New Approaches in Classroom Management" (T10).

Leadership-Coaching Training	• The significance of leadership and coaching training cannot be overstated for teachers employed in SAC (T1).
Skills Development Training	• It is imperative for schools under the Ministry of Education to assume the responsibility of emphasizing individual skills, while simultaneously offering teachers opportunities for skill development through comprehensive training programs (CEA2).
Training on Using Technology	• They can receive training for using technology (T5).
Activity and Workshop Development	• Efforts should be directed towards the enhancement of activity and workshop development skills among educators, necessitating the organization of training sessions dedicated to this purpose (SGEA4).

As per the revelations in Table 10, the participants concurred that a primary school teacher working in a SAC must undergo comprehensive training encompassing integrated/differentiated curriculum training, motivation training, new approaches in classroom management, leadership-coaching, skill development, technology utilization, psychology, as well as activity and workshop development.

The answers to the eleventh research question, *"What training should a primary school teacher working in a Science and Art Center receive to effectively address challenges arising from diverse variables specific to the classroom environment?"* are presented in Table 11.

Table 11. *The answers to the question "What training should a primary school teacher working in a Science and Art Center receive to effectively address challenges arising from diverse variables specific to the classroom environment?"*

Categories	***Descriptions***
Classroom Management Training	• The provision of classroom management training in this domain leads me to believe that the incidence of problematic situations can be minimized (T6). • Classroom management training in the realm of special education is instrumental in effectively managing various variables, irrespective of specific needs, with a firm grasp on the principles of special education (SGEA3). • I hold the view that classroom management training, particularly tailored to students with special education needs, can equip teachers with the necessary skills to handle challenging situations stemming from individual differences in the classroom. I advocate for the implementation of these courses as part of the educational curriculum (SGEA4). • Emphasizing classroom management, positive discipline, and equitable practices, it is feasible to participate in relevant training courses (SGEA2).
Problem Solving Methods Training	• By utilizing case studies, teachers can gain valuable insights into various strategies for effectively addressing different challenges (T4). • To equip educators with the necessary skills, problem-solving and crisis management training can be provided (SGEA4). • Considering that certain variables may be beyond the control of both the teacher and the student, it becomes crucial for the teacher to possess strong problem-solving abilities and adaptability to novel situations. Therefore, training sessions focusing on these aspects are warranted (T8).
Training on Developing Thinking Skills	• I believe that teachers should proactively devise contingency plans (a, b, and c) for students facing difficulties. This preparation is vital as teachers must possess a diverse skill set to effectively tackle challenges stemming from various variables. These skills encompass management, critical thinking, problem-solving, creativity, and reflective thinking, necessitating the provision of pertinent training (CEA2). • In order to bolster students' abilities in algorithmic thinking, problem-solving, and the development of thinking skills, dedicated training sessions are recommended (T5).
Positive Psychology Applications in Education	• The implementation of Positive Psychology Practices in Education training holds promise in this context and can yield valuable benefits (T10).

As indicated in Table 11, the participants emphasized that a primary school teacher operating within a SAC should be equipped with training in several areas to effectively handle challenges arising from diverse variables specific to the classroom environment. The recommended training areas include classroom management, problem-solving methods, thinking skills development, and the application of positive psychology practices in education.

The answer to the twelfth research question, "*What training should a primary school teacher*

working in a Science and Art Center receive to incorporate effective methods, approaches, strategies, and techniques for the education of gifted students within a regular classroom setting?" are presented in Table 12.

Table 12. *The answers to the question "What training should a primary school teacher working in a Science and Art Center receive to incorporate effective methods, approaches, strategies, and techniques for the education of gifted students within a regular classroom setting?"*

Categories	Descriptions
Self-Regulation Training	• In this context, SAC teachers may have certain limitations, as the child's own class teacher plays a crucial role in determining the child's knowledge, skills, and attitude. Nevertheless, an effective approach could involve providing Student Self-Regulation Training (T10). • To facilitate this training, it is essential for the student to possess a high level of self-awareness. Consequently, training programs should be thoughtfully designed to support and nurture self-regulation skills (SGEA4).
Teaching Methods and Techniques Training	• To effectively employ diverse teaching methods, the teacher must possess knowledge of these techniques. For instance, if drama is to be utilized, the teacher should undergo drama training. Additionally, integrating students with unique qualities, including gifted students, into the regular classroom setting requires a thorough understanding of their characteristics and the dynamics among all students. Consequently, the teacher shoulders a substantial responsibility in this regard. While the student's giftedness is evident, it is equally crucial for the teacher to adeptly handle and support their education. (CEA2).
Inclusion/Integration Training	• Overall, it is essential for them to receive inclusive education (T3).
Effective Use of Technology, Animation, Cartoon etc. Training	• They may undergo training to proficiently utilize technology, ensuring it aligns with its intended purpose. Additionally, they can develop design skills, engage in cartooning, and explore animation techniques (T5).
Awareness Training on the Needs and Offerings of the Age	• Awareness raising activities should be carried out on the needs of the age and what it offers (SGEA3).

According to the findings in Table 12, participants emphasized the necessity for primary school teachers in SAC to undergo various essential training courses. These include self-regulation training, teaching methods and techniques training, inclusion/integration training, effective use of technology, animation, cartoon, and more, while also being aware of the developmental needs and opportunities available for their students.

The answers to the thirteenth question of the research, *"What training should a primary school teacher working in a Science and Art Center receive about creating an effective classroom climate by harnessing the talent of a gifted student?"* are presented in Table 13.

Table 13. *The answers to the question "What training should a primary school teacher working in a Science and Art Center receive about creating an effective classroom climate by harnessing the talent of a gifted student?"*

Categories	Descriptions
Differentiation/Enrichment Training	• Drawing inspiration from the adage "strength comes from unity," the training courses should be thoughtfully designed to prioritize group work, enabling each student to leverage their talents to the fullest extent. Moreover, incorporating differentiated activities and teaching techniques in these trainings is essential. Additionally, teachers should also participate in group activities during these training sessions (T4). • Correct management of differentiation can lead to the resolution of this issue (SGEA2).
Effective Classroom Management Training	• Thanks to the practices focused on student recognition, acknowledging differences, and implementing effective classroom management strategies, I believe that primary school teachers working in SACs will not encounter difficulties in establishing an effective classroom climate that harnesses the talents of gifted students (T6).
Training on the Characteristics of the Specially Gifted	• Enabling gifted children to build meaningful relationships with their peers through the utilization of their talents requires specialized training. It is evident that not every teacher can effortlessly accomplish this task (CEA2).
Leadership Mentoring Training	• Providing leadership and mentoring training is essential to empower teachers in guiding and supporting gifted students effectively (T3).

Activity Development Training	• Supporting teachers with the ability to recognize students cognitively, psychologically, and socially, and develop child-based activities ensures a tailored approach to meet the unique needs of each gifted student (T7).
Training on Understanding Student Psychology	• Training focused on understanding student psychology (T8).
Integration Training in Special Education	• I strongly recommend offering integration training in special education (SGEA3).
Education of Other Individuals in the Ecosystem	• To shift the perception of gifted students from being perceived as threats to becoming balanced contributors, education should be extended not only to the gifted individual but also to others within their ecosystem (SGEA4).

Based on the findings from Table 13, the participants highlighted various essential training areas that primary school teachers in SACs should undergo. These include differentiation/enrichment training, effective classroom management, understanding the characteristics of gifted students, leadership-mentoring skills, activity development, comprehension of student psychology, integration in special education, and training related to engaging with other individuals in the ecosystem.

The answers to the fourteenth question of the research, *"What training should a primary school teacher working in a Science and Art Center receive to effectively manage the behaviors of gifted students in the classroom environment that might impact the teaching-learning process?"* are provided in Table 14.

Table 14. *The answers to the question "What training should a primary schoolteacher working in a Science and Art Center receive to effectively manage the behaviors of gifted students in the classroom environment that might impact the teaching-learning process?"*

Categories	Descriptions
Classroom Management of the Gifted / Classroom Behaviors of the Gifted Training	• Organizing a training environment that includes sample events and scenarios related to classroom management, along with discussion sessions to find effective solutions to problems, can be an impactful approach for providing training (T4). • I firmly believe that applied trainings specifically focused on classroom management for gifted students will be highly effective in handling their behaviors within the learning-teaching process (T6). • Providing dedicated trainings on the classroom behaviors of gifted students can also contribute significantly to enhancing their classroom experience (T10).
Education of the Gifted - Experience-Material Sharing with International Platforms	• Establishing an international gifted education platform offers a valuable opportunity to promote collaboration and knowledge sharing. Through official agreements with educational attachés from various countries, valuable professional experiences can be exchanged in an international context. This platform can facilitate online meetings, material sharing, and joint activities to enrich gifted education practices (T2). • To foster a deeper understanding of diverse gifted education practices worldwide, organizing teacher mobility programs can be immensely beneficial. Enabling teachers to visit different educational institutions and observe various approaches in action enhances their expertise and enriches their perspectives (SGEA4).
Effective Communication Methods	• They should receive training on effective communication methods (T5).
Efforts in Collaboration with the Counseling Service	• It is essential to offer training programs in cooperation with the student counseling service (T8).
Drama Training	• Drama training will significantly enhance the teacher's capabilities and effectiveness (T5).
Emotional, Social Agility Training	• Training programs can be designed to include content that supports individuals' self-regulation skills while offering necessary assistance to elevate their emotional and social agility levels (S7).
- Training in applied behavior analysis	• They should be offered training in applied behavior analysis (SGEA3).

Based on the findings presented in Table 14, the participants advocated for specific training recommendations for primary school teachers in SACs. These recommendations encompassed diverse areas such as classroom management tailored to the needs of gifted students, classroom behaviors exhibited by gifted students, engaging in knowledge sharing with international platforms dedicated to gifted education, honing effective communication techniques, undertaking collaborative studies with

the guidance unit, incorporating drama techniques in teaching, nurturing emotional intelligence, developing social agility, and applying behavior analysis principles in managing the behaviors of gifted students.

DISCUSSION, CONCLUSION, RECOMMENDATIONS

The present study aimed to identify the professional development needs of primary school teachers employed in SACs. To achieve this goal, a two-round classical Delphi technique was employed. The research involved posing questions to an expert group and analyzing their responses. Based on the expert opinions and the subsequent data analysis, the following results were obtained:

Primary school teachers working in SACs should receive the following training to address their professional development needs;

- Practical training focusing on educating gifted individuals, covering topics such as understanding special talent and giftedness, special talent and intelligence theories, preparing level-appropriate and creative activities, addressing the needs of twice exceptional students, and exploring the psychology of gifted individuals;
- The ability to recognize the characteristics of gifted students through comprehensive training in cognitive, affective, and social development as well as gaining valuable insights through portfolio training, case studies, and field visits;
- Training on SAC legislation and processes, including diagnostic procedures and mastering the e-SAC module for gifted students;
- Enriched/differentiated education in supporting talents and adopting a need-based approach within the framework of individual differences, current teaching strategies training, exploring differences, scenario/case study training, digital competence and research skills training, student performance assessment and inclusion training;
- Enrichment/differentiation/acceleration training on being aware of their own professional development needs, micro-teaching, professional sharing with experienced educators, interdisciplinary integrated program training, training on guiding gifted students;
- SAC department sharing, mentoring of experienced academicians, SAC teacher-school teacher sharing activities in order to foster the understanding of continuing the process of inclusion in SAC education processes by working in a planned and programmed manner;
- Cooperation-collaboration training with institutions, communication-compatibility, needs analysis and school-family cooperation training to ensure harmony between SAC and non-SAC programs;
- SAC-family cooperation on involving the family in the process, family education programs, family-teacher communication skills, education for families of gifted children;
- Comprehensive training in scientific research methods, postgraduate education, project writing, scientific process skills, and conducting research and development work in collaboration with researchers. Scientific research methods in working with researchers, graduate education, project writing, scientific process skills, R&D training;
- An integrated/differentiated program to eliminate classroom situations that may cause gifted students' talents to atrophy, motivation, new approaches in classroom management, leadership/coaching, skill development, using technology and activity-workshop development training;
- Classroom management in special education to cope with problems that may arise from different variables specific to the classroom environment, problem solving training, thinking skills

development, training on positive psychology applications in education;

- Awareness training on self-regulation, teaching methods and techniques, mainstreaming/integration training for the education of gifted students in the regular classroom environment, technology and what the age offers;
- Differentiation/enrichment in creating an effective classroom climate, effective classroom management, gifted education, leadership/mentoring education, activity development, understanding student psychology, integration education in special education, education of other individuals in the ecosystem;
- Classroom behavior training of gifted students in terms of behavior management, experience sharing with international platforms on gifted education, effective communication methods, drama training, emotional/social agility training and applied behavior analysis training.

Educators undergo a series of comprehensive training programmes designed to enhance their ability to provide effective education for gifted and talented students. These programmes cover a wide range of topics, from understanding the theories of giftedness and intelligence to the development of creative activities tailored to different ability levels. The training also addresses the complex needs of twice-exceptional students and delves into the psychological aspects of giftedness. In addition to cognitive, affective and social development, educators gain practical insights through portfolio training, case studies and field visits.

In addition, educators are trained in the legal framework and operational procedures related to special education and counselling (SAC). This includes diagnostic procedures and the competent use of e-SAC modules for gifted students. The training focuses on promoting cooperation and collaboration with different educational institutions, improving communication and compatibility, conducting needs assessments and strengthening the relationship between schools and families. Families are encouraged to get involved, with programmes designed to educate families about the needs of gifted children and to improve communication between families and teachers. In addition, educators receive extensive training in scientific research methods, postgraduate training and research project development. This enables them to collaborate with researchers to carry out research and development and contribute to the field of gifted education. The overall aim of these training programmes is to enable educators to create effective learning environments that nurture the talents of gifted students and promote their development in different educational settings.

Primary school teachers working in SACs should actively participate in various professional development training courses, as mandated by the teaching profession's principle of continuous improvement. These training courses should be offered both upon their entry into the institution and throughout their tenure. Given the unique demands of working with gifted students, it is essential for teachers to engage in comprehensive professional development activities to enhance and update their knowledge and skills. Working with gifted students and their families, who have distinct characteristics and expectations compared to traditional education settings, presents teachers with a formidable challenge. The limitations of conventional classroom environments in meeting the developmental needs of exceptionally gifted students further underscore the necessity for continuous professional development among educators.

Upon reviewing studies on in-service training needs for teachers working with gifted students, it becomes evident that there is an abundance of research focusing on various subject areas, generally encompassing all teachers at SACs. However, there is a significant dearth of literature specifically examining the professional development needs of primary school teachers. As a result, this section explored studies conducted with teachers from other disciplines to shed light on this subject. Furthermore, there is a scarcity of research addressing the support provided by primary school teachers

to gifted students in regular education classrooms (Akar, 2021).

In their systematic review research on the challenges faced by students and teachers in SACs, Şahin et al. (2023) identified issues related to the professional development of teachers. The study highlighted concerns such as inadequate professional development opportunities, shortcomings in student identification processes, insufficient experienced teachers, limited teacher competencies, communication problems with parents, and inadequate cooperation with other schools and universities. Existing literature supports the notion that professional development activities for teachers working with gifted students are essential, as they enhance teachers' knowledge levels and diversify their instructional practices (Fraser-Seeto, Howard, & Woodcock, 2014; Kontaş, 2009; Gökdere, 2004; Gökdere & Ayvacı, 2004; Gökdere & Çepni, 2004). Sezginsoy's (2007) study also underscores that the challenges in education and training arise from teachers' lack of adequate in-service training, leading to uncertainty in delivering appropriate education to gifted students in SACs. This further emphasizes the necessity of in-service training for all teachers. Collaborating with universities to develop and implement comprehensive in-service training programs is believed to enhance teachers' performance in addressing these challenges (Şenol, 2011). Based on this study, several professional development needs of primary school teachers currently working or intending to work in SACs were identified and based on the findings, the following suggestions can be proposed:

Suggestions for policy makers:

- Policy makers should design targeted modules based on a comprehensive assessment of the professional development needs of primary school teachers currently employed or planning to work in SAC.
- It is crucial to provide substantial professional development support to primary school teachers before they begin working with gifted students in SAC.
- To ensure the effectiveness of SAC's educational practices, policy makers should prioritize continuous updates and innovations in the professional development of teachers. These updates should align with the evolving needs of stakeholders and emerging trends in the field of gifted education.

Suggestions for researchers:

- Researchers are encouraged to conduct comprehensive evaluations of in-service training programs designed for primary school teachers in SACs. These evaluations should utilize diverse assessment methods and include impact analyses to measure the effectiveness and outcomes of the training initiatives.

The primary limitation of this research lies in its restricted focus on primary school teachers exclusively employed in SACs. Consequently, the findings may have limited generalizability to other educational settings and contexts. The research design also presents a limitation concerning generalization, as the involvement of only a limited number of experts and teachers may impact the broader applicability of the results and conclusions.

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Developing an Achievement Test for Primary School English Course: Validity and Reliability Study

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ABSTRACT

The objective of this research was to develop a multiple-choice achievement test for the 4th-grade English lesson unit called "My Day." The test's administration took place in the autumn term of the 2022-2023 academic year and involved 621 fifth-grade students from the central district of Niğde province. Out of these students, 209 participated in the pilot phase, while the remaining 412 students were involved in the actual application of the test. The test items were meticulously analyzed using the Test Analysis Program (TAP). Based on the results of the item discrimination analysis, two items were deemed less effective and, therefore, excluded from the final version of the test. Ultimately, the test consisted of 25 carefully selected items to evaluate the student's understanding of the "My Day" unit. To assess the internal reliability of the test, the researchers calculated the KR-20 value which turned out to be 0.888. This value demonstrated that the test exhibited a satisfactory level of consistency and reliability in measuring the intended learning outcomes. Overall, the rigorous development process and statistical analysis provide confidence in the validity and accuracy of the achievement test. Several recommendations are made in order to increase the test's usefulness and efficacy. The researcher could conduct a follow-up study to evaluate the long-term impact of the achievement test on students' language learning progress. Additionally, they may explore adapting the test for use in various regions and cultures to assess its cross-cultural validity, aiming to further improve its effectiveness and applicability..

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INTRODUCTION

With globalisation, commercial and cultural relations between countries have increased. Increasing relations have created a need for language learning, and the necessity of living in a multilingual world has become more understood. Today, English is one of the most widely used and learned languages among the world languages (Ilyosovna, 2020). English, which is accepted as a worldwide language, is used in many fields such as business, education and tourism. Knowing English increases competitiveness in the global market, expands international business opportunities and facilitates intercultural communication. In addition, many scientific articles and publications are written in English.

As in the whole world, the desire to learn English in Turkey continues to increase day by day. English language learning has become one of the indispensable elements of Turkish education policy (Sönmez & Köksal, 2022). The English language learning policy in Turkey emphasises the teaching of English from the primary school level onwards, and envisages its use as a primary language (Gürsoy, Korkmaz & Damar, 2017). In particular, learning English at an early age aims to catch the period when the child's language learning capacity is at its highest and to provide more permanent learning. In addition, an early start to language learning improves the child's linguistic skills and helps the formation of a wider language pool (Krasnıqı & Muhaxherı, 2019). For these reasons, studies on early language teaching in Turkey, as in EU countries, have increased in recent years. In 1997, with the extension of primary education to eight years, English was included among the compulsory courses in the fourth and fifth grades (Sarıçoban, 2012). With the uninterrupted 12-year compulsory education that started to be implemented as of the 2012-2013 academic year, English language teaching was included in the education programme starting from the second grade. In this way, it is aimed that children are introduced to a foreign language at an early age, gain awareness of language and culture, and begin to develop positive attitudes (Paker, 2018). The introduction of English education at an early age necessitated studies to meet the needs of young learners and some changes were made in the curriculum (Özüdoğru & Adıgüzel, 2015). With these changes, various methods, different approaches and applications have been used in English language teaching. In order to get efficiency from all these processes and to ensure that they can play an effective role in the lives of individuals, there should be a very good planning, implementation and measurement and evaluation system in English language teaching (Baysal & Ocak, 2019).

Assessment and evaluation in English language teaching is a process of determining how good students' English language skills are and in which areas they have improved. Assessment helps to see the effectiveness of English language teaching and the level of students' English language skills. Once the level of students' English language skills is determined, teachers can start to design a programme that focuses on English language teaching and is appropriate to students' needs. From this point of view, it is very important that assessment and evaluation should be carried out with quality and care (Meidasari, 2015). The detection and elimination of any teaching deficiency is only possible through a successful assessment and evaluation process. By using assessment and evaluation tools, teachers can determine how well students understand and how well they can apply. It also helps them to identify students' deficiencies and take the necessary steps to improve their areas of weakness. These are necessary steps for education to be efficient and effective. Measurement in education is the determination of the accuracy or level of a student's knowledge, skills and abilities (Kim, Raza, & Seidman, 2019). Assessment is the process of evaluating the knowledge and skills learned by a student according to certain criteria and making a judgment (Andrade & Brookhart, 2020). Measurement and evaluation in education are necessary to follow the learning process, identify deficiencies and strengths, encourage students and evaluate the quality of education. Measurement can be done through tests, exams, performance assessments, projects and other tools.

One of the most frequently used measurement tools is achievement tests. These tests are used to measure the knowledge and skills gained by students in a particular subject (Borghans & et al., 2016). The content of achievement tests is prepared depending on the course outcomes and administered at the end of the unit, semester or course (Alderson, Clapham, & Wall 2002). Achievement tests have higher validity and reliability than other measurement tools and this is one of the reasons why achievement tests are frequently preferred in education (Karip, 2012). English language teaching and assessment and evaluation are two disciplines that are very close to each other and achievement tests are a frequently used measurement tool in English language courses as in other courses. The validity and reliability of the measurement result depend on how valid and reliable the achievement test is. In this context, there is a need for achievement tests with proven validity and reliability in English language teaching as in every field. When the literature is reviewed, it is seen that there are very few studies in the field of English (Baysal & Ocak, 2019; Özüdoğru & Adıgüzel, 2015; İncirci & Parmaksız, 2016). In this context, the aim of this study is to develop an achievement test compatible with the objectives of the "My Day" unit in Grade 4 English lesson. The "My Day" unit aims to help fourth-grade students develop their organizational skills, time management, and self-awareness by planning and reflecting on their daily activities. It encourages students to understand the concept of routines and how they can be beneficial in managing their time and responsibilities effectively.

METHOD

Research Design

Developing an achievement test typically involves a research method known as test development or test construction. This method follows a systematic process to design, create, and validate a reliable and valid assessment tool to measure specific knowledge, skills, or abilities of the test takers. This study was conducted using quantitative research methods. (Fraenkel & Wallen, 2006).

Research Sample

The population of the study consisted of fifth-grade middle school students studying in the central district of Niğde, and the sample consisted of a total of 621 fifth-grade students (209 pilot, 412 actual implementations) studying in four middle schools in the central district of Niğde in the first semester of the 2022-2023 academic year. The gender distribution of the students is given in Table 1.

Table 1. *Gender information of the participant students*

Gender	n	%
Female	325	52
Male	296	48
Total	621	100

Although the test developed in the study was aimed at the fourth grade "My Day" unit, the reason why fifth-grade students were included in the sample of the study was that the fourth-grade students had not yet studied this unit, so it was thought that they would tend to leave the questions blank when a test was applied on a subject they did not know. In order to minimise this problem and to ensure that all questions were answered, the sample was composed of fifth-grade students.

Research Instruments and Processes

Determining the Purpose:

As a result of the literature review, no valid and reliable achievement test for the fourth-grade primary school English course was found. This achievement test was developed in order to measure student achievement towards the objectives of the fourth grade "My Day" unit. This study, which is original in the literature, aims to contribute to the literature and provide a data collection tool for future researchers.

Determination of the Learning Outcomes and Preparation of the Specification Table:

Before the achievement test questions were prepared, Bloom's taxonomy (Huitt, 2011) was taken into consideration and a specification table containing the learning outcomes was prepared. Since there were no open-ended questions in the achievement test aimed to be developed, it was not possible to prepare questions for application, analysis and synthesis steps.

Formation of the Question Pool:

A question pool consisting of 35 items was created by the researcher by taking into account the prepared specification table and the learning outcomes. Care was taken to prepare all the questions to be included in the achievement test in a way to represent all achievements of the target subject at a certain level. The learning outcomes of the questions and their distribution according to Bloom's taxonomy are given in Table 2.

Table 2. *Question pool specification table*

Subjects	Outcomes	Knowledge	Comprehension
1. Talking about the daily routine	1.1. Students will be able to understand the general and specific information in a short, oral text about daily routines.	1,2,13,28,31	16,19,27
	1.2. Students will be able to talk about their daily routines.	4,12,22,29,33	8,11,25,30
2. Telling the time and days	2.1. Students will be able to recognize the time in a short oral text.	3,5,17,21,24,35	9,20,23
	2.2. Students will be able to talk about the time.	6,14,15,18,26,34	7,10,32

Obtaining Expert Opinions, Writing Supervision and Revision of the Items:

Expert opinions were sought to ensure the content, construct and face validity of the prepared questions. The opinions of three teachers who are experts in the field of English were taken for the content validity study, an associate professor in the field of measurement and evaluation and an associate professor in the field of instructional technologies for the construct validity study, and a teacher who is an expert in the field of Turkish Language and Literature for the face validity study. As a result of the interviews, the items were reviewed one by one and the number of items was reduced to 27 because some of the questions did not measure the outcomes, the visuals could not be understood, and 35 questions were unlikely to be completed by primary school students in one lesson hour. The final version of the specification table after the expert opinion is given in Table 3.

Table 3. *Specification table after expert opinion*

Subjects	Outcomes	Knowledge	Comprehension
1. Talking about the daily routine	1.1. Students will be able to understand the general and specific information in a short, oral text about daily routines.	1,10,22,23	14,21
	1.2. Students will be able to talk about their daily routines.	3,9,16,25	6,19
2. Telling the time and days	2.1. Students will be able to recognize the time in a short oral text.	2,12,15,18,27	7,17
	2.2. Students will be able to talk about the time.	4,11,13,20, 26	5,8,24

Pilot Application and Item Analysis:

The achievement test, which was reduced to 27 items after the expert opinion, was applied in printed paper form to 209 fifth-grade students studying in a secondary school in the central district of Niğde in the first semester of the 2022-2023 academic year with the permission of the Directorate of National Education. The sample was selected by random sampling method. Students were given 1 lesson hour for the test and it was determined that it was completed in the given time. After the pilot application, the data were entered into the Excel matrix prepared by the researcher and analysed with the TAP programme. Item difficulty and discrimination indices of each item were analysed.

In test analysis, the item difficulty index (P) is an indicator that measures how difficult a question in a test is. It is usually calculated as the correct answer rate of the question and low rates indicate that the question is more difficult and high rates indicate that it is easier (Tekin, 2000). Evaluation criteria according to the item difficulty index are given in Table 4.

Table 4. *Evaluation criteria according to item difficulty index*

Item Difficulty Index (P)	Item Evaluation
0.00-0.29	Difficult
0.30-0.49	Medium difficulty
0.50-0.69	Easy
0.70-1.00	Very easy

Item difficulty index (P) takes a value between 0 and 1. When the P value approaches zero, it indicates that the item is difficult and when it approaches one, it indicates that the item is easy. It is desirable that the item difficulty index of the item is around 0.50, that is, the item should be neither too difficult nor too easy.

In test analysis, item discrimination index (D) is an indicator that measures how a question in a test affects the performance of a group of students. It is usually calculated as the difference between the correct answer rate of students with better performance and the correct answer rate of students with worse performance (Büyüköztürk, 2011). Evaluation criteria according to item discrimination index are given in Table 5.

Table 5. *Evaluation criteria according to item discrimination index*

Item Distinctiveness Index (D)	Item Selection decision
0.19 and smaller	Should not be tested or replaced completely
Between 0.20-0.29	Should be corrected and tested
Between 0.30-0.39	Should be tested without correction or with minor adjustments
0.40 and greater	Good item should be tested as is

Item discrimination index (D) takes a value between -1 and +1. When the D value approaches -1, it indicates that the discrimination is low, and when it approaches +1, it indicates that the discrimination is high. The higher the discrimination, the higher the reliability of the item.

Conducting the Actual Application and Item Analysis:

In the item analysis conducted after the pilot application, two questions were removed from the test because the discrimination index of two questions was below 0.20. Without making any changes in the other questions, the achievement test was made ready for the actual application with 25 multiple-choice questions. The actual application of achievement test was applied to a total of 412 fifth-grade students studying in three secondary schools in the central district of Niğde in the first semester of the 2022-2023 academic year. After the actual application, the data were entered into the Excel matrix prepared by the researcher and analysed with the TAP programme. The item difficulty and discrimination indices of each item were analysed. The scores of the 25-item achievement test applied

to the students and the calculated test statistics are given in Table 6.

Table 6. *Test statistics*

	Score
Number of Examinees	412
Total Possible Score	25
Minimum Score	1.000 = 4.0 %
Maximum Score	25.000 = 100 %
Median Score	17.000 = 68.0%
Mean Score	16.733 = 66.9%
Standard Deviation	5.767
Variance	33.264
Skewness	0.418
Kurtosis	-0.847
Mean Item Difficulty	0.669
Mean Discrimination Index	0.550
Mean Point Biserial	0.524
KR20 (Alpha)	0.868

Ethic

The author(s) confirm(s) that ethical approval was obtained from Niğde Ömer Halisdemir University (Approval Date: 26 /10 /2022, 2022/12-28).

FINDINGS / RESULTS

Findings Related to Item Analysis

The results of the item analyses of the pilot application of the achievement test are given in Table 7 and the results of the item analyses for the actual application are given in Table 8.

Table 7. *Pilot application item analysis results*

Item	**Number correct**	**Item Diff.**	**Disc. Index**	**Correct in high grp**	**Correct in low grp**	**Point biserial**
1	126	0.60	0.55	55	20	0.49
2	141	0.67	0.48	54	23	0.42
3	109	0.52	0.48	49	18	0.37
4	71	0.34	0.20	30	17	0.16
5	144	0.69	0.67	63	20	0.61
6	70	0.33	0.39	35	10	0.39
7	88	0.42	0.52	44	11	0.43
8	107	0.51	0.58	52	15	0.47
9	73	0.35	0.55	44	9	0.51
10	158	0.76	0.50	62	30	0.45
11	128	0.61	0.59	56	18	0.54
12	85	0.41	0.62	46	7	0.53
13	157	0.75	0.58	61	24	0.54
14	102	0.49	0.69	56	12	0.57
15	46	0.22	0.14	22	13	0.19
16	154	0.74	0.61	63	24	0.54
17	64	0.31	0.39	36	11	0.40
18	116	0.56	0.58	55	18	0.49
19	121	0.58	0.63	58	18	0.54
20	96	0.46	0.70	54	9	0.56
21	110	0.53	0.70	56	11	0.61

22	107	0.51	0.73	58	11	0.61
23	91	0.44	0.52	49	16	0.48
24	85	0.41	0.47	43	13	0.46
25	128	0.61	0.66	56	14	0.54
26	77	0.37	0.47	42	12	0.43
27	78	0.37	0.61	46	7	0.54

According to the item analysis results of the pilot application consisting of 27 items, the standard deviation value of the test was calculated as 6,174. The standard deviation value of an achievement test shows how variable the test scores are (Tabachnick, Fidell, & Ullman, 2007). A high standard deviation indicates that the distribution of test results is wide and that students perform differently on the test. In this case, the standard deviation value of 6.174 showed that the test results varied slightly among the students and the questions in the test were easily answered by some students, while some students had difficulty.

The Point biserial correlation coefficient measures the relationship between the correct answer of a question and the overall test scores and takes a value between -1 and 1. The higher the point biserial value of a question, the higher the correlation between the correct answers and the overall test scores. If the point biserial value is close to zero, it means that there is no relationship between the correct answer of the question and the overall test scores (Kornbrot, 2014). The point biserial value of the achievement test was calculated as 0.476 and showed that the test was a medium level test.

The average difficulty index of the achievement test was calculated as 0,502. Item difficulty index is a parameter that measures how difficult or easy a test is. Item difficulty index takes a value between 0 and 1 and 0.5 represents a moderate level of difficulty (Tekin, 2000). Therefore, the item difficulty index of 0.502 indicated that this achievement test had an average level of difficulty.

The average discrimination index of the achievement test was calculated as 0,542. Item discrimination index is a parameter that measures whether a test can distinguish students with high scores from students with low scores. The item discrimination index takes a value between 0 and 1 and values higher than 0.40 are considered as good discrimination (Büyüköztürk, 2011). Therefore, the item discrimination index of 0.542 showed that this achievement test had a moderate level of discrimination.

After the pilot application, item analysis and option analyses were performed with TAP software and discrimination index and point biserial values of each item were examined. The lowest item discrimination index was 0,141 (M14) and the highest discrimination index was 0,734 (M16). The lowest point biserial value was 0,164 (M4) and the highest point biserial value was 0,611 (M21). According to the evaluations of item discrimination and point biserial indices, items with a value less than 0,20 should either be removed from the test or changed completely. Accordingly, M4 and M14 were submitted to expert opinions again and it was decided to remove the items from the test. Before the items were removed, the specification table was examined and it was determined that there was no problem in terms of content validity. The number of items was rearranged and the 25-item achievement test was made ready for the actual application.

Table 8. *Main application item analysis results*

Item	**Number correct**	**Item Diff.**	**Disc. Index**	**Correct in high grp**	**Correct in low grp**	**Point biserial**
1	344	0.83	0.44	127	67	0.51
2	362	0.88	0.33	127	81	0.44
3	344	0.83	0.46	127	65	0.51
4	337	0.82	0.53	128	57	0.58
5	181	0.44	0.63	99	17	0.52
6	220	0.53	0.50	102	36	0.42
7	210	0.51	0.56	103	30	0.48
8	220	0.53	0.66	116	30	0.51
9	349	0.85	0.43	128	69	0.54

10	253	0.61	0.63	118	36	0.56
11	231	0.56	0.65	110	26	0.53
12	364	0.88	0.31	127	83	0.48
13	268	0.65	0.77	127	27	0.65
14	370	0.90	0.26	127	89	0.40
15	178	0.43	0.55	127	89	0.45
16	261	0.63	0.61	123	43	0.53
17	268	0.65	0.62	123	41	0.53
18	289	0.70	0.50	120	53	0.48
19	308	0.75	0.67	127	39	0.65
20	328	0.80	0.58	127	50	0.61
21	243	0.59	0.76	124	26	0.63
22	194	0.47	0.66	109	23	0.53
23	352	0.85	0.44	128	68	0.55
24	165	0.40	0.47	89	28	0.36
25	255	0.62	0.72	124	30	0.64

According to the item analysis results of the actual application consisting of 25 items, the standard deviation value of the test was calculated as 5,767. The lower standard deviation value compared to the pilot application showed that the test results varied less among the students.

The point biserial value and discrimination index of the final achievement test were calculated as 0,524 and 0,550, respectively. The higher values compared to the pilot application showed that the discrimination of the final achievement test with 25 items was higher. The average difficulty index of the final achievement test was calculated as 0,669. The higher value compared to the pilot study showed that the achievement test was easier. The histogram graph of the students' 25-item achievement test scores is given in Figure 1.

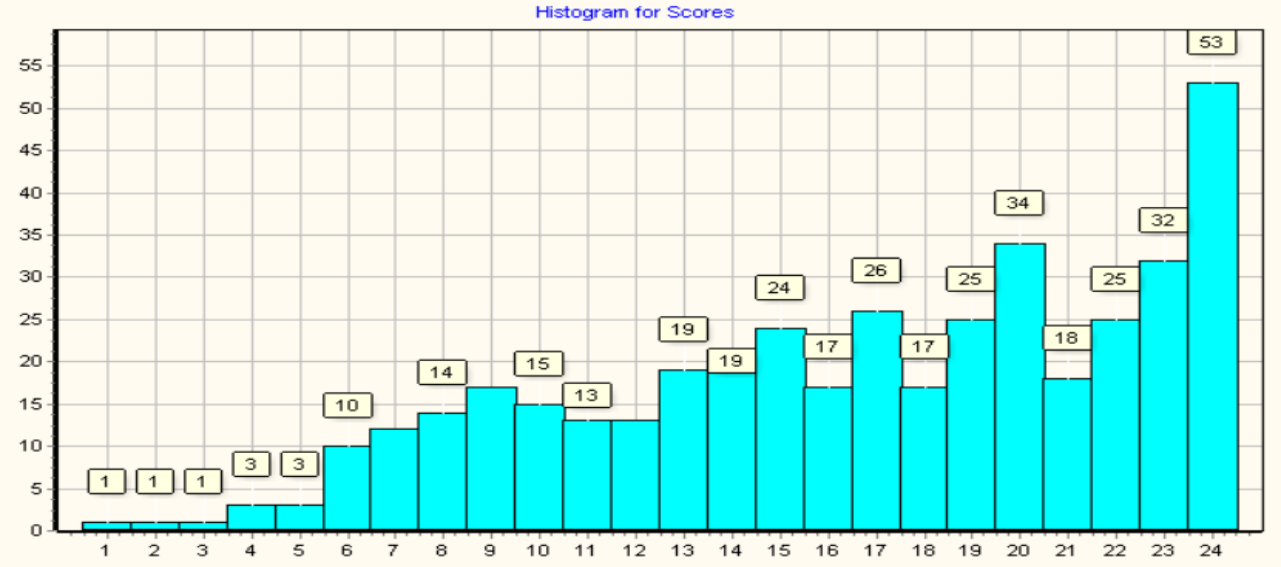

Figure 1. *Histogram graph based on assessment scores*

In the achievement test, kurtosis and skewness values are statistical measures that measure the shape and symmetry of the distribution of test scores. If the kurtosis and skewness values of the test scores are between +1.5 and -1.5, a normal distribution is observed (Tabachnick, Fidell & Ullman, 2007). As a result of the application, the kurtosis value of the achievement test was calculated as -0.847 and the skewness value as 0.418. In this context, it was observed that the achievement test scores were normally distributed.

After the actual application, item analysis and option analyses were performed with the TAP programme, and the discrimination index and point biserial values of each item were examined. The lowest item discrimination index was 0,263 (M14) and the highest discrimination index was 0,771 (M13). The lowest point biserial value was 0,364 (M14) and the highest point biserial value was 0,651

(M13). Considering that the items with item discrimination and point biserial values higher than 0.30 have good discrimination (Usta and Karakuş, 2016), no changes were made to the items.

Findings Related to Item Analysis

Reliability in achievement tests is a feature that determines the repeatability of the test and how accurate and stable its measurement is (Mohamad & et al., 2015). In other words, the reliability of an achievement test indicates the consistency of the results of the same test when it is applied at different times or under different conditions. Kuder-Richardson 20 formula was used to measure the reliability of the achievement test.

KR-20 Reliability test is a method used to measure intra-test consistency. This test is particularly suitable for multiple-choice tests. The KR-20 value is a number ranging from 0 to 1, and the closer it is to 1, the higher reliability the test is considered to have. If the KR-20 value is 0.70 and above, the test is considered to have sufficient reliability (Kılıç, 2016).

The KR-20 value of the pilot application was calculated as 0.870; the KR-20 value of the actual application was calculated as 0.888. In this context, it was observed that both application tests were quite reliable, but the actual application was more reliable.

DISCUSSION, CONCLUSION, RECOMMENDATIONS

Measurement and evaluation in foreign language teaching is an important tool that helps to determine where students are in the learning process, to guide the teaching process for teachers, to determine students' needs and to increase their motivation. Achievement tests are one of the most frequently used methods in measurement and evaluation. It is important that achievement tests are valid and reliable in order to accurately measure students' actual achievement. A test that is not valid and reliable can prevent educators from making the right decisions by mismeasuring students' achievement. In the literature review, it was found that there are very few achievement tests with proven validity and reliability in the field of English (Baysal & Ocak, 2019; Özüdoğru & Adıgüzel, 2015; İncirci, 2016). This study, it was aimed to develop an assessment tool compatible with the 4th grade English lesson "My Day" unit outcomes and to reveal the item analyses of this tool.

Considering the test development steps, firstly the aims of the test were determined and the target group was selected. A specification table suitable for the achievements of the unit for which the achievement test was to be prepared was prepared and a question pool of 35 items was created. After the expert opinions, the number of items was reduced to 27 and a pilot application was conducted with 209 5th grade students. The KR-20 value of the pilot application was 0.80 and the average discrimination index was calculated as 0.542. According to the results of the item analysis performed in the TAP programme, since the discrimination index of 2 items was below 0.20, the items were presented to the expert opinion again and since it was not possible to make changes in the items, it was decided to remove the items from the test. The achievement test, which was reduced to 25 items, was applied to 412 fifth-grade students. The KR-20 value of the actual application was 0,888 and the average discrimination index was calculated as 0,550. According to the results of the item discrimination index, all of the items were higher than 0,30 and there was no need to make any changes.

In this study, a multiple-choice achievement test with proven validity and reliability was developed. Since there is no valid and reliable test development study for the 4th grade English course in the literature, it is thought that the achievement test will contribute to this field.

As a result, this achievement test is important both in terms of providing a valid and reliable measurement tool for primary school English teachers in the process of evaluating their students and in terms of providing a data collection tool for lecturers and researchers conducting scientific studies in the

field of language. In order to standardise the test, the number of samples to which the test will be applied can be increased or the method of applying the test can be changed. It is recommended for future researchers to develop achievement tests for other unit achievements and to conduct a follow-up study to assess the long-term impact of the achievement test on students' language learning progress. Researchers may explore the possibility of adapting the test for use in different regions and cultures to evaluate its cross-cultural validity or investigate the potential benefits of incorporating different question formats, such as open-ended or performance-based items, to assess students' English language proficiency comprehensively.

Limitations

This study on the development of an achievement test for the fourth-grade English lesson "My Day" unit presents several limitations. Firstly, the sample size was limited to 621 fifth-grade students from the central district of Niğde province, which may restrict the generalizability of the findings to a broader population. Additionally, the study focused on a specific grade level, overlooking potential variations in language learning progress across different educational stages. The study did not account for external factors like student motivation or socio-economic backgrounds, which could influence test performance

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Students' Understandings Related to Their Upcoming High-Stakes Tests: A Phenomenographic Study

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ABSTRACT

The present study aims to explore the different ways in which a group of students, diversified across school levels, understand the high-stakes tests that they are going to take. High-stakes tests are defined as tests whose results have implications for school system and educational policy, and where important decisions about students, teachers and administrators are made. Phenomenography was chosen as the research method for this purpose. Phenomenography is a research method which describes differences in the way we experience and understand the phenomena around us. The study involved 18 students who prepared for three different high-stakes tests (LGS, YKS, and KPSS) during the 2021-2022 school year. Data were collected through semi-structured interviews. The researchers studied what participants experienced during the exam preparation and how they view their high-stakes test. The phenomenographic analysis revealed six different ways of understanding related high-stakes tests. These are "a life and death matter," "a frightening experience," "a time of strain," "a struggle at an inconvenient time," "an improving experience," and "an opportunity to change the direction of life." Age, experience, and number of retakes of the test are critical in forming these understandings. The results of this study will provide data for educational researchers to develop new perspectives and strategies for educational practice.

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INTRODUCTION

The exam situations that students experience starting in the early years of their education affect their daily lives in different ways, depending on the scope and importance of the exams. These exams may be a written assessment by their teachers, a school-wide mock exam, a district-wide performance assessment test, or a centralized statewide exam that may impact students' educational process. Education is a complex and multi-layered system, like any other system, it has inputs, processing, and outputs. An assessment conducted to show the interaction between these processes and the difference between expected and actual performance is necessary and important to determine the degree of achievement of educational goals in terms of creating desired behaviors in students (Ertürk, 2017). Examinations, due to their components like measurement, control, and feedback functions, are considered an important element of educational systems and have been discussed in many studies (Büyüköztürk, 2016). The type of test that is the subject of our study is the large-scale centralized exams that students take at certain stages of the educational process.

High-stakes tests, which are on the agenda in the educational systems of many countries, are not a new phenomenon in educational literature. Large-scale tests have been used for more than a century to hold teachers accountable for their students' learning, to ensure that students have acquired certain desired skills, or to better set performance standards. Since that time, education policymakers have used various tests to hold students and schools accountable for the functioning of the learning process through state-administered tests, knowing that their direct intervention in the classroom would be limited (Madaus & Russsel, 2010). High-stakes tests, the subject of this study, are defined as tests whose results have implications for school systems and educational policy, and where important decisions about students, teachers, and administrators are made (Amrein & Berliner, 2002).

Centrally administered high-stakes tests are mostly designed to assess student, teacher, and school performance (Minarechova, 2012). These tests, administered with the participation of large student populations, provide the institutions that develop and monitor educational policy with evidence of school performance against a set of criteria, allowing for the monitoring of instruction over a long period (Dulfer, Polesel & Rice, 2012). In this regard, high-stakes tests serve as an accountability mechanism for teachers and schools. This is because, in some countries where these tests are administered, students performing well can bring fame and some financial benefits to schools, while the opposite can lead to sanctions against schools and teachers (Amrein & Berliner, 2002). Data from tests can be used to plan interventions to improve the performance of low-performing student groups. They are also a way to increase the credibility of schools in the eyes of the public by raising academic standards and holding students and teachers accountable for meeting those standards (Marchant, 2004). Test scores also play an important role in parents' decisions about their children's schools. According to Minarechova (2012), for the majority of parents, school test performance has been the deciding factor in recent years, while features such as school facilities and location have less influence on their decision.

In Turkey, the results of almost all high-stakes tests administered at the national level are used for placement (Büyüköztürk, 2016). These tests, which rank students according to their scores, are used for transition to higher education or personnel selection in public institutions. High-stakes tests, which have a significant impact on candidates' academic development and careers, affect all education stakeholders (Dulfer et al., 2012). In Turkey, other tests are considered high-stakes tests. However, since LGS (High School Graduation System), YKS (Higher Education Institutions Examination), and KPSS (Public Personnel Selection Examination) are the exams with the highest participation rates, although they are not mandatory, it was considered appropriate to include these exams in the study.

In Turkey, the LGS, which students take in 8th grade, is not only a test of students' academic ability but also a determining factor for the high school they will attend. In 2018, several types of high schools, such as science, Anatolian, Anatolian technical, project, and social science, were designated as "Qualified

High Schools" (Demir & Yılmaz, 2019). Admission to these schools requires students to take the LGS exam and earn enough points in accordance with the schools' quotas. If a student did not take the exam she or he can choose among the 5 schools closest to their address and be admitted to one of these schools (MEB, 2018). The qualitative differences between schools lead to the expectation that attending a school that admits students with high scores will pave the way to a good university education. This notion intensifies competition among applicants and sets students on a demanding and sometimes exhausting pace (Özkan & Turan, 2021).

The demanding high-stakes testing process that begins in secondary school continues throughout the four years of high school education. The YKS exam, which candidates take at the end of 12th grade, consists of the Basic Proficiency Test (TYT), which measures basic proficiency in the major subjects, and the Field Proficiency Test (AYT). The scores obtained on these exams determine which university and field of study the candidate is allowed to enroll in. The notion that a high score on the exams gives candidates academic advantages, such as access to a more qualified education and a more prestigious school diploma, and the fact that all of this is crucial to the opportunities and possibilities that students face for the rest of their lives, can make the exams a struggle for existence in the eyes of students and their families (Büyüköztürk, 2016).

If university students intend to work in public institutions and organizations after graduation, they must take the KPSS exam. Administered by the Center for Student Selection and Placement (ÖSYM), this exam is mandatory for those being appointed to public office for the first time. If they perform well on the exam and secure a position commensurate with their education, they will have benefits such as regular overtime, a stable income, job security, and health insurance make public employee appointment attractive. The KPSS exam, which has a validity period of 2 years, is an exam that undergraduate students can take before receiving their diplomas. The fact that it is time for individuals who have completed their education to earn an income increases the social and economic pressure of the KPSS exam on candidates (Sezgin & Duran, 2011).

The structure of entrance exams for high schools, universities, and civil service in Turkey was not always as it is today. Although the name of the exams, the number of sessions, or the assessment procedures have changed over time, Turkey has been conducting high-stakes tests at the national level for secondary education since 1997, for transition to higher education since the mid-1950s, and for public service selection since 1999 (Atılgan, 2018; ÖSYM, 2022). One of the basic assumptions of high-stakes testing is that decisions about students are inevitable and that the information gathered to make those decisions must be collected and combined in a deliberate, considerable, and defensible manner (Cizek, 2001).

High-stakes tests that use standardized, norm-referenced tests for ranking and selecting are based on comparing a candidate's correct answers to questions with a large group of test-takers. Therefore, such tests are less likely to include items that measure basic skills that everyone should be able to master to produce more sophisticated results (Marchant, 2004). These tests, which give an advantage to those who can solve more complex questions in a short time, are defined by students as "difficult." Educational researchers, however, view exam questions from a different perspective. The multiple-choice questions used in these exams are criticized because they are difficult to test candidates' high-level thinking skills (Eşme, 2014), that they are not suitable to measure their interests, abilities, and creativity (Dinç, Dere, & Koluman, 2014), that they are not capable of deep and multi-layered assessment, and that they cause superficial learning (Pamplett & Farnill, 1995). However, the fact that it can test large numbers of candidates in a variety of domains in a short period, that it can be scored quickly and inexpensively with computer-based readers, and that it allows individuals or groups to be compared on a variety of variables and with test takers' performance in previous years is presented as an important advantage (Dufresne, Leonard, & Gerace, 2002; Hammond, McIndoe, Sansome, & Spargo, 1998). In addition, the reasons given

for preferring multiple-choice questions in high-stakes tests are that, compared to exams with interviews or open-ended questions, a greater variety of curriculum topics can be included in the exam and that it is objective to eliminate biases that can occur in scoring such exams (Brady, 2005).

In addition to the purpose, implementation modalities, and structural features of high-stakes tests, issues such as the design of the instructional process and the functioning of the system, the impact of these tests on everyday life, and the psychological conditions of candidates are also the subject of educational research. It is necessary to mention the research on high-stakes tests to paint a general picture of the environment in which high-stakes tests are administered.

Candidates associate high scores with a better future, which creates an environment of fierce competition. This situation reinforces the tendency toward extracurricular resources (Kumandaş & Kutlu, 2010). Expenditures on courses, study centers, private tutoring, and publications purchased to prepare for exams put a strain on the family budget (Can, 2017). In addition to their impact on the family budget, these institutions, which are thought to better prepare students for the exam, may weaken student retention with their entirely exam-oriented course content. According to a 2010 report by the Education Reform Initiative (ERG), students who prepare for tests tend to view the time they spend in school as a waste of time and stay away from school.

Tests, which have a lot at stake, also have implications for the teaching process and learning practices, as they can affect candidates' futures. Since the priority is to achieve high scores on the tests, teaching methods are designed accordingly (Abrams, Pedulla, & Madaus, 2003), teachers teach according to the test technique by emphasizing the test topics (Çetin & Ünsal, 2019), and they tend to use lecture-based methods instead of time-consuming practices that they consider worthless in their efforts to prepare for the test (Büyüköztürk, 2016). This situation negatively affects students' affective gains and prevents them from developing in areas such as arts and sports, which they are not responsible for in exams (Amrein & Berliner, 2002).

Another situation caused by the competition that naturally accompanies the educational process, in which exams are an important agenda item, is that students relate their competencies to the results they obtain in tests. Tests that result in students being constantly compared to each other in test preparation in class and school, and teachers' interest in students who do well on these tests, damage the self-esteem of students who do not receive this attention. This situation can affect student achievement by weakening their academic confidence (Dulfer et.al., 2012).

Another conclusion reached by these studies on the effects of high-stakes testing on students is that intense preparation negatively affects individuals' social lives and causes great anxiety. Due to the high pace of learning, students move away from social life and do not have time to participate in cultural, artistic, and sports activities (Gündoğdu, Kızıltaş, & Çimen, 2010). The fact that one or more exams are coming up and that the results of these exams will determine their lives puts pressure on students as well as their families and even their teachers (Atılgan, 2018; Demir & Yılmaz, 2019). Apart from the hours they spend in school, long study hours, anxiety about the future, and constant focus on the exam prevent candidates from participating in artistic, social, and sports activities (Güngör, 2021), and the economic burden of exam preparation makes it even more difficult for them to participate in such activities (Sezgin & Duran, 2011).

The literature also indicates that students experience some psychological difficulties when preparing for an exam where the stakes are high. Concerning the NAPLAN exam (The National Assessment Program-Literacy and Numeracy) in Australia, Dulfer et al. (2012) found that 90% of students who take the exam are under severe stress. The same study found that students are very worried about being thought "stupid" in the face of poor exam performance, and nearly 70% of them are afraid of their families'

reaction. Fear of failure, fear of not achieving their goals, lack of zest for life, and extreme reactions accompanied by sudden anger are also common emotional states among exam candidates (Kumandaş & Kutlu, 2010). These emotional outbursts can damage the parent-child relationship due to the stressful environment created by exam preparation in the family (Güngör, 2021). Furthermore, it has been shown that concentration disorders due to tension and excessive stress can also affect students' performance (Dulfer et al., 2012).

It is also known that high-stakes tests cause several physical ailments as well as psychological problems caused by stress and its effects on the candidates' daily lives. According to Dulfer et al. (2012), Kumandaş and Kutlu (2010), and Minarechova (2012), the most common physical problems are breathing difficulties, muscle tension, digestive problems, loss of appetite, increased blood pressure, headaches, sleep disturbances, muscle cramps, crying spells, nausea before the test, feeling cold during the exam and vomiting before, during, or after the test.

The observations and experiences of the researchers who designed and conducted the present study are that the high demand for the limited number of quotas intensifies competition and causes constant stress in students and that this intense period of stress significantly affects their lives. Therefore, it was necessary to reveal their understandings related to high-stakes tests, because it is not only the test or the form of the test that determines students' learning behavior. Their perception of the assessment method also plays an important role in this regard (Struyven, Dochy, & Janssens, 2005). The two researchers of the study believe that a deep understanding of how students perceive and make sense of the assessment process that affects their learning practices will provide important data for educational researchers in developing new approaches and guiding candidates. The purpose of this study is to uncover the different ways in which a group of students diversified across the school level understand the high-stakes tests that they are going to take. In other words, it was intended to show how many different ways high-stakes tests were understood by students.

METHOD

Research Design

In this study, phenomenography was used as a research design to uncover differences in the understanding of a group of students preparing for three different high-stakes tests. Phenomenography, which describes differences in the way we experience and understand the phenomena around us, was developed in the early 1970s by a group of Swedish researchers who were studying student learning. According to one of these researchers, Marton (1988), there is not an infinite number of perceptions of a phenomenon; existing understandings are limited in number and can be described in different qualitative ways. Traditional phenomenography is defined as "a research design that aims to investigate the qualitatively different ways in which people understand a particular phenomenon or aspect of the world around them" (Marton & Pong, 2005, p.335).

Phenomenography has a non-dualistic ontological property. That is, there are not two separate worlds that we can define as objective and subjective. We live in a single-understood world (Barnard, McCosker, & Gerber, 1999). In such a world, knowledge is assumed to be created by human thought and action. In this respect, knowledge and concepts have a relational character. Concepts depend on both human activities and reality outside the individual (Svensson, 1994). There are always differences in the way people understand the world, and these differences arise from our experiences. Phenomenography was developed to understand how individuals understand a particular aspect of reality, what it means to them, and how this approach underpins their actions (Marton, 1981).

Phenomenographic research contributes to our understanding not only by illuminating the fundamental meaning of phenomena but also by revealing how people respond to the world. There are several principles to keep in mind. Phenomenographic research is concerned with the content of thought

rather than the process of thought and perception. Rather than looking for overarching laws, thinking is defined by what is both experienced and thought. This approach is not interested in formulating general principles about how things come about. Its goal is to describe the qualitatively different ways in which a group of people experiences the world around them to understand and experience a phenomenon under study (Barnard et.al.,1999).

The different ways of understanding included in the definition of phenomenography are the basic unit of description in phenomenographic research and are represented in the form of categories of description that are to be analyzed to create an outcome space that reveals logical relationships (Marton & Pong, 2005). The focus of a phenomenographic study is on description. In description, the first-order perspective describes the aspect of the world that is the subject of the research as it is. Phenomenographic research, on the other hand, is concerned with the second-order perspective. That is, it attempts to describe how the phenomenon is seen by people (Marton, 1988). Participants who describe their experiences in interviews may express more than one meaning (Barnard et al., 1999). This is not uncommon. Researchers emphasize differences rather than similarities in expressions of meaning when reporting their findings (Orgill, 2012).

The two researchers in the present study assumed that students will develop different perceptions based on their experiences preparing for a high-stakes exam and that uncovering these perceptions will provide important data for the literature. According to Marton (1988), uncovering the perceptions of a phenomenon is particularly important in developing the instructional techniques necessary for students to develop a new understanding of a particular phenomenon. In this regard, understanding how differently students perceive high-stakes tests would help educational programmers develop new perspectives and strategies to guide instructional practice. It would also provide a perspective for studies to improve the quality of counseling services. Therefore, phenomenography was chosen as the research design that would perfectly fit the purpose of the research question.

Study Participants

The study group, formed according to the principle of maximum variation, consisted of 6 LGS candidates from three different secondary schools, 6 YKS candidates from three different high schools, and 6 KPSS candidates from 3 different undergraduate programs. A gender balance was observed in each group of examination candidates. The candidates preparing for the YSK and KPSS were in their final year of school at the time of the survey and were taking the exam for the first time. The differences in the study group were the type of exam they were preparing for and their gender.

Research Instruments and Processes

The phenomenographic research tradition calls for a small number of open-ended questions to allow participants to address aspects of the research topic they consider important during the interviews. During the interviews, participants should be encouraged to describe the context they mention in as much detail as possible. This will help to understand what the participants experienced and how they conceptualize the phenomenon that is the subject of the research (Marton, 1988). Participants were asked 3 questions to determine their understanding of high-stakes testing.

1) First, what experiences would you like to talk about this test? How do you feel during this time?

2) Did you experience other things during the exam preparation that made you think or touched you emotionally? Can you give any other examples?

3)Thinking of all these examples, how would you describe or imagine your upcoming exam in general?

During the interviews, some probing questions such as “Can you elaborate a little?” and “Can you give an

example?" were asked when deemed necessary to achieve clarity and detail. This ensured that participants expressed their understanding with rich and nuanced explanations. Interviews were conducted in April and May 2022. Interviews were recorded with the participants' permission. After each interview, it was transcribed using MacOs dictation software.

Data Analysis

The analysis approach of Lamb, Jörgen, and Liesch (2011) was used in the analysis of this study. Accordingly, each interview transcript was first read twice independently by the researchers to be familiar with the participants' understanding. The researchers did not focus on specific statements but rather examined each participant's overall understanding of the phenomenon. At the end of these readings, participants were grouped according to the similarities and differences in their general understanding. The second phase looked for the answer to the question "What" the participants experienced during the exam preparation and focused on their specific experiences. The most important statements of the participants about their experiences were identified. New groups were formed, which allowed the researchers to compare the answers to the question "What do they experience?" with the participants' lived experiences. Third, the issue of how participants viewed high-stakes testing was focused on. Here, the interview scripts were read several times in an attempt to capture both the meaning of salient statements and the understanding of the interview as a whole.

The two researchers conducted each phase of the analysis simultaneously but independently and compared the conclusions they reached. No inconsistencies were found between the conclusions and inferences. As a member check, participants who had expressed a new understanding were contacted again and asked for confirmation. They were also reminded that they could retract their statements if they felt they had been misunderstood or if there were clues to their identity. None of the participants made such a request. Participants confirmed that the conclusions and emerging understanding were consistent with their statements.

Ethic

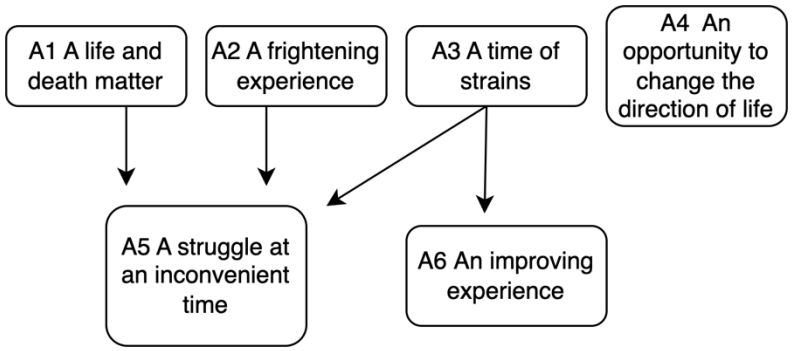
The research data were collected after obtaining the approval of the Provincial Directorate of National Education under the decision of the Research Ethics Committee of Necmettin Erbakan University. At the first contact with the participants, they were given the research permit obtained from the Provincial Directorate of National Education and the consent form of participants. This document was signed by the parents of the participants under 18 years. Participants and parents of underage participants were also given a consent form explaining their rights during the research process (voluntariness, confidentiality principles, anonymity, withdrawal from the research, etc.). Their rights were verbally reiterated at the beginning of each interview.

FINDINGS

At the end of phenomenographic studies, an outcome space emerges in which the findings are presented in the form of categories of description. These conceptions can be presented individually or in a hierarchical order of equal importance (Barnard et al., 1999). In this study, the presentation of interrelated perceptions in a hierarchical order was preferred.

At the end of the analysis, there were 6 different understandings that participants held about the exams they were preparing for. These understandings are shown in the diagram below, considering the hierarchical structuring between them. It was found that the type of exam, which is one of the areas of difference, and accordingly age, had an impact on the formation of understandings. However, gender had no effect.

Figure 1. *Participants' understandings of high-stakes testing*



As can be seen in this diagram, participants with an understanding of A5 also have understanding of A1, A2, and A3. Participants with understanding of A6 also have understanding of A3. However, these participants did not have A1 and A2 conceptions. Participants with understanding A4 were not connected to other understandings.

A1 A life and death matter

Participants with this understanding believe that the results of the exam they are preparing for will shape the rest of their lives, just as a train traveling fast on the tracks changes direction at the switch. LGS3, one of the participants with this understanding, expressed his belief in the determinism of the exam for his life by saying, *"There is no going back once you take the test, you have to go forward, it is a path of no return."* Many of the participants who expressed their understanding were candidates preparing for the LGS exam and expressed the following about the determinant role of the exam:

"This exam stresses me out a lot because it determines our whole future." LGS3

"This is an exam that will determine our lives. It will categorize us; it will determine our future according to our intelligence." LGS5

"It should not be so decisive. If we go to a bad high school, our lives will be very bad...I think this exam is bad because it is too decisive." LGS1

"This exam will determine my life...I live for this exam, I stand up for it, I study for it, I fight for it. Even the breath I take is almost for it." YKS4

A2 A frightening experience

Participants with A2 understanding are afraid to fail and view the exam as an experience to be afraid of. All these candidates indicated that they were under a great deal of stress. The fears they expressed when describing stress were as follows: not having enough time in the exam, difficult questions, something going wrong on the day of the exam, and being left behind in competition with peers. The prominent statements participants made about finding the exam scary were as follows:

"This exam feels like saying "climb Everest" before you have even set up any real obstacles in front of you. If you fall, you pay the penalty with your future, so I find it very scary." LGS6

"This exam is like a big, dark shadow in my life. It is very scary because it causes me nothing but stress. Suppose I pass, what will happen after university? Will I be able to find a job?" YKS1

"I cannot feel any emotion other than stress, anxiety, and sadness...Not only the exam, but even the most basic things about university scare me, I am afraid that I might be alone, and after university it is scary anyway young people cannot find jobs." YKS3

"This exam scares me a lot. There are rumors that there will be many appointments this year because of the elections. If I do not get appointed this year, they will not appoint many people next year.... I cannot get married if I do not get appointed." KPSS3

A3 A time of strains

Participants with this understanding agree that the questions of the exams they are preparing for are

difficult. Preparing for such difficult exams entails a demanding process that requires individuals to organize their lives, accordingly, limit their social lives, and deal with stress. The following excerpts summarize the experiences of participants who have busy schedules, spend most of their time at school and courses, and continue studying when they get home:

"I think this exam is difficult because the questions are not appropriate for our age." LGS4

"All I do is study, it takes up my whole life, I do not have time to do anything else, I have problems with my conscience when I want to do something, it is very tiring, very difficult." KPSS4

"At my age, I should go to concerts, I should go to the movies, but it's not like that, I have zero social life. We have such a busy schedule that I have become KPSS to the bone." KPSS6

Participants with A3 understanding were LGS and KPSS candidates. There were no candidates with this understanding among YKS candidates. LGS candidates with A3 understanding also had A5 understanding. KPSS candidates in this group also had A6 understanding. School life in 8th grade and LGS candidates' exam preparation are intertwined. The exam questions consisted only of the subject content of the 8th-grade curriculum, and the content of school lessons and homework were organized accordingly to better prepare candidates for the exam. LGS candidates, in describing their experiences that caused them to find the exam challenging, indicated that they found the questions labeled as "skill-based questions" difficult and that they had difficulty solving these questions in sufficient time. KPSS candidates, on the other hand, were more intense about the difficulties they experienced during the process. They complain that the things they need to do to succeed in school and prepare for the exam often have nothing to do with each other and that this duality wears them down; that they cannot spare time for anything other than school, internship, KPSS course, and studying for the exam because they have to complete an internship in their senior year; and that some of their teachers at school do not understand the importance of the exam to them and behave incomprehensibly.

"This is an exam that requires a lot of effort, you have to compromise on a lot of things, I have already compromised on my social life, I have compromised on school. Normally I do not like to put things off until the last day, I always put off homework, exams in school, etc. until the last day, I focus more on KPSS." KPSS2

"If you took the exam, you were guaranteed a job, you could be appointed. So did the teachers we met in the internship, but not us. Our professors do not understand either, they respond to us by saying we should not be so KPSS oriented...We are very stuck." KPSS6

A5 A struggle at an inconvenient time

All participants with this understanding are LGS candidates and also have A1, A2, and A3 understanding. These participants feel that the difficulty they experience, and the stress of the exam are not appropriate for their age. Rather, they see it as a cruelty of the system that they must take an exam at a young age that they believe is crucial for the rest of their lives.

"We are too young now; I know how important it is (in terms of the exam) but there are others who do not know that. Their lives will be ruined, it's very bad. For example, such exams can take place at a later age.... And it is very cruel to be exposed to such stress at such a young age." LGS1

"I think this exam comes at the wrong time because, at our age, our thoughts are not really on the exam. Our thoughts are usually occupied with things like games and entertainment. It is very bad and ridiculous to force 13, 14-year-olds to take such an exam that they will pay for with their whole future." LGS6

A6 An improving experience

Participants with A6 understanding also have A3 understanding and all of them are KPSS candidates. These participants believe that exam preparation has made their lives more orderly and that this orderliness and what they have learned while studying for the exam have had a positive impact on their personal development, even if they have had a difficult experience.

"It has brought order to my life." KPSS4

"I studied very well in grade 12. I wanted to have something again, a life where I knew what I was going to do when I woke up in the morning. That was one of the good things about studying for the exam this year." KPSS2

"I refrain from idle activities, like playing computer games, which I used to play a lot, or watching TV. Now I read books or watch history videos to relax. My preferences have changed. Can we call that maturity? I think this exam year makes me more mature. I am not complaining about it, it is helping me become a more intellectual person."

KPSS5

The second candidate, KPSS5, said that he would not be able to get married if he could not be appointed, *"Now that we have something big to fight for, I feel full and more satisfied with my life...We can compare it to adrenaline sports, where you risk a lot, but it is fun. It's the same here. There are a lot of risks. You cannot commit, everything can go wrong, but I still enjoy it. Because I like dealing with something difficult." KPSS5*

"I have a better command of educational terminology now, and what I learned was useful to me during my internship. Therefore, I can say that I am glad that I am studying for the exam. Even though I cannot be appointed now, it will be useful to me in the years to come." KPSS2

A4 An opportunity to change the direction of life

Participants with this understanding see the exam as an opportunity to improve their lives. A4 understanding was not related to other understandings. YDS2 who have their own business and family waiting for him to take over the business,

"I have been going to my father's workplace since I was 7 years old. I am always in the industry. This exam is an opportunity to escape to my own life, I want to live my own life, not the one that is imposed on me".

"My parents are workers, if I had not studied, I would probably be a worker too. Factories are common here. But I decided to study, I will become a civil servant, and I will move up to a higher class. This will make my family very happy, and I will be happier. This is my view of KPSS, it should be seen as an opportunity, a chance to move up to a higher class." KPSS1

Understanding A4 could have been included in A1 because it plays a crucial role in shaping participants' lives. However, the participants who expressed understanding of A1 believe that variables other than their own efforts (such as a mishap or health problem that may occur on the day of the exam, attention lapses because they cannot concentrate enough due to excitement, the questions are more difficult than expected, questions are asked outside of curricula, there is not enough time) have a greater impact on the outcome of the exam they will take. This leads them to tend to view the exam as an external factor that is more crucial to their lives than their own efforts. Participants with this understanding, who believe that they will succeed if they put in the effort, do not view factors outside their control as a threat.

"I do not care about the 3,500,000 people because if you work, you work and if you do not work, you do not work. What I want is to learn more, to get better. I do not care if 5 million people take the test, I care about my own work." YKS2

Participants with an A6 understanding see the exam as a means by which they can determine the rest of their lives and think they are in charge.

DISCUSSION AND RECOMMENDATIONS

Although the participants' experiences that shaped their understanding of high-stakes testing vary, what they have in common is that they present an intense pace of learning and organize their lives accordingly to succeed in the exams they will take. Participants indicate that they spend most of their time studying to succeed on the exam and that they do not have time to do things like play games, exercise, meet with friends, read a book by a favorite author, attend cultural events, watch TV, and spend time with their family, and that they miss these things. This is also found in the studies of Kumandaş and Kutlu (2010), Güngör (2021), Gündoğdu et al. In addition, it is also found that students who do not participate in social activities in addition to attending school or courses and do not make sufficient use of counseling services have higher test anxiety (Ünalan, Çifçili, Dinç, Akman, & Topçuoğlu, 2017). The descriptions of the participants in the present study confirm this. Scheduling time for activities that students enjoy and that are compatible with their learning routines would have a positive impact on their stress levels. In addition, it would be beneficial for school counselors to include activity suggestions that support students' holistic development when planning study with students preparing for the exam and to involve students' parents in this planning.

Grouping the prominent statements related to the question "What does he/she experience?" under the

categories of understanding in the analysis of the study, it was found that all these experiences related to understanding confirmed the findings of the following researchers. The findings of the present study, which confirm other researchers about the lives of students preparing for the exam, are as follows: Stress and physical discomfort associated with stress, insomnia, crying spells, feeling tired and sick most of the time (Dulfer et al., 2012; Marchant, 2004); tension and angry outbursts (Güngör, 2021; Kumandaş & Kutlu, 2010; Minarechova, 2012); intrusive behavior or pressure from family (Gündoğdu vd., 2010; Güngör, 2021); difficulty in concentrating due to severe stress (Abrams vd., 2003). In addition, "worrying about falling behind in competition with peers", "fear of being judged as stupid and unsuccessful", and "difficult questions", which can be found among the findings of these studies, are the fears expressed by the participants of this study. In addition to these negative situations caused by the exam, the strain on the family economy caused by exam preparation (Can, 2017) is a factor that increases participants' concern about not meeting their families' expectations. Based on this, it is suggested that informative counseling activities should be provided for parents whose children are preparing for the exam and for teachers who teach in these students' classes and that teachers and parents should be taught appropriate communication language to reduce students' anxiety levels.

Aside from the challenging situations that the participants in the present study experienced in the process they underwent, the focus of the research is to uncover the understandings that emerged from these experiences. When the 6 understandings obtained are analyzed in terms of exam type, the understanding of A1 (A life and death matter) does not occur in the KPSS candidates, while it occurs in almost all of the LGS candidates and less than half of the YKS candidates. This may be because the LGS exam, which unlike YKS and KPSS can only be taken once, effectively promotes this understanding. The exam they will take cannot be made up. Güngör (2021) also cites this as one of the negative features of the exam. The high level of anxiety caused by a single exam and an intensive preparation process can have a negative impact on the candidates' living conditions (Dinç vd., 2014). Candidates are aware that no matter how well prepared they are, a mishap on the day of the exam can undo their efforts. Another reason could be the maturation factor. KPSS candidates are aware that there are other options if they do not score high enough for an appointment or fail the interview, and they are old enough to make decisions that will shape their lives. In fact, during the interviews, the KPSS candidates talked about contingency plans in case they did not pass the exam. The LGS age group, which has limited say in major decisions about their own lives, is not able to express alternative orientations. They tend to believe that this exam will lead them down an irreversible path. This understanding of the participants is consistent with the category of "exams as selective and determining our lives" in Baş and Kıvılcım's study (2019, p.658).

Participants with A1(A life and death matter) and A2 (A frightening experience) understandings indicated that their stress levels were high, they felt under pressure, and they worried that they would not be able to meet their families' expectations. Some of the participants even cried during the interviews. A1 and A2 understandings are most prevalent among LGS and YKS candidates. It is conceivable that this is due to family intervention. As Büyüköztürk (2016) points out, these exams become a struggle for existence in the eyes of both students and their families. Some of the participants said that their families even intervened in their friendships at school and that they removed their friends who they believed negatively influenced their studies by cooperating with the teachers. In addition, in the LGS and YKS groups, it was observed that parents controlled the number of questions solved each day and monitored the results of mock exams on a course and subject basis. Participants complained that family conversations revolved mainly around exam-related topics. Parents' interventions, which were intensified since it was an exam year, their pressure to work harder, and their inability to use the right methods to motivate their children may cause the candidates, who are inexperienced in stress management due to their age, to approach the exam with negative emotions.

Of note, some of the statements made by participants with understanding A1 (A life and death

matter), A2 (A frightening experience), and A5 (A struggle at an inconvenient time) were that they felt constantly sad, tired, and unhappy. In fact, it was recorded in the interviews that they often had angry outbursts, were in a tense and intolerant mood, and that their relationships with their families were damaged as a result. According to Minarechova (2012), this is a natural stress response of children working under constant pressure and a common negative effect of high-stakes tests on students.

Participants with A3 (A time of strains), in contrast to participants with A1 (A life and death matter) and A2 (A frightening experience), did not express concerns about not meeting family expectations. In addition, these participants, who were predominantly KPSS candidates, were also sympathetic to A6 (An improving experience). Analyzing the interview transcripts of the participants who had expressed A1 (A life and death matter), A2 (A frightening experience) A5 (A struggle at an inconvenient time), as well as A3 (A time of strains), and A6 (An improving experience), it was found that the first group was more pessimistic and focused more on the negative effects of the examination process on their experiences and emotional state. On the other hand, it was observed that the participants who held the A3 and A6 understandings were able to evaluate the exam and its impact on their lives in a multidimensional way and make different plans considering the possibility of failure. Some of these candidates won the program in which they were studying on their second attempt at the exam. The fact that they had taken a high-stakes test at least twice before the KPSS was an important experience for them, and this experience may have differentiated their understanding from that of younger candidates, who were more likely to view the exam as a matter of life or death.

Although sleep disturbance did not show significant consistency among participants who had the same understanding or among candidates preparing for the same exam, it is a problem that affects candidates' quality of life and work efficiency.

Most studies dealing with the various aspects of high-stakes tests highlight the negative effects of these tests. Based on the participants' experiences and their perceptions shaped by these experiences, LGS and YKS candidates need the kind of guidance and support that will help them perceive the exam as such, deal with their stress and anxiety levels, and acquire the skills to develop and maintain a systematic learning discipline. Büyüköztürk (2016) states that the exam atmosphere can change the priority of school counseling services and increasing academic success by improving students' exam performance can become a higher priority. The accounts of participants who reported their experiences with their school's counseling services in the interviews confirm Büyüköztürk's view. The LGS and YKS candidates talk about the weekly study plans given to them by the guidance services and most of them complain that they are not able to implement the given program. Candidates state that these study plans do not meet their needs and are often too hard to follow. Students' lives are intensified by exam preparation, increasing pressure (candidates mentioned this in three groups: pressure from self, pressure from family, and pressure from school), and stress prevents them from perceiving the exam as one that can be achieved with systematic effort. In fact, during the interviews, participants who indicated A1 (A life and death matter), A2 (A frightening experience), and A5 (A struggle at an inconvenient time) understandings used the metaphors "impending disaster," "a terrible shadow," "path of no return," "like death," "dark shadow," "bridge over the abyss" to describe the exam. In the present study, the participants who revealed the A3 (A time of strains) understanding did not use exaggerated metaphors or expressions with bad connotations despite the difficulties they experienced. The same participants also demonstrated an understanding of A6 (An improving experience). Participants with an understanding of A4 (An opportunity to change the direction of life) also had no negative thoughts about the exam. The positive perceptions of high-stakes tests are A6 (An improving experience) and A4 (An opportunity to change the direction of life). All but one of the candidates who expressed these perceptions were KPSS candidates. Examining the experiences of YKS2, the only participant in this group who is not a KPSS candidate, reveals that his learning behaviors and discipline are motivated entirely by the motivation to succeed and have control of his own life. He describes a situation that contrasts with the family pressure to "study harder" that his peers

complain about. It may be utopian for now to propose the abolition of exams or the development of alternative assessment and evaluation methods for placement exams, but it may be possible to support the holistic development of candidates by increasing their well-being and life satisfaction under current exam conditions. Based on the findings, it is believed that improving the self-regulation skills of students preparing for the LGS and YKS exams and teaching them stress management skills, coupled with proper motivation, will make the exam preparation process less stressful for them. Changing one's way of understanding is a big step in learning (Larsson & Holmström, 2007). The understanding of participants who expressed that the exam they were preparing for had a positive impact on their personal development and experience can inspire educational professionals to change the understanding of students who often attribute pessimistic meanings to exams to a more optimistic and constructive approach. It can ensure that students do not view exam preparation as a tedious and agonizing time, but rather as a period in which they develop appropriate learning methods, gain experience in preparing for an important exam, and come to know themselves better as students. The findings of the present study will provide data for studies aimed at helping students acquire self-regulation skills and for studies aimed at promoting motivation in preparing for high-risk exams. In conclusion, it would be beneficial to transform high-stakes tests, which affect millions of students each year, into a developmental experience for students to develop systematic and disciplined study habits to achieve their goals and increase their life satisfaction by reducing their anxiety.

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Investigation of Self-Regulated Online Learning According to Demographic Variables and Their Relationship to Learning Approaches

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ABSTRACT

Self-regulation in online learning environments is of great importance in terms of ensuring effective learning since it makes the learner autonomous. In this context, the research aims to compare the self-regulated online learning of education faculty students according to certain variables and to reveal the relationship between their self-regulated online learning and learning approaches. The research is conducted using a correlational research design. Firstly, the general view of students' self-regulated online learning and learning approaches was determined. After that, self-regulated online learning averages were compared according to their gender and academic averages, and finally, the relationship between self-regulated online learning and learning approaches was presented. The study group of the research, which continues their education through distance education due to the pandemic in the 2021-2022 academic year; consisted of a total of 376 students who studied in different departments of the education faculty of Necmettin Erbakan University in Konya. The research findings demonstrate the fact that students' self-regulated online learning corresponds to an above-average value and their self-regulated online learning differs according to their gender and academic achievement. Moreover, there is a moderately positive correlation between the deep learning approach and self-regulated online learning skills, and a low negative correlation between the superficial learning approach and self-regulated online learning skills.

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INTRODUCTION

The effects of radical and rapid technological developments in the 21st-century information age on social and institutional structures have begun to be felt in almost every field, including education systems (Uşun, 2000). For that matter, educational institutions have also started new searches to manage their resources effectively (Sultan, 2010). In this context, the limitations of time and space in education have disappeared with the "internet", which is the most important effect of these new fluctuations in the field of technology on education (Pardue, 2001). Online learning applications have become increasingly widespread with the developments in communication technologies and the emergence of the Internet (Moore & Kearsley, 2005). The fact that it provides flexible learning opportunities by removing geographical distances and time limitations, and producing fast and practical solutions that incorporate the basic features of the 21st century, has increased the popularity of online learning (Kesim, 2011).

In accordance with Morrison (2003), online learning is supported by Internet technology and managed by this technology, can be performed synchronously and asynchronously, and helps to gain knowledge and skills with these applications. Online learning environments are places where the internet is used to access learning materials; where the opportunity to interact with the content, the environment manager, and other students is provided; where technical support can be provided throughout the learning process; where individuals are enabled to construct and internalize knowledge to learn a certain knowledge and are environments which develop with learning experiences and become more effective as they evolve (Ally, 2004; cited in Pala, 2014). Online learning gives learners flexibility in terms of where and when to learn. From this point of view, it also provides benefits to students who do not attend traditional educational programs for a variety of reasons (Joosten & Cusatis, 2020).

In order to achieve the targeted success in online learning environments, learners must have some characteristics. These are features such as self-learning, and self-motivation, to be able to set a goal and persistence towards this goal (Berigel & Çetin, 2019). Self-regulation, which is directly related to these skills, plays an important role in achieving the determined goals and being successful in any learning environment process (Shea, et al. 2013; cited in Kilis & Yıldırım, 2018). Self-regulation is even more important, especially in distance education and online learning environments. Because in such learning environments, there are no real-time teachers as in traditional classroom environments, and the learning environment and process are more autonomous. (Artino & Stephens, 2009; Barnard et al., 2009; Dabbagh & Kitsantas, 2004; Schunk & Zimmerman, 1998; cited in Kilis & Yıldırım, 2018). Therefore, self-regulation skills become much more important, especially in distance education and online learning environments.

Self-regulation, first mentioned by Bandura, the founder of social cognitive theory, is defined as the individual's making judgments by observing his behavior, comparing it with his own criteria, and if necessary, adapting his behavior to the criteria, influencing, directing, and controlling his own behavior (Bandura, 1977; cited in Senemoğlu, 2013). Zimmerman (2001) defines self-regulation as the emotions, thoughts, and behaviors that a person develops in order to reach a goal. The self-regulation process is an active and constructive process in which students set their own goals in the learning process and regulate and observe their behaviors, motivations, and cognitions in line with these goals (Pintrich, 2000). While Pajares (2008) explains this concept as "the metacognitive process that enables students to understand and evaluate the behaviors they exhibit, and also to plan alternative paths for success"; Kauffman (2004) defines self-regulation as the learner's effort to observe, supervıse, and regulate the learnıng process. Hoyle (2010), on the other hand, discussed self-regulation, which he defined as psychology-based, as the reactions of individuals to the contradictions that arise when their expectations and the perceived reality do not match. Self-regulated learning includes the cognitive strategies that the individual uses to realize cognitive processes such as remembering and understanding, the

metacognitive strategies they use for planning, monitoring, and regulating these cognitive processes, the actions they take to control and manage their performance in academic tasks, and their motivations that act as catalysts in realizing all these processes (Pintrich & De Groot, 1990). Many different models of self-regulated learning have been developed based on theory. The most well-known of these models are those developed by Boekaerts (1992), Borkowski (1996), Winne & Hadwin (1998), Pintrich (2000), and Zimmerman (2000) (Uygun, 2012). All of these models share the assumption that the general structure of self-regulated learning is that learners set targets for their learning process; it's also an active, constructive process in which they regulate and control their cognition, motivation, and behavior (Pintrich, 2000).

The concept of learning approaches, on the other hand, refers to the differentiation in the purpose and activities chosen by the students to perform a particular learning task (Entwistle & McCune, 2004). Tang (1994) states that the concept of a learning approach includes a set of strategies for fulfilling the given task and motivation toward learning. The concept of learning approaches is used in the literature as a concept that includes both students' learning strategies and their motivation to use these strategies together (Prosser & Trigwell, 1999). In other words, the learning approach is the orientation that emerges depending on the intention of the learner when dealing with the subject of learning (searching for meaning, creating meaning, memorizing, being successful, etc.) (Ekinci, 2011). It is mentioned that many variables affect learning approaches. Examining the literature, it is seen that the learning-teaching environment and individual characteristics (self-efficacy, readiness level, etc.) are effective in learning approaches. Ekinci (2009) defined the characteristics that affect the preferences of learning approaches as personal characteristics (gender, class, age, etc.), personality characteristics (being introverted, extroverted, academic self-confidence, etc.), subject area, past experiences, and characteristics of the learning-teaching environment.

The concept of learning approaches first emerged in the 1970s as a result of the work of Marton and Saljo with a group of university students. Early researchers considered learning approaches at two levels: deep and superficial approaches (Canıdemir, 2013). In the superficial learning process, it has been observed that students aim to memorize the information and ideas they think are important in the text, rather than trying to understand the holistic meaning of the text. They try to memorize the details that they think will answer the questions that may be asked later and do not tend to seek meaning. In the in-depth learning process, it has been seen that students direct their attention to the semantic content of the learned material and understand what is meant to be told, rather than the factual information in the text (Marton & Saljo, 1976; cited in Kılıç, 2009). These two approaches point to two opposite poles. While students using the deep approach try to see the relationships related to the subject and create structures related to the learning task with an internal motivation; students using the superficial approach try to complete the learning task as soon as possible with external motivation sources such as fear of failure or getting high grades (Johnson, 1997).

Examining the literature on self-regulated learning, it is seen that although there are many studies, the research is mostly aimed at determining the effects on the academic achievement of the students. In addition, the number of studies investigating self-regulated online learning (SROL) for the distance education process is quite low. Various variables that may be related to SROL have been examined in studies in Turkey (Barut Tuğtekin, 2022; Çivril & Aruğaslan, 2022; Dönmez, 2021; Düzgün & Ünal, 2022; Koç, 2019; Meşe, 2021; Özdemir, 2018; Yetik, 2017; Taşçı, 2022; Tülübaş, 2022; Usta, 2011; Özdemir & Önal, 2021), and abroad (Hong, Lee & Ye, 2021; Broadbent & Poon, 2015; Barnard, Paton & Lan, 2008; Barnard-Brak, Paton & Lan, 2010; Ulfatun, Septiyani & Lesmana, 2021; He, Zhao & Su, 2022; Mahmud & German, 2021; Swafford, 2018; Sansato, Riyanti, Prostati, Triatmoko, Susanty & Yang, 2022). In these studies, SROL level and its relationship with some variables (such as length of stay online, gender, grade level, marital status, etc.), (Mahmud & German, 2021; Barut & Tuğtekin, 2022; Çivril & Arugaslan, 2022; Özdemir, 2018; Özdemir & Önal, 2021), SROL profiles (Barnard-

Brak et al., 2010), the effect of SROL on academic achievement (Broadbent & Poon, 2015; Tülübaş, 2022), SROL and online learning self-efficacy (Ulfatun et al., 2021; Sansato et al., 2022), motivation (Swafford, 2018), academic procrastination behavior (Hong et al., 2021), cognitive immersion (Koç, 2019), the relationship between academic achievement (Barnard et al., 2008; Düzgün & Ünal, 2022) and attitude towards the internet (Usta, 2011) and the effects of different learning environments (such as metacognitive judgment training, differentiated education, personalized feedback, metacognitive support training) on SROL (Meşe, 2021; Taşçı, 2022; Dönmez, 2021; Yetik, 2017) were examined. While a highly positive relationship was found between SROL and academic achievement, motivation, attitude towards the Internet, and online learning self-efficacy; a negative relationship was found between SROL and academic procrastination behavior.

Many studies are available in higher education to determine students' learning approaches and to provide effective learning in light of this information. Studies in this regard show that learning approaches are one of the determinants of learning (Senemoglu, 2011). Self-regulated learning, on the other hand, emphasizes autonomy and control in the sense that the individual monitors, directs, and regulates actions taken to acquire knowledge, develop experience, and improve oneself (Paris & Paris, 2001). In this context, it was decided to examine the relationship between the learning approaches of education faculty students and their online self-regulated learning, considering that it would be quite meaningful to examine these two variables, which are thought to affect each other in a meaningful way.

Although there are many studies on self-regulated learning both in Turkey and abroad, no study examining the relationship between students' SROL and learning approaches has been found. In this study, we plan to investigate the relationship between SROL learning and the learning strategies used by undergraduate education students. Therefore, we aim to answer the following research inquiries:

(1) What is the level of SROL among education faculty students learning in online environments?

(2) What is the level of preference for learning approaches (superficial or deep) among education faculty students who learn in online environments?

(3) Is there a significant difference between the SROL of education faculty students who learn in online environments in terms of gender?

(4) Is there a significant difference between the SROL of education faculty students who learn in online environments in terms of the academic achievement variable?

(5) What is the relationship between SROL and the learning approaches of university students learning in online environments?

METHOD

Research Design

The research is a study in the correlational research design. This model is aimed to determine the presence and/or level of change between two or more variables and to specify the relationships between the variables. In relational research, two different relational analyses can be made. These are the relationships obtained by correlation-type relationships and comparison (Karasar, 2006). Correlational models are research models that aim to determine the existence or degree of change between two or more variables (Cohen et al., 2003). In this study, the self-regulated online learning of education faculty students was examined; correlation calculations were made in order to determine the relationship between SROL and learning approaches.

Study Group

The study group of the research, who continued their education through distance education due to the pandemic in the 2021–2022 academic year, consisted of a total of 376 students who studied in

different departments of the education faculty of Necmettin Erbakan University in Konya.

The research group was selected through convenience sampling and included in the study based on their voluntary participation. The data obtained from 378 students were utilized in the study. The data were collected through forms created in online environments. After data set analysis, a total of 2 outlier data were excluded from the study, and the data set of 376 faculty of education students was included in the study.

Of the Faculty of Education students, 305 (81.1%) were female and 71 (18.9%) were male. 105 of the students were in the Department of Basic Education (27.9%); 90 of them were in the Department of Foreign Language Education (23.9%); 88 of them were in the Department of Mathematics and Science Education (23.4%); 47 of them were in the Department of Turkish and Social Sciences Education (12.5%); 25 of them were in the Department of Fine Arts Education (6.6%); 13 of them are studying at the Department of Educational Sciences (3.5%); and 8 of them are studying at the Department of Physical Education and Sports (2.1%). The academic average of 261 (69.4%) of the students was between 70 and 84; the academic average of 96 (25.5%) was between 85 and 100; and the academic average of 19 (5.1%) was in the range of 60 to 69. Since the number of students in the departments differs according to the number of students studying in the relevant department and the preference of the department, this has led to an increase in the difference between the percentages.

Research Instruments and Processes

Self-Regulated Online Learning Scale

In the study, the SROL scale developed by Yavuzalp & Özdemir (2020) was used to determine the SROL of education faculty students. The scale, whose original form was developed by Jansen et al. (2017), was adapted to Turkish by Yavuzalp & Özdemir (2020). As a result of the exploratory factor analysis, the 5-factor structure found in the original scale was formed in the same way. It was determined that the factor load distributions varied between .393 and .906, the total eigenvalue was 22.34 and the total variance explained was 62.06%. Cronbach Alpha value of the sub-dimensions of the scale ranged between .70 and .95.

Learning Approaches Inventory

In the study, the "Learning Approaches Inventory", developed by Kember, Bigss & Leung (2004) and adapted into Turkish by Çolak & Fer (2007), was used to determine the learning approaches adopted by the education faculty students. This 5-point Likert-type scale consists of 22 items in total. The measurement tool consists of two sub-dimensions: "Deep Learning" and "Superficial Learning". The Cronbach Alpha coefficient of the scale was .79 for the deep learning approach and was calculated as .72 for the superficial learning approach. In this study, the reliability coefficient was recalculated and found to be .806 for the “deep learning” and .684 for the superficial learning approach.

Data Analysis

In the study, descriptive statistics were used to determine the SROL levels and learning approaches of education faculty students. Before starting the analyses, it was checked whether the answers given by the faculty of education students to the scales met the assumptions of normality. In order to find out whether the data obtained from the scales meet the normality assumption, the Kolmogorov-Smirnov test and skewness and kurtosis values were calculated together. Since the normality assumptions were met, parametric tests were used in the analysis of the data. In the comparison of SROL levels and learning approaches of education faculty students by gender; an independent sample t-test was used. One-way analysis of variance (ANOVA) was used to compare SROL with students' academic averages and simple linear correlation was used to determine the relationship between SROL skills and preferences for learning approaches.

Ethic

The necessary ethics committee permissions for the research were obtained from the Social Sciences Ethics Committee of Necmettin Erbakan University with the decision dated 12.05.2023 and numbered 14236.

FINDINGS

1. What is the level of SROL among education faculty students learning in online environments?

Table 1. *Descriptive statistics on SROL skills of education faculty students*

	N	Min	Max	$\bar{X}$	S
Metacognitive Skills	376	1.06	7.00	4.4948	1.26756
Time management	376	1.00	7.00	4.3236	1.50895
Environmental Structuring	376	1.00	7.00	5.3362	1.39675
Persistence	376	1.00	7.00	4.7681	1.35065
Seeking for help	376	1.00	7.00	4.6064	1.51844
GENERAL	376	1.11	6.94	4.6509	1.10354

According to the table, the mean scores of the online SROL scale sub-dimensions of the Faculty of Education students, from the most used to the least used, are respectively environmental structuring ($\bar{X}$=5.3362), persistence ($\bar{X}$=4.7681), seeking for help ($\bar{X}$=4.6064), metacognitive skills ($\bar{X}$=4.4948), time management ($\bar{X}$=4.3236). It is seen that the average score of the students of the Faculty of Education regarding the general SROL scale is at the level of $\bar{X}$= 4.6509. The mean score corresponds to a value above the middle level on the response scale. This result shows us the students own self-regulation skills.

2. What is the level of preference for learning approaches (superficial or deep) among education faculty students who learn in online environments?

Table 2. *Descriptive statistics of education faculty students' preferred learning approaches*

	N	Min	Max	$\bar{X}$	S
Deep	376	1.45	5.00	3.5010	.56709
Superficial	376	1.36	4.55	2.9930	.57959

According to the table, it is seen that the average of the students' deep learning approaches is higher than the average of the superficial learning approach. According to this finding, it can be said that students prefer the deep learning approach more. While the deep learning approach point average corresponds to the "I agree" level on the response scale, the superficial learning approach corresponds to the "I agree moderately" level on the response scale.

3. Is there a significant difference between the SROL of education faculty students who learn in online environments in terms of gender?

Table 3. *Comparison of education faculty students' SROL by gender*

	N	$\bar{X}$	S	Sd	t	p
Female	305	4.7485	1.02943	374	3.614	0.00
Male	71	4.2312	1.30440			

The t-test for unrelated samples, conducted to determine whether there is a difference between the self-regulated online learning of students according to their gender; showed that there is a statistically significant difference at 0.05 significant level between the mean score of female students ($\bar{X}$= 4.7485) and male students ($\bar{X}$= 4.2312). This difference is in favor of female students. In other words, it can be said that female students use SROL skills more than male students.

4. Is there a significant difference between the SROL of education faculty students who learn in online environments in terms of the academic achievement variable?

Table 4*. Comparison of SROL of education faculty students according to students' academic averages*

Source of Variance	Sum of Squares	sd	Mean Squares	F	P	Significant Difference
Between groups	7.809	2	3.904	3.245	.040	Between 85-100 range to 75-84 range
Within groups	448.864	373	1.203			
Total	456.673	375				

In order to test whether there is a difference between the SROL of students with different academic averages in terms of their academic averages, the SROL averages of the groups formed according to their academic averages were compared with a one-way analysis of variance for unrelated samples. According to test result, a statistically significant difference was observed between at least two of the averages of the students whose academic average is between 85-100 ($\bar{X}$=4.8848), the average of the students whose academic average is between 70-84 ($\bar{X}$=4.5846), and the average of the students whose academic average is between 60-69 ($\bar{X}$=4.3787). the Dunnett's C multiple comparison test demonstrates that the significant difference was between the online SROL skill scores of the students whose academic average was between 85-100 and 70-84.

5. What is the relationship between SROL and the learning approaches of university students learning in online environments?

Table 5*. Simple linear correlation of SROL skills and learning approaches*

	Deep Learning	Superficial Learning
Self- Regulated Online Learning	.632	-.188

The simple linear correlation process performed to reveal whether there is a relationship between students' learning approaches and SROL skills shows that there is a relationship between SROL skills and learning approaches. It was determined that there was a moderate positive correlation ($r=.632$, $p<0.01$) between the deep learning approach and SROL skills, and a low negative correlation ($r=-.188$, $p<0.01$) between the superficial learning approach and SROL skills.

DISCUSSION, CONCLUSION, RECOMMENDATIONS

This study aimed to compare the SROL of education faculty students according to certain variables and to reveal the relationship between their SROL and learning approaches.

According to the research findings, the SROL skill level of education faculty students is above average. In Turkey, during the pandemic period, courses in higher education institutions were carried out through distance education, and the data from our research was obtained during the distance education process. Online courses, certificates, and diploma programs are currently conducted through distance education in many higher education institutions in Turkey. In this context, according to the results obtained, university students use self-regulation skills in online learning environments. This value is above the average. However, considering that the maximum value that can be taken on the response scale is 7, it shows that students' SROL skills need to be developed and supported. Evaluating the participation of the students at the level of sub-dimensions (time management, metacognitive skills, seeking help, persistence, environmental structuring), we encounter a situation similar to the scale in general. These averages reveal the areas in the sub-dimensions that need improvement. This result of the SROL of education faculty students is in line with similar research results in the literature. Koç (2019), Barut Tuğtekin (2022), Çivril & Aruğaslan (2022), and Düzgün & Ünal (2022) stated that the SROL scores of university students who learn online are above the average. Tümen Akyıldız (2020) stated that students' SROL scores are at a moderate level. This may be because the distance education process is compulsory throughout the country and students may not feel ready for this process.

According to another finding of the study, the SROL of education faculty students differs along with their gender. This difference is in favor of female students, which is probably because most of the students participating in the research are women and female students approach academic studies more meticulously. Meece & Painter (2008) found that women outperform men and acknowledge that cultural stereotypes regarding male and female abilities can have important consequences. For example, it has been argued that women are more often expected to conform to social norms; therefore, their experience and skills in regulating their emotions and behaviors tend to be superior to men (Davis, 1995; cited in Özdemir & Önal). There are similarities between the finding that female students have higher SROL averages than male students and the results of previous studies. Çivril & Aruğaslan (2022), Tülübaş (2022), Özdemir & Önal (2021), McSporran & Young (2001), Liu, He, Zhao & Hong (2021), Özsoy-Güneş, Güneş & Kırbaşlar (2014), Zimmerman & Martinez-Pons (1990) & Artsın (2018)'s finding that female students' SROL scores are higher, is in line with our research result. However, Özdemir (2018), Aslan Baysal & Çakır (2022), Çivril Aruğaslan (2022), and Düzgün & Ünal (2022) revealed that gender does not affect students' self-regulation skills in online environments; but Koç (2019) and Tümen Akyıldız (2020) stated that this result is in favor of men. These findings from current studies do not overlap with our research findings.

Examining the SROL averages of the education faculty students according to the general academic averages, it is observed that the students with an academic average between 85-100, had a significantly higher SROL level than students with an average of 75-84. According to this result, it is possible to say that students with higher academic achievement have higher SROL skills. It is supported by many studies that students with high SROL levels have high academic success (Atmojo et al., 2020; Sangsawang, 2020; Albelbisi & Yusob, 2019; Barnard-Brak et al., 2013; Denge & Başaran, 2021; Eker, 2014; Wang et al., 2013; cited in Düzgün& Ünal, 2022).

According to the last finding of our research, it was seen that there is a positive and significant relationship between the deep learning approach and SROL skills. Self-regulated learning includes the cognitive strategies that the individual uses to realize cognitive processes such as remembering and understanding, the metacognitive strategies they use to plan, monitor, and regulate these cognitive processes, the actions they take to control and manage their performance in academic tasks, and their motivations that act as catalysts in realizing all these processes (Pintrich & De Groot, 1990). The deep learning approach, on the other hand, is expressed as the tendency to be willing to learn, to interact intensively with the content, to link previous information with newly learned information, to associate concepts with daily experiences, and to examine the logic of the subject (Byrne, Flood & Willis, 2001).

The fact that students adopt the deep learning approach reveals that they aim to understand the learning material in depth and show an interest in and active participation in their studies (Senemoğlu, 2011). In addition, Marshal & Case (2005; cited in Karataş, 2021) state that there is a clear relationship between deep learning approaches and metacognitive activities. The deep learning approach requires employing metacognitive features such as self-assessment, self-questioning, identifying mistakes, and considering options and limitations of ideas. The deep learning approach focuses on high-level cognitive activities such as questioning, connecting, detecting, and problem-solving, as well as understanding in learning. Inevitably, the quality of learning for students who perform these activities in the learning process will increase (Durdukoca, 2013).

As is known, the main factors that determine self-regulated learning and learning approaches consist of motivation and strategies. Motivation refers to why students want to learn, and strategy refers to how they learn (Ellez & Sezgin, 2002). How students plan their study process and the tactics they use while working are seen as part of learning strategies (Çolak, 2006). It is expected that the qualities of the deep learning approach in terms of motivation and strategies will affect self-regulated learning. Both the deep learning approach and self-regulated learning require the active participation of the learner in the learning process. Examining the variables related to the deep learning approach in the literature, the deep learning approach and self-efficacy beliefs (Ekinci 2015), academic success (Ekinci, 2009), teaching-learning environment perception (Ekinci, 2009); intelligence scores (Premuzic & Furnham, 2008); self-esteem (Abouserie, 1995); intrinsic motivations (Entwistle, Mccune & Hounsel, 2002) are found to have positive and significant relationships. Therefore, due to the consistency of the results of this study with the mentioned studies, it is thought that the variables related to self-regulated learning are also related to the deep learning approach.

According to the findings obtained from the research, the following suggestions can be made.

SROL environments are important in ensuring effective learning, as they make the learner autonomous. Based on the research findings, it is important to take measures to develop online self-regulated learning skills in higher education programs. In particular, opportunities should be created for students to set goals for themselves in their learning processes and to evaluate their progress in the process and at the end. It is thought that the use of methods that will enable students to adopt self-regulation and deep approach in learning environments for online or distance learning students will increase the quality of learning outcomes. In terms of future research, it is thought that experimental testing of the effects of SROL by making interactive applications that support the deep learning approach will contribute to the literature.

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Preschool Teachers' Technology Use: Attitudes and Perceptions of Self-Efficacy

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ABSTRACT

This study seeks to determine the perceptions of technology self-efficacy and attitudes toward using technological equipment among preschool teachers. In this investigation, a sequential explanatory mixed method was employed. The primary participant group was selected using convenience sampling, whereas the subsample group was selected using maximum variation sampling. Participants included 118 teachers from nationwide preschool education organizations affiliated with the Ministry of National Education (MoNE). The Use of Technology in Early Childhood Education Questionnaire (Blackwell et al., 2013), the Self-efficacy Scale of Technology Usage in Education [SECTUE] (Doğru, 2017), and the Attitude Scale for the Use of Technological Equipment in Preschool Education [ASUTEP] (Kol, 2012) were utilized as quantitative data collection instruments. The researchers created a semi-structured interview form to collect qualitative data. Most teachers have a favorable view of the use of technology in preschool education and a high level of self-confidence in using technology. The study's quantitative findings indicate that variables such as gender, professional experience, type of organization, school district, education level, and the school's technology policy do not affect preschool teachers' attitudes toward technology and their perceptions of self-efficacy. In contrast, age and education level significantly affect attitudes and self-efficacy, respectively. Additionally, there is no correlation between attitude and self-efficacy. Preschool teachers often highlighted the need for a smart board as a technological inadequacy. The elimination of this weakness is thought to enhance teacher motivation. Furthermore, educators expressed the need to integrate innovative technologies in preschool environments. Teachers' willingness to use technology in their classrooms, positive attitudes, and self-efficacy perceptions are indicators that teacher support can be provided in the process of technology integration in preschool education.

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INTRODUCTION

Preschool education, also known as early childhood education, is one of life's pillars and spans from birth to age six (Karoğlu & Ünüvar, 2017). During this time, the child's cognitive, social, emotional, physical, and linguistic development is substantially complete, and their personality and moral development take shape (Aral et al., 2006; Barnett, 1995; MoNE, 2013). Preschool education is a developmentally appropriate process that provides a stimulating environment, imparts cultural values, and considers individual differences (Taşkın et all., 2014). The richer the stimuli in the preschool environment and the more diversified the experiences offered to the child, the faster the child develops, the more learning experiences they have, and the more lifelong learning gains they can achieve (Barnett, 2011). In today's era of information and communication, children are exposed to technological devices at a young age, and technology is frequently used in environments with various stimuli (Christakis & Garrison, 2009). In today's world, where technology has become an integral part of children's daily routines, it is frequently stated that technology should be used consciously (Kol, 2012). It is crucial to determine whether the time children spend with technology and the content and quality of their communication are appropriate (Christakis & Garrison, 2009).

Children may have challenges in adequately utilizing the technological equipment offered to them in a meaningful way, demanding the guidance and support of an adult. It can contribute to their learning if adults adequately meet these needs (Plowman at all., 2010). Teachers play a crucial function in this respect. Considering the amount of time children spend in school, teachers must have an adequate understanding of technology, select the appropriate technological devices for classroom use, and be able to guide children's interest in technology appropriately (Metin, 2008). Teachers with experience with technology create a more effective learning environment in the classroom and can utilize technological devices more effectively (Anastasiades & Vitalaki, 2011). According to Blackwell et al. (2000), teachers who have cultivated these skills are likelier to incorporate student-centered education into their curriculum.

According to Simsar and Kadim (2017) and Gök et all. (2011), teachers hold divergent views regarding the use of technology in the educational setting. Teachers can integrate technology into educational environments at varying intervals, frequencies, and course levels. McMurtry and Burkett (2010) examined teachers' diverse approaches to technology use, their attitudes toward technology use, their integration of technology into educational initiatives, and their use of technology in the classroom. If effective use of technology in classrooms is desired, teachers must better their technology skills, stay abreast of current developments in their fields, and incorporate contemporary approaches into their lessons (Sak et all., 2016). Notably, teachers who integrate technology into classroom practices (Simon et all., 2013) utilize technological devices as educational support materials and instruments for independent learning (Inan & Lowther, 2010). To integrate technology into the classroom and use it healthily, teachers must support the process and provide children with opportunities to learn with technology (Blum & Parette, 2015). According to Doğru et all. (2017), teachers' negative attitudes and low self-efficacy beliefs negatively impact their use of technology. Determining preschool teachers' attitudes and self-efficacy perceptions regarding their use of technology in educational environments is crucial for effective technology integration.

This study seeks to determine the attitudes and self-efficacy beliefs of preschool teachers regarding the use of technology in the classroom. In addition to analyzing teachers' attitudes toward technology and self-efficacy beliefs regarding demographic variables, this study examines their perspectives on technology and self-efficacy. Using a mixed method in which quantitative and qualitative data are analyzed, the study also seeks to contribute current findings with diverse data to the existing body of research. To these objectives, the following are the research questions:

- What do teachers think of the use of technology in preschool classes?

- What are preschool teachers' attitudes toward using technological instruments in the classroom and their levels of technology self-efficacy?
- Is there a relationship between preschool teachers' attitudes toward using technological equipment in the classroom and their technology self-efficacy beliefs?
- How do preschool teachers' demographics, such as level of education, professional experience, technology policy in educational organizations, and in-service training, affect their attitudes towards using technological tools in the classroom and their self-efficacy beliefs towards technology?
- What concepts emerged from teachers' semi-structured interviews regarding the use of technology in preschool education?

BACKGROUND

Utilizing Technology in Preschool Education

Preschool education encompasses the most vital years of a child's existence and is characterized by providing rich stimuli and support for all areas of development (Alabay, 2020). During this period, a flexible, play-based educational approach suited to each child's unique developmental characteristics should be implemented (MoNE, 2013). In addition, Oğuzkan and Oral (1983) noted that during this period, children experience the most rapid growth in all developmental areas and complete most of their personality development. In preschool education, it is crucial to plan this period's education so that parents and teachers can support children's healthy development, observe their skills and interests, and guide them (Fidan & Erden, 1998).

Preschool education must emphasize the cognitive, social, psychomotor, and physical development domains (Kurnaz & Özyürek, 2019). However, the extent to which technology supports these developmental areas is contested in the literature (Van Scoter Ellis & Railsback, 2001). Multiple studies have demonstrated, for instance, that technology can positively affect children due to its numerous interaction possibilities (Behnamnia et all., 2023; Umarova, 2023; Yang et all., 2022). However, if not used properly, it can negatively affect brain development (American Academy of Pediatrics Council on Communications and Media [AAP], 2016). According to Clements and Nastasi (1993), children between the ages of 2 and 7 can use computer applications suited to their developmental characteristics, but adult support is still necessary. During the preschool years, using technology with adult support can increase children's interaction and contribute to cooperation (Ching et al., 2009; Doggett, 2014; Gedik et all., 2017; Lim, 2012). The potential of conscious technology use under the guidance or supervision of parents or teachers to contribute to the development of preschool-aged children is not to be ignored (Buckleitner, 2009).

Before teachers can implement technological change in educational settings, they must accept change (Fullan, 2007). For effective use of technology in education, teachers should prioritize children's development and implement technologies suited to children's developmental characteristics in the classroom (Rosen & Jaruszewicz, 2009). The increase in technological devices used in preschool educational environments necessitates that teachers acquire specific skills to utilize these devices effectively (Dong, 2018). For instance, while teachers' self-efficacy in the use of technology influences their use of technology in the classroom (McMurtry & Burkett, 2010), the training they receive also influences their self-efficacy perceptions regarding technology (Aral et al., 2006; Blackwell et al., 2013). In addition, the teacher's attitude toward technology in the educational environment affects the integration of education and technology (Jack & Higgins, 2019). Teachers with a positive attitude toward technology can utilize it in all aspects of their lives (Sincar & Aslan, 2011).

Technology Self-Efficacy

Bandura (1997) defined self-efficacy as a person's perception of their capacity to organize the activities required to perform at a certain level and effectively complete them. Individuals with high self-efficacy perception about a subject perceive this situation as a task to be overcome when they encounter any difficulty in that subject (Göçer & Türkoğlu, 2018). Self-efficacy perception significantly influences all individual behaviors, including task completion and achieving goals (Maddux, 2016). For this reason, tools for measuring general self-efficacy perception (Aypay, 2010; Schwarzer & Jerusalem, 1995) and particular purpose measurement tools such as educational software development (Aşkar & Dönmez, 2004), science education (Bıkmaz, 2002), and mathematics and computer self-efficacy perception (Işıksal & Aşkar, 2003) have been developed. Among these are the technological self-efficacy beliefs designed for teachers. The scale (Doğru, 2017) provides the opportunity to measure a teacher's self-confidence in this domain, which is one of the critical elements of effective technology integration. Because technology is an integral part of life, the use of technology in education and the integration of education and technology have become mandatory. Teachers must have high technology self-efficacy beliefs to utilize technology effectively in the classroom (Lee & Tsai, 2014). Teachers' high self-efficacy beliefs increase their potential to integrate technology into educational environments (McCown & Roop, 1999). According to Sanders and Morrison (2001), teachers with low self-efficacy beliefs regarding technology are more hesitant to use technology in the classroom and incorporate technology into their programs to the extent of their confidence. Few studies have been conducted to ascertain teachers' self-efficacy perceptions of technology in preschool education and to examine its effects despite its significance. For instance, Yılmaz et all., (2016) conducted a study involving 174 preschool teachers in Balıkesir. According to the findings of the study, the gender, professional experience, and educational background of the participants did not influence their perceptions of self-efficacy. The study also discovered a weakly positive and statistically significant correlation between participants' self-efficacy beliefs and their attitudes toward using technological instruments in preschool education. In their study with 141 participants, including preschool teachers and pre-service teachers, Deniz and Avcı (2023) concluded that self-efficacy perception towards information communication technologies significantly predicted self-efficacy perception toward technological pedagogical content knowledge.

Attitude towards Technology Use

Attitude is an individual's tendency to respond relatively positively or negatively to any concrete or abstract object that has meaning for him/her and that he/she is aware of (Ustaahmetoğlu, 2013). Teachers' attitudes towards technology can be considered their tendency to use it in their classrooms. Considering the positive relationship between attitude and behavior (Bandura, 1986), it is crucial to determine teachers' perceptions and analyze the variables affecting this perception for effective technology integration. Teachers' positive attitudes towards technology affect the effective use of technology and play a role in children's positive attitudes towards technology (Çelik & Bindak, 2005). In addition, one of the factors of teachers' positive attitudes toward their profession is their ability to use technology in their classrooms (Usta & Korkmaz, 2010). There are various studies on the subject in the literature. In a study of 303 preschool teachers working in İstanbul province, Gülen and Kaya (2023) found that teachers' attitudes toward using technology tools and equipment varied by gender, age, school type, and education level but not by variables such as the type of university from which they graduated or professional experience. Çörekci (2020) investigated the perspectives of 180 preschool teachers and prospective teachers regarding the use of technology in music education. The research concluded that gender, age, experience, region, type of institution, instrument performance, and perception of competence in using technology in music education did not affect attitudes toward its use.

METHOD

Research Design

The sequential explanatory mixed method was used to analyze quantitative and qualitative data one after the other in this study. Mixed methods are preferred because they enhance the diversity of research analysis by combining quantitative and qualitative data (Fraenkel et all., 2012). In this study, following the suggestion of Fraenkel et al. (2012), the researchers initially collected and analyzed quantitative data, accompanied by the gathering and analysis of qualitative data. Subsequently, the results section combined both the quantitative and qualitative findings.

Participants

During the academic year 2021-2022, 118 teachers from preschool education institutions participated in the study (Table 1). The teachers affiliated with the MoNE from the provinces of Ankara, Ağrı, Antalya, Bartın, Giresun, İstanbul, İzmir, Kars, Malatya, Yozgat, and Van who agreed to complete the online form were announced through official channels and social media. To ascertain this primary participant group, one of the non-random sampling methods, convenience sampling, was employed (Büyükoztürk et all., 2020).

Table 1. *Demographics of participants*

Variable	Category	f	%
Gender	Female	113	95.8
	Male	5	4.2
Age	20-29	52	44.1
	30-39	40	33.9
	40-49	20	16.9
	50-59	6	5.1
Education level	High School	3	2.5
	College	25	21.2
	Undergraduate	77	65.3
	Graduate	13	11
Experience	0-5	33	28
	6-10	26	22
	11-15	43	36.4
	16-20	9	7.6
	20+	7	5.9
Organization	Public school	76	64.4
	Private school	42	35.6
School district	Urban	107	90.7
	Rural	11	9.3

Maximum variation sampling was used to create a subsample group from the entire participant population (Büyükoztürk et al., 2020; Fraenkel et al., 2012). Upper and lower categories were identified using the arithmetic mean and standard deviation (Fraenkel et al., 2012). In this study, those above the mean and standard deviation values for both measures comprised the upper group, while those below the mean and standard deviation values comprised the lower group. A subsample group was established by identifying the participants with the highest and lowest scores. The SECTUE subgroup comprised 10 participants (Table 2), while the ASUTEP subgroup contained 8 participants (Table 3). The ages of the participants in the SECTUE subsample ranged from 20 to 29, 30 to 39, and 40 to 49, and there were nine women and one male in the group. Their professional experience ranged from 0 to 5 years, 6 to 10 years, 11 to 15 years, and 16 to 20 years, and they held college, undergraduate, and graduate degrees. The teachers of the upper group were coded as T-high, while those of the lower group were coded as T-low.

Table 2. *Demographics of SECTUE subgroup*

Teachers	Age	Gender	Education Level	Experience	SECTUE Scores
T-high1	30-39	F	undergraduate	6-10	240
T-high2	30-39	F	undergraduate	11-15	240
T-high3	30-39	F	undergraduate	11-15	240
T-high4	30-39	F	graduate	0-5	239
T-high5	20-29	F	undergraduate	16-20	238
T-low1	40-49	M	undergraduate	11-15	105
T-low2	20-29	F	undergraduate	0-5	109
T-low3	30-39	F	college	11-15	117
T-low4	40-49	F	undergraduate	11-15	125
T-low5	40-49	F	graduate	16-20	133

The subsample group from which the ASUTEP data were collected consists of eight teachers whose ages range between 20-29, 30-39, and 40-49 and consists of seven women and one male. The participants, whose professional experience ranged from 0 to 3, 6 to 10, and 11 to 15 years, held seven undergraduate degrees and one graduate degree.

Table 3. *Demographics of ASUTEP subgroup*

Teachers	Age	Gender	Education Level	Experience	ASUTEP Scores
T-high1	20-29	F	undergraduate	0-5	85
T-high2	20-29	F	undergraduate	6-10	83
T-high3	30-39	F	undergraduate	11-15	83
T-high4	20-29	M	undergraduate	0-5	83
T-low1	40-49	F	undergraduate	11-15	40
T-low2	20-29	F	undergraduate	0-5	60
T-low3	20-29	F	graduate	0-5	65
T-low4	30-39	F	undergraduate	6-10	66

Data Collection Instruments

Technology in Early Childhood Questionnaire

The Technology in Early Childhood Questionnaire (TECQ) created by Blackwell et all. (2013) was translated into Turkish by Omrüuzun (2019) with two early childhood education experts and a language expert. The questionnaire includes questions regarding the frequency with which teachers utilize technology, their technological instruments, their views on the use of technology in the classroom, and their technology training.

Self-Efficacy Scale of Technology Usage in Education

The Self-Efficacy Scale of Technology Usage in Education (SECTUE), developed by Doğru (2017), includes 48 items, and is measured on a five-point likert scale. The fit index values were computed as follows: X2=1114.22, NFI=0.97, RFI=0.97, CFI=0.98, GFI=0.75, AGFI=0.71, IFI=0.98, and RMSEA=0.073. The factor loadings of the items exhibited a range of 0.35 to 0.91. Based on the findings from both exploratory and confirmatory factor analyses, it can be stated that the scale items demonstrated a satisfactory level of fit. The Cronbach Alpha coefficient for internal consistency was computed to be 0.935 over the entirety of the scale.

Attitude Scale for the Use of Technological Equipment in Preschool Education

The Attitude Scale Towards the Use of Technological Equipment in Preschool Education (ASUTEP), as Kol (2012) devised, comprises 20 items and follows a five-point Likert scale. The researchers assessed the fit of the scale for conducting factor analysis by utilizing the Kaiser-Meyer Olkin (KMO) coefficient, which yielded a value of 0.89. The Barlett Sphericity test was employed, resulting in a value of 0.00. The scale used in this study was determined to be suitable for factor analysis based on the item factor loadings, which ranged from 0.481 to 0.787. Additionally, the scale's reliability was assessed using Cronbach's Alpha coefficient, which yielded a value of 0.92.

Semi-structured Interview Form

The semi-structured interview form developed by the researchers and used to obtain qualitative data consists of four questions. The development of semi-structured interview forms adhered to the recommendations outlined by Galletta (2013). The opinions of two faculty members who are experts in early childhood education and technology and one language expert were solicited, and arrangements were made to construct the final form. The questions in the form, which has an application time of 20-30 minutes, are as follows: "How do you use technological equipment in your classroom?"; "What do you think about using technology in the classroom? How do you think your attitude towards technology affects your use?"; "For what purposes do you use technology in the classroom?"; "To what extent do you consider yourself competent in incorporating technology into your classroom?".

Data Collection Process

The study's data collection procedure consisted of two phases. Using TECQ, ASUTEP, and SECTUE, quantitative data were collected online from 118 preschool teachers in the first stage. In the second stage, the ASUTEP and SECTUE scores were ordered from highest to lowest. Ten participants with five high and five low scores on the SECTUE scale, eight with four high and four low scores on the ASUTEP scale, and 18 participants in total formed a subsample. The researcher conducted semi-structured face-to-face interviews with this group to collect and analyze qualitative data.

Data Analysis

The quantitative data analysis in this study was conducted using SPSS (Statistical Package for the Social Sciences). The statistical significance level for quantitative data analysis was set at 0.05. The scales used in the data group were subjected to reliability and normality analysis, and the appropriate statistical tests were identified (Table 4).

Table 4. *Analysis of reliability and Kolmogorov-Smirnov (K-S) normality*

Scale	Cronbach's Alpha (α)	K-S (p)
ASUTEP	0.90	.010
SECTUE	0.96	.000

It is recognized that the scale data are highly reliable ($\alpha>0.80$), and the K-S test results indicate that the scale data show a normal distribution ($p<0.05$). As a result, nonparametric methods were employed in the analyses of the scales. The Mann-Whitney U analysis compared scale scores based on two categories of variables. The Kruskal Wallis H test was used to compare scale scores from multiple categories. If the Kruskal Wallis H test indicated a significant difference between the groups, the Mann-Whitney U test was used to determine the difference between which groups. Spearman Correlation analysis was used to examine the relationship between the scale scores. Qualitative data was examined using content analysis. In content analysis, frequently occurring and interrelated concepts in the data are grouped and interpreted based on shared characteristics. (Fraenkel et al., 2012).

Ethic

The ethics committee of the Gazi University Ethics Commission approved the study with the research code number 2022-653. Participants who accepted the "Participant Volunteering Form" were informed that their participation in the study was voluntary and that their information would be used anonymously by the researcher alone.

FINDINGS

Preschool Teachers' Perspectives on the Use of Technology in Education

Utilized Technologies in the Classroom and Frequency of Use

Internet (52.5%), smartphone (46.6%), and camera (40.7%) were the technologies used daily and most frequently, while the technologies not used were the smart board (61.9%), camera (33.1%), smartphone (27.1%), computer (12.7%), and internet (11.9%) (Table 5). Although it is recognized that technology is utilized as much as possible, computers (18.6%), smartphones (13.6%), and internet (10.2%) are not utilized despite having ample access.

Table 5. *Utilized technologies in the classroom and frequency of use*

		No access	have access but do not use it	Every two to three months	Once a month	2-3 times a month	Once a week	3-4 times a week	Every day
Computer	f	15	22	7	1	5	10	11	47
	%	12.7	18.6	5.9	0.8	4.2	8.5	9.3	39.8
Internet	f	14	12	5	1	3	9	12	62
	%	11.9	10.2	4.2	0.8	2.5	7.6	10.2	52.5
Camera	f	39	4	5	0	3	6	13	48
	%	33.1	3.4	4.2	0.0	2.5	5.1	11.0	40.7
Smart Board	f	73	7	4	1	5	5	5	18
	%	61.9	5.9	3.4	0.8	4.2	4.2	4.2	15.3
Smartphone	f	32	16	1	2	2	3	7	55
	%	27.1	13.6	0.8	1.7	1.7	2.5	5.9	46.6

Teachers' Confidence in the Technologies They Utilize

Teachers are generally accepted to be confident in their ability to utilize technology in the classroom (Table 6). Internet (83.9%), computer (83.1%), camera (79.7%), smartphone (77.9%), and smart board (75.4%) are the technologies that teachers are confident in using, whereas smartphone (13.5%), computer (12.7%), internet (12.7%), camera (9.3%), and smart board (9.3%) are the technologies that teachers are not confident in using.

Table 6. *Teachers' confidence in the technologies they utilize*

		I do not confident at all	I do not confident	Undecided	I am confident	I am very confident
Computer	f	7	8	5	61	37
	%	5.9	6.8	4.2	51.7	31.4
Internet	f	6	9	4	59	40
	%	5.1	7.6	3.4	50.0	33.9
Camera	f	6	5	13	57	37
	%	5.1	4.2	11.0	48.3	31.4
Smart board	f	6	5	18	53	36
	%	5.1	4.2	15.3	44.9	30.5
Smartphone	f	5	11	10	49	43
	%	4.2	9.3	8.5	41.5	36.4

Technologies Employed in Classroom Activities

Most teachers use technology in their classrooms for all activities except the smart board (65.3% do not use it) (Table 7). The activities that utilized technology the most were field trips (13.4%), movement (11%), and music (10.1%), whereas the activities that utilized technology the least were

literacy preparation (0%), Turkish (0.8%), games (1.6%), and science education (3%).

Table 7. *Technologies employed in classroom activities*

		Not using	Field trips	Drama	Science	Movement	Math	Music	Literacy prep.	Game	Art	Turkish	All activities
Computer	f	37	1	2	0	4	0	2	0	0	1	1	70
	%	31,4	0.8	1.7	0	3.4	0	1.7	0	0	0.8	0.8	59.3
Internet	f	19	1	2	0	6	0	7	0	0	2	0	81
	%	16,1	0.8	1.7	0	5.1	0	5.9	0	0	1.7	0	68.6
Camera	f	37	10	2	1	1	0	0	0	1	1	0	65
	%	31,4	8.5	1.7	0.8	0.8	0	0	0	0.8	0.8	0	55.1
Smart board	f	77	1	0	2	0	2	1	0	0	0	0	35
	%	65,3	0.8	0	1.7	0	1.7	0.8	0	0	0	0	29.7
Smartphone	f	51	3	0	1	2	0	2	0	1	1	0	57
	%	43,2	2.5	0	0.8	1.7	0	1.7	0	0.8	0.8	0	48.3

Opinions Regarding Technology Use in Education

Most teachers (44,1 %) stated that the optimal time to introduce technology to preschoolers is between 49 and 72 months (Table 8). According to 38.1% of teachers, the optimal age range is between 0 and 48 months, while 17.8% cite early childhood. In addition, 89.8% of the teachers stated that educators use technology and interactive media appropriately, while 4.2% disagreed and 5.9% were unsure.

Table 8. *Opinions regarding technology use in education*

Opinions	Category	f	%
The optimal age to introduce kids to technology	0-48 month	45	38.1
	49-72 month	52	44.1
	early childhood	21	17.8
Early childhood educators' use of technology and interactive media that is appropriate	I agree	106	89.8
	I disagree	5	4.2
	Undecided	7	5.9

The Receiving Technological Training by Educators

While 38.12% of teachers reported receiving training on the use of technology in education during their undergraduate studies, 61.9% emphasized that they did not. Table 9 shows that 10.2% of respondents did not receive technology-related professional development training, 55.1% received individual training, 16.9% received online training, and 17.8% received assistance from a colleague. 66.9% of teachers reported that their institutions did not provide in-service training on the use of technology in education, 14.4% reported that in-service training was provided several times a year, 7.6% once a year, 6.8% once every two to three years, and 4.2% once a month. In addition, 45.8% of teachers emphasized that their school has a technology use policy, while 54.2% emphasized that their school does not have a technology use policy.

Table 9. *Training offered by teachers regarding the use of technology*

Variable	Category	f	%
Status of undergraduate education	Yes	45	38.1
	No	73	61.9
Participation in professional development training related to technology	No	12	10.2
	Individual	65	55.1
	Online	20	16.9
	Assistance from a trainer	21	17.8
Frequency of in-service training in the organization	None	79	66.9
	Every two to three years	8	6.8
	Once a year	9	7.6
	A few times a year	17	14.4
	Once a month	5	4.2
The school's technology policy	Yes	54	45.8

	No	64	54.2

Preschool Teachers' Attitudes Regarding the Use of Technological Equipment in Education

It is seen that preschool teachers' attitudes towards the use of technological equipment are above the average score that can be determined from the scale (Table 10). In this case, the participants favor using technological instruments in the classroom.

Table 10. *Descriptive statistics of teachers' ASUTEP scores*

Scale	N	Min	Max	X	S
ASUTEP	118	40	85	74.34	5.45

Preschool Teachers' Self-Efficacy Perceptions Towards the Use of Technology in Education

Preschool teachers' self-efficacy regarding technology use in education is believed to exceed the scale's mean score (Table 11). The finding shows that the participants' perceptions of technological self-efficacy are positive.

Table 11. *Descriptive statistics of teachers' SECTUE scores*

Scale	N	Min	Max	X	S
SECTUE	118	105	240	191.98	29.56

The Correlation Between Preschool Teachers' Technology Self-Efficacy Beliefs and Attitudes Towards the Use of Technological Equipment

Table 12 demonstrates no correlation between teachers' attitudes toward the use of technological instruments and their self-efficacy regarding the use of technology in education ($p>0.05$).

Table 12. *Correlation between preschool teachers' ASUTEP and SECTUE scores*

Scale	r	p
ASUTEP SECTUE	.092	.324

The Effects of the Demographics of Preschool Teachers on Attitudes Towards the Use of Technology in Education and Self-Efficacy Beliefs

According to Gender

There is no statistically significant difference between teachers' attitudes toward the use of technology in education and their self-efficacy levels according to their gender ($p>0.05$).

Table 13. *Statistics regarding preschool teachers' ASUTEP and SECTUE scores by gender*

Scale	Gender	N	X	S	U	p
ASUTEP	Female	113	151.97	24.84	275.5	.925
	Male	5	143.00	53.32		
SECTUE	Female	113	192.59	28.61	244.5	.612
	Male	5	178.20	48.98		

According to Age

The attitudes of preschool teachers toward the use of technology in education differ significantly with age ($p<0.05$) (Table 14). The attitudes of teachers aged 50 to 59 are significantly lower than those of all other age groups. However, it is also recognized that age does not significantly affect teachers' perceptions of their technological self-efficacy ($p>0.05$).

Table 14. *Statistics regarding preschool teachers' ASUTEP and SECTUE scores by age*

Scale	Age	N	X	S	x^2	p	Difference
ASUTEP	20-29	52	155.92	24.44	8.2	.043	1>4, 2>4, 3>4
	30-39	40	151.53	23.18			
	40-49	20	149.75	31.99			
	50-59	6	120.67	25.48			
SECTUE	20-29	52	194.29	30.16	4.5	.209	-
	30-39	40	193.98	25.94			
	40-49	20	190.25	32.64			
	50-59	6	164.50	29.47			

According to Educational Levels

Table 15 demonstrates that teachers' attitudes and self-efficacy regarding technology use in education differed significantly by educational level ($p<0.05$). The self-efficacy and attitude levels of graduate degree participants are statistically significantly higher than those of college and undergraduate participants.

Table 15. *Statistics regarding preschool teachers' ASUTEP and SECTUE scores by education level*

Scale	Education Level	N	X	S	x^2	p	Difference
ASUTEP	High School	3	156.67	6.81	12.6	.006	2<4, 3<4
	College	25	145.48	32.19			
	Undergraduate	77	149.61	24.30			
	Graduate	13	173.92	16.46			
SECTUE	High School	3	202.00	5.00	14.5	.002	2<4, 3<4
	College	25	182.48	33.97			
	Undergraduate	77	190.03	27.29			
	Graduate	13	219.54	20.76			

According to Professional Experience

As shown in Table 16, there is no statistically significant difference between teachers' attitudes toward the use of technology in education and their self-efficacy beliefs based on their professional experience ($p>0.05$).

Table 16. *Statistics regarding preschool teachers' ASUTEP and SECTUE scores by professional experience*

Scale	Experience	N	X	S	x^2	p
ASUTEP	0-5	33	158.88	26.79	3.0	.393
	6-10	26	151.50	17.40		
	11-15	43	149.23	29.19		
	16-20	9	148.00	25.13		
	20+	7	136.71	31.28		
SECTUE	0-5	33	198.61	31.59	1.7	.637
	6-10	26	191.31	24.04		
	11-15	43	189.42	31.01		
	16-20	9	189.56	29.36		
	20+	7	182.14	31.89		

According to the Type of Organization

According to Table 17, there is no statistically significant difference between teachers' attitudes toward the use of technology in education and their self-efficacy levels based on the type of organization for which they work ($p>0.05$).

Table 17. *Statistics regarding preschool teachers' ASUTEP and SECTUE scores by the type of organization*

Scale	Type of Organization	N	X	S	U	p
ASUTEP	Public	76	153.66	26.45	1384.5	.234
	Private	42	147.86	25.90		
SECTUE	Public	76	195.59	29.13	1268.5	.066

Private	42	185.45	29.55	

According to the School District

Table 18 indicates no statistically significant difference between teachers' attitudes toward the use of technology in education and their self-efficacy beliefs based on the region of the school where they work (p>0.05).

Table 18. *Statistics regarding preschool teachers' ASUTEP and SECTUE scores by the school district*

Scale	School District	N	X	S	U	p
ASUTEP	Urban	107	150.79	26.73	488.5	.354
	Rural	11	159.36	21.01		
SECTUE	Urban	107	190.79	29.76	457.5	.225
	Rural	11	203.64	25.95		

According to the Receiving Training on Using Technology in Undergraduate Education

Table 19 demonstrates no statistically significant difference between attitudes toward the use of technology in education and beliefs of self-efficacy based on teachers' training in the use of technology during their undergraduate education (p>0.05).

Table 19. *Statistics regarding preschool teachers' ASUTEP and SECTUE scores by receiving training*

Scale	Training	N	X	S	U	p
ASUTEP	Yes	45	151.42	30.36	1576.5	.714
	No	73	151.70	23.67		
SECTUE	Yes	45	194.80	32.26	1415.5	.208
	No	73	190.25	27.86		

According to the School's Technology Policy

Table 20 reveals no statistically significant difference between teachers' attitudes toward the use of technology in education and their self-efficacy beliefs based on whether their school has a technology policy (p>0.05).

Table 20. *Statistics regarding preschool teachers' ASUTEP and SECTUE scores by the school's technology policy*

Scale	Technology Policy	N	X	S	U	p
ASUTEP	Yes	54	151.39	28.16	1677.5	.785
	No	64	151.77	24.83		
SECTUE	Yes	54	190.76	31.35	1699.0	.875
	No	64	193.02	28.17		

Emerging Concepts from Semi-structured Interviews

The study aimed to supplement the teacher's responses to the questionnaires and scales with qualitative data and expand the analysis. In order to determine teachers' perspectives on the use of technology in the classroom, four-question semi-structured interviews were conducted. Teachers with high scores on the attitude scale were coded as TA-high, and those with low scores were coded as TA-low; those with high scores on the self-efficacy scale were coded as TSE-high, and those with low scores were coded as TSE-low. Table 21 outlines the concepts that emerged from the semi-structured interviews.

Table 21. *Emerging concepts from semi-structured interviews*

Context	High Group Concepts	Low Group Concepts
Using technology in the classroom	Active learning Concrete Experience Visualization Instant Feedback	Embodiment Diversity in activities
Teacher attitudes towards technology use	Self-confidence Knowledge of technology use Experience	Embodiment Diversity in activities
Purpose of using technology	Concrete learning Activity types Activating curiosity	Visual awareness Diversity of methods and techniques
Confidence in the use of technology (self-efficacy)	Active engagement Technological opportunities Material support Experience	Material deficiency

The query "How do you use technological tools in your classroom?" was asked of teachers. Teachers in the high group emphasized active learning, concrete experience, visualization, and instant feedback, whereas teachers in the low group emphasized concretization and diversity in activities. The following are some statements made by teachers:

> TSE-high1: We must arrange our activities accordingly in order to guarantee that students learn for life through the activities we conduct in the classroom. We specifically offer activities in which youngsters will be more involved. Technological tools can help us visually express the subject we are working on that day. As a result, we make it concrete. This also increases children's participation.

> TA-low4: We live in a technological age. At home, every child has easy access to modern devices. To make a difference at school, we now incorporate lessons into our activity plans that allow students to participate more actively and concretize abstract topics. We may also broaden our horizons by utilizing smartphones, smart boards, and the internet. With rapid feedback, we can determine whether they understand the content and increase involvement.

Participants were asked, "What are your thoughts on using technology in the classroom? How do you believe your perspective on technology impacts your use of technology? Teachers in the upper group expressed self-confidence, experience, and knowledge of technology use, whereas teachers in the lower group expressed insufficient knowledge and an incapacity to acquire materials. Some teacher statements include the following:

> TA-high2: We do not always use technology in the classroom. It cannot be adapted to every activity. We are increasingly willing to use our phones and computers in class. Because we have more experience with them. We are not excited when new technology equipment arrives or is seen if we need to learn how to use it. Using technology should be valuable for our efforts as well.

> TSE-low3: I am optimistic about technology. When used correctly, I feel it can be incredibly beneficial to kids. Technology can be used to draw children's attention during activities and playtime. However, we are limited in materials in our class. We can only use our phones. Our usage area is limited when materials are few.

In response to the question, "Why do you use technology in the classroom?" teachers in the upper group highlighted the concepts of concrete learning, arousing curiosity, and types of activities, whereas teachers in the lower group emphasized the concepts of visual awareness and diversity of methods and techniques. Some teacher statements include the following:

> TSE-high5: Because children have a short attention span and a limited ability to comprehend

abstract concepts, we believe it is necessary to concretize the concepts we aim to teach in the classroom. We can depict these notions using technology. This allows us to hold children's attention for extended periods.

TA-low1: When completing arithmetic tasks in the classroom, showing rather than explaining the ideas of light and heavy makes learning more persistent. We boost their visual perception by doing so. We apply several ways in the activities at the same time. We provide diversity by utilizing technological resources rather than merely paperwork.

Teachers were asked, "To what extent do you consider yourself competent at incorporating technology into the classroom?". The teachers in the upper group concurred on the concepts of active participation, technological possibilities, material support, and experience, whereas the teachers in the lower group mentioned a lack of materials. Some teacher statements include the following:

TA-high3: Technology is now present in every aspect of our daily existence. It is nearly hard to do anything apart from it. The employment of technology in our classrooms is unavoidable. We employ devices such as phones, tablets, and computers in reading and math exercises. Of course, first and foremost, you must understand how to use them. For example, we teach children number concepts by picturing them on the smart board. Participation is increasing. We are having more fun. We can play a variety of songs and games. We have a basic knowledge of how to use them. If we teachers are trained in this area, we can undertake more different activities if we have advanced technological experience.

TSE-low4: Normally, I am more at ease with the technological tools we utilize in class. I analyze them in the evening, gather the needed materials, and present them in the classroom the following day. I believe that the greater the diversity in line with the possibilities, the more excellent the retention in learning. Unfortunately, not all classrooms in our country have equal access to technology. The lack of materials also indicates educational disparities. Everyone uses the same program but does not employ the same methods or materials to present the exercises. I am confident that if smart boards were installed in every classroom and teachers were taught how to use them, teacher retention would increase even further.

RESULTS AND DISCUSSIONS

Most preschool teachers are assumed to be open to incorporating technology into their classrooms. Internet, smartphones, and cameras were the technologies they utilized the most, but they highlighted the smart board the most. There are some findings in the literature that there are problems in the distribution (İdin & Dönmez, 2016) and use (Somyürek et all., 2009) of smart boards. Teachers in the upper group stated that they use technology in the classroom due to its benefits in active learning, concretization, activating curiosity, visualization, and feedback processes, whereas teachers in the lower group stated that they use technology due to its contribution to the diversity and concretization processes. Almost all participants noted that learning with technology is more permanent, emphasizing the significance of incorporating technology into educational settings. It is generally accepted that most teachers feel comfortable integrating technology into their lessons. Internet, computers, cameras, and smartphones are the primary technologies they employ confidently. Furthermore, semi-structured interviews revealed that teachers were generally confident in using technology in the classroom; however, there was a need to introduce more cutting-edge technologies and provide in-service training. It is also recognized that most educators utilize technology in almost all activities. Field trips, movement, and music were the activities where technology was utilized the most, while Turkish, games, and science were the activities where technology was utilized the least. Notable is the absence of technology in literacy preparation activities. Moreover, while most teachers believe that the optimum age to introduce children to technology in preschool is between 49 and 72 months, most believe that technology and interactive media are utilized correctly in classrooms. Şalcı et all. (2018) concluded that

preschool teachers should introduce children to technology between the ages of six and seven. The American Academy of Pediatrics (2011) emphasized that exposing children under two to visual media could result in various problems. Although the reservations are more evident for children under the age of two, it is acknowledged that there are varying viewpoints for older children. Remarkably, most teachers stated they did not receive any training on using technology during their undergraduate education and that their organizations did not provide training in this area. In addition, more than half of the participants stated no technology policy in their schools. Blackwell et all. (2014) revealed that providing support to teachers and having a technology policy at school affected teachers' self-confidence, affecting their perceptions of technology. It is known that preschool teachers take technology literacy courses in their undergraduate programs and that MoNE offers both in-person and online in-service training. Nonetheless, it is apparent from the teacher interviews that these trainings are insufficient.

The participants are assumed to have a positive attitude toward technology use in the classroom. In semi-structured interviews, the teachers in the upper group stated that self-confidence, experience, and knowledge of technology use positively impacted their attitudes toward technology use, whereas the teachers in the lower group emphasized that difficulties in providing materials and lack of knowledge on these issues negatively impacted their attitudes. Based on the acceptance that effective use of technology is related to teachers' attitudes towards technology (Albion, 2001), it is assumed that teachers in preschool education with these positive attitudes will support technology integration in schools. It was also discovered that instructors were highly confident in their technology use. Nevertheless, in semi-structured interviews, all teachers in the lower and upper groups emphasized that a lack of materials, issues with material support, and inadequate technological facilities affected their perceptions of self-efficacy. In addition, the teachers in the upper group claimed that their self-efficacy increased as their experience with the use of technology grew and as the rate of support from technological tools increased to guarantee students' active participation in the lesson. Köroğlu and Demiriz (2015) stated that preschool teachers' perceptions of technology competence were relatively high. Studies also highlight that teachers' information and communication technology literacy is high (Cüre & Özdener, 2008; Keskin, 2008) and not just at the perception level. Based on the assertions that teachers' perceptions of their self-efficacy about technology are crucial for effective technology use (Torkzadeh & Van Dyke, 2001) and that it is effective for teachers to teach technology to their students correctly (Gnidovec et all., 2020; Henson, 2001), this finding is quite encouraging. There was no correlation between teachers' technology self-efficacy beliefs and their attitudes regarding using technological instruments in the classroom. The finding is somewhat unexpected. It was believed that teachers with high self-efficacy would demonstrate positive attitudes toward technology at a high level, whereas those with low self-efficacy would demonstrate attitudes at a low level. Köroğlu and Demiriz (2015) also concluded that there is no correlation between preschool teachers' attitudes toward technology and their perceptions of self-efficacy. Nonetheless, Yılmaz et all. (2016) observed a weakly positive correlation between preschool teachers' attitudes toward technology and their self-efficacy beliefs. However, it is recognized that the study examined general self-efficacy beliefs and that the sample group was limited to Balıkesir.

The gender factor did not affect the technology self-efficacy beliefs and attitudes of preschool teachers toward using technological instruments. All teachers' attitudes (Gülen & Kaya, 2023) and self-efficacy perceptions (Yılmaz et al., 2016) are positive, regardless of gender, which is a very encouraging finding. Köroğlu and Demiriz (2015) reached a similar conclusion in their investigation. It was recognized that the age of teachers affected their attitudes toward the use of technological equipment significantly. Regarding attitudes toward the use of technology, it is observed that younger teachers are more optimistic than senior teachers. Regarding self-efficacy, it was recognized that age did not play a role. Çetin and Güngor (2014) concluded that younger teachers had more positive technology self-efficacy. Professional experience did not affect preschool teachers' technology self-

efficacy beliefs and attitudes regarding using technological tools. Önkol et all. (2011) and Çörekçi (2020) found that professional experience did not influence preschool teachers' computer usage skills and abilities. However, according to Marcinkiewicz (1993), younger teachers with less professional expertise have more favorable attitudes toward technological innovations. Pajares (2002) emphasizes that although younger instructors have less technological experience, their knowledge is more up-to-date. It is recognized that the literature on age and professional experience contains a variety of results and perspectives. It was observed that the level of education affected technological self-efficacy beliefs and attitudes toward using technological equipment. On both evaluations, preschool teachers with a master's degree scored statistically higher than those with an undergraduate or college degree. With graduate education, preschool teachers cultivate a positive attitude toward technology and self-efficacy solid beliefs. In the literature, some studies contradict this finding. Güneş and Buluç (2017) did not find a correlation between education level and technology self-efficacy, while Köroğlu and Demiriz (2015) did not find a correlation between education level and technology self-efficacy and attitude toward the use of tools. It demonstrates, however, that taking a course on the use of technology in education during undergraduate education does not affect the attitudes and self-efficacy beliefs of preschool teachers regarding the use of technological tools. This situation indicates that the courses related to the use of technology in education offered in undergraduate education should be re-evaluated in terms of curriculum or practical application. In addition, it is believed that teachers' employment in private or public schools, rural or urban areas, or institutions with a technology policy do not affect their attitudes and self-efficacy perceptions regarding technology use.

This study has reached significant conclusions regarding teachers' perceptions, one of the most critical actors in preschool education, regarding the widespread use of technology in classrooms. Positive thoughts, attitudes, and self-efficacy perceptions regarding the use of technology in the classroom were prevalent among teachers. This circumstance suggests that teachers can play a supportive role in integrating technology to enhance the efficacy and efficiency of preschool education.

RECOMMENDATIONS

Preschool teachers frequently emphasized the lack of a smart board as a technological deficiency. It is believed that eliminating this deficiency will boost teacher motivation. In addition, teachers requested the incorporation of new technologies into preschool settings.

There was mention of the need for more training on the effective use of technology in both undergraduate education and in-service training. It may be beneficial to examine the currency of the curriculum and practices of technology-related courses in the curriculum for undergraduate education. Additionally, it would be beneficial to examine the MoNE's in-service training on the use of technology in the classroom, considering preschool teachers.

It was discovered that technology was either not used in certain activities, such as those involving literacy preparation, or was used only rarely in other activities, such as games and Turkish education. It may be beneficial to investigate whether teachers consciously chose not to use technology in these activities due to a lack of knowledge or for another reason.

The differing views of teachers regarding the age at which children should be introduced to technology are alarming. The findings of scientific studies may be beneficial in informing teachers about the topic.

It is believed that more than half of preschools do not have a technology policy; if they do, the teachers are unaware. With the assistance of school administrators and under the direction of MoNE and YEĞİTEK officials, it may be beneficial to raise awareness about the school's technology policy.

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Evaluation of Nature-Integrated STEM Activities from the Students' Perspectives

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ABSTRACT

This study aims to evaluate the courses designed using the STEM approach, which combines nature-based learning environments with informatics from students' perspectives. Under the scope of nature-based courses, some activities integrated into "Drama, Biomimicry, Ecoprint, Basic Electricity, Metamorphosis, and Bridging Science" were conducted for 10 days. Following, a part of technology-integrated courses such as "Digital Storytelling, Algorithm and Augmented Reality/Visual Block Programming" were instructed to students and employed to perform STEM activities by getting the inspiration of the courses. Then the views of 37 middle school students who participated in the courses were collected using a semi-structured form of qualitative data collection tools in four categories: Preparation, Instructional Material, Process, and Contribution. The data were analyzed by categorical content analysis, and the findings related to each subcategory, concept, and code for each category were presented in tables. To increase coding reliability, the opinions of two field experts and a measurement and evaluation expert were consulted. A Consensus was reached with another expert, resulting in a 95% agreement. According to the study results, the students generally express positive opinions on the courses. They stated that courses and game-based lessons that are based on learning by doing and experiencing are more interesting, and that the combination of nature-based learning and information technology is an important experience for them.

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INTRODUCTION

In today's conditions, almost every household has some type of computer. As a result, today's children are using smartphones, tablets, and laptops from an early age. Starting with acquiring basic computer skills at an early age, this process is directed towards homework, study, research, designing and producing various projects by the time they reach school age. These devices, which are mostly used as an entertainment tool for secondary school students, are increasingly directed towards research and production courses at the request of parents and teachers at a later stage. It is a visible fact that these initiatives, whose success has not yet been proven, are essential in today's world (Önür and Kozikoğlu, 2020; Mısırlı, 2015).

Haddon (2004) emphasis that in a world surrounded by smart devices, the importance of computer science is becoming increasingly apparent every day. Computer has become a fundamental skill, just like reading and writing. Being competent in these skills is becoming increasingly important to succeed in daily and work life. In such a world equipped with smart devices, we need to have these essential skills to maintain our daily lives. Most individuals must interact and communicate with these devices while meeting their basic needs. For instance, individuals who do not know the language of smart devices and cannot communicate with them experience difficulties maintaining their daily lives and will face even more difficulties in the future (Tamilselvan, Sivakumar & Savukan, 2012).

The speed of technological developments is causing our daily lifestyle to change rapidly. Many people prefer to order their basic needs from their homes instead of going to a store while shopping. Nowadays, the internet is not a separate world spent in special times, but it has become an integrated concept in our lives. Being online means being online in life. Therefore, using smart devices only to communicate, understand their language, and stay in communication with them has become a standard skill for today, and using these devices for production purposes has become important. To use these devices for production purposes, one must have coding or programming knowledge, which is their native language. Resnick & Siegel (2015) describe coding as a new type of literacy and personal expression, rather than a series of technical skills that are important for everyone, like learning how to write.

Science education has been frequently accepted as an inseparable and extremely important part of comprehensive schooling, research studies of the last few decades confirm such a position (Lamanauskas, 2013). Natural science’s importance is indubitable. The Rapid spread of scientific cognition inevitably raises new challenges for natural education, the penetration into educational environments is intensive induces to re-evaluate of generally used education strategies and technology-science integration.

The role of Informatics in education

In developing education systems for educating individuals with 21st-century skills, education has started to be given more importance in line with the demands of the industrial sector and the future predictions of economists (Kasalak & Altun, 2020). It is thought that the current demands of the industry will be met with STEM education that allows interdisciplinary applications. The US government has realized it will lag behind other countries economically due to the increasing number of countries trying to gain global market share in economic activities (Tuğluk & Öcal, 2017). Considering that an increase in the number of professionals in STEM disciplines is needed to catch up with innovations and technological developments, it has included the STEM discipline in educational curricula.

In addition to STEM education, the importance of programming knowledge and skills for the global revival of a country is emphasized. Having programming knowledge is a driving force for preparing the workforce of the future for the information technology industry and all other areas, allows

students to be the creators of innovation, and the knowledge and skills gained by learning computer programming are 21st-century skills that everyone needs to learn today (Popat & Starkey, 2019).

Computer science and coding skills are widely regarded as valuable in the current and predicted job market (Zinth, 2015). In today's world, coding education equips individuals with the necessary skills and equipment to survive, and coding education is important in adapting to society's current needs. Therefore, coding education is included in the curricula of many countries such as the US, the UK, Belgium, and Spain (Okal, Yıldırım, & Temur, 2020).

Many studies show that integrating computer science supports creative and critical thinking. These studies provide suggestions for integrating computer science into the education system. Computer science allows students to see themselves as passive consumers of technology and as active producers and inventors of technology beyond coding (Çiftçi & Bildiren, 2020). In general, the literature suggests that students use many skills beyond coding when learning to code. These skills can be further developed by incorporating them into a planned instruction or curriculum (Popat & Starkey, 2019). However, by its very nature, programming is a difficult process. Especially at a young age, it is considered more challenging to teach because it requires abstract thinking skills. Recognizing the importance of acquiring these skills early, researchers have designed various environments where young children can easily learn programming. The best example of this is the Scratch visual block-programming environment developed at the Massachusetts Institute of Technology (MIT). Visual programming environments are a good starting point for students of all ages with no programming background (Çiftçi & Bildiren, 2020). The development of Scratch has enabled many studies on teaching coding at an early age. Many countries are conducting studies to provide coding education to students easily. Therefore, countries have facilitated the creation of different programming environments such as "code.org, Scratch, and MBlock" and integrated them into their curricula (Okal, Yıldırım & Temur, 2020).

STEM and robotic coding

Although many studies support the inclusion of computer science courses in K-12 education, some students perceive computer science as boring, complex and difficult to master (Çiftçi & Bildiren, 2020). In addition to visual block programming environments, various robotic tools are used to make coding learning more fun and relatively more concrete. Robotic tools, especially popular with the STEM education movement, help students assimilate STEM concepts (Horizon Report, 2016).

STEM, technology-integrated learning topics such as computational thinking, computer science education, robotics, and coding, enable children to engage in problem-based courses by designing robots and writing computer code (Çiftçi & Bildiren, 2020). Research indicates that including robotics in early childhood education environments effectively increases and supports interest in STEM learning (Horizon Report, 2016). According to Eguchi (2017), educational robotics is an effective learning tool for project-based learning in which STEM, coding, computational thinking, and engineering skills can all be integrated into a single project. Studies show that integrating STEM concepts and practices leads to increased conceptual learning across disciplines and supports gains in engineering and technology (Gencer, Doğan, Bilen, & Bilge, 2019).

It is understood that combining STEM education and coding education makes abstract concepts concrete, and leads to permanent, meaningful, and in-depth learning (Avcı, Okuşluk, & Yıldırım, 2021). Robotic sets are essential tools that enable the integration of STEM and coding. Considering the goals of STEM literacy education, it is thought that robotic tournaments, in particular, can have a positively impact students' coding skills and direct them from being consumers to producers in their future lives (Dönmez, 2017).

While robotics offers students opportunities to discover how technology works in real life, it also

allows them to find new ways of working together to develop collaboration skills and express themselves using technological tools, problem-solving, and critical and innovative thinking. Most importantly, educational robotics provides a fun and exciting learning environment due to its applied nature and technology integration (Greca Dufranc, García Terceño, Fridberg, Cronquist & Redfors, 2020). Governments that recognize these advantageous aspects of robotics and STEM are developing STEM education strategies that prioritize the inclusion of robots and robotic courses and trying to integrate them into their curricula. In some schools in Singapore, robotics has become an integral part of the applied STEM curriculum; similarly, camps held at Arizona State University aim to increase girls' interest in STEM by teaching them the basics of robotics coding. While the Queensland government in Australia recently made it mandatory to add robotics to school curricula, the South Korean government has launched a program that opens new horizons by teaching students English through robots (Horizon Report, 2016). In many countries, STEM and robotics activities are organized in out-of-school learning environments such as summer camps and after-school courses, as in our country. Whether in-school or out-of-school activities, learning by doing and experiencing brings the active learning process, which is called the learning process in which students are forced to use their mental abilities through complex activities by taking responsibility for learning, and are offered decision-making and self-regulation opportunities (Açıkgöz, 2008). According to Harmin and Toth (2006), students who are supported with STEM-based robotic activities in which active learning is experienced intensively by creating inspiration for the richness of nature, technological innovations, activities and products for education and training processes will be more successful.

STEM and Nature Education

Natural habitats are the fastest learning environments (Özdemir, Akfırat & Adıgüzel, 2009). Informal environments are important in complementing the knowledge and skills learned in schools, allowing research and experimentation, and enabling children to think in a questioning and versatile way to reach knowledge (Noel-Storr, 2004). Nature is an unlimited learning environment for children. Using the outdoors as a classroom increases children's natural curiosity and enthusiasm. Providing education outside meets students' kinesthetic needs, a 15-minute neighborhood walk or play break on natural surfaces can calm restless minds and increase children's ability to concentrate and creativity (Cleaver, 2007). Children need nature to develop their senses healthily and therefore to learn and enhance their creativity (Louv, 2019).

Researchers point out that environmental education in the natural environment enables students to explore real-life examples of principles, problems, and issues (Ballantyne, Fien & Packer, 2001). Courses in nature encourage children to collaborate, be more creative, and solve problems (Buldur, Bursal, Yücel & Yalçın Erik, 2018). Nevertheless, due to the crowded city life, distance from natural living, living conditions and the fact that technology also surrounds children's world, children spend less time in nature. Experts state that children with less time in nature have dulled physical and mental senses and poor experiences (Louv, 2019).

According to leading landscape architect Frederick Law Olmstead (1865), it has long been accepted that natural scenery works the mind without causing fatigue, calms and revitalizes the body, and has a refreshing relaxation and revitalization effect on the entire system (Kimbell, Schuhmann, & Brown, 2009). Today's children live away from the environments that provide mental tranquility. However, nature deprivation is one side of the coin, and the other side is the abundance of nature. Indeed, new research focuses on what is gained by nature's presence rather than what is lost in its absence (Louv, 2019).

Today, nature-based learning environments are overshadowed by indoor digital high-tech environments. The effect of digital tools on learning is undeniable when used appropriately. Therefore, it is thought that an effective learning design can be created by combining the strengths of these two

environments. In this study, an effective learning design was attempted to be created by using the strengths of both environments. Yıldırım and Altun (2015) state that STEM is an approach that processes knowledge found in nature. Therefore, the STEM education approach is based on the designed education. The STEM approach is used in the designed education to understand how science, technology, engineering, and mathematics are applied in natural environments and to solve problems related to these fields.

As Tuğluk and Öcal (2017) suggest, if it is wanted to meet technical and technological innovations that will most likely lead to future economic and social developments, more researches on STEM fields are needed. This study aims to fill this gap in Turkey. Therefore, the participants are planned to connect the natural sciences to the technology after the activities that were described as nature based learning. For this purpose, the following questions were sought to be answered in the study.

1. What are the students' opinions (regarding preparation, use of materials, course process and contribution) about Nature-Based Learning Activities (Drama, Biomimicry, Ecoprint, Basic Electricity, Metamorphosis and Build Bridges with Science).
2. What are the students' opinions (regarding preparation, use of materials, course process and contribution) about "Digital Storytelling, Algorithm, Augmented Reality and Visual Block Programming" which are the activities of Technology-Integrated Learning?

In the first category “Drama, Biomimicry, Ecoprint, Basic Electricity, Metamorphosis and Build Bridges with Science” courses are selected as nature courses because of emerging from nature itself. In second category the courses “Digital Storytelling, Algorithm, Augmented Reality and Visual Block Programming” are taken as technology integrated courses because these courses base technology itself. In each category, the components of curriculum, goals, content, process and evaluation (Demirel, 2006) gave inspiration to name the activities as preparation, use of materials, course process and contribution.

METHOD

Research Design

The study is qualitative research conducted using a case study model. Qualitative research aims to obtain in-depth data by questioning the causes and reasons per the research objective. According to Creswell (2007), a case study is a qualitative research approach where the researcher deeply examines one or more limited situations over time using multiple data collection tools (observations, interviews, audio-visuals, documents, reports) and identifies themes related to the situations and conditions.

Participants

In this study, the opinions of 37 secondary school students regarding the courses carried out in the summer term of the 2020-2021 academic year were collected using a semi-structured interview form as one of the qualitative data collection tools. For the selection of the participants, leaflet including a brief description of the activities, were posted to the schools. After the consultancy with the family of the students, the directory decided the participants and sent 40 students’ name to the project coordinator/author. The study group of the research was determined by the criterion sampling method, one of the purposeful sampling methods. According to Patton (1987), all situations that meet a set of predetermined criteria are studied in criterion sampling. The researcher can prepare the criterion or criteria, or a list of previously established criteria can be used. In this study, the students who met the predetermined criteria such as being at the secondary school level, having an interest in nature, being willing to participate in activities outside the school period, and having permission from their families with a consent form were included in the study group.

Research Instruments and Processes

The semi-structured interview form prepared by the researchers was used to evaluate the technology-integrated workshops conducted with the STEM approach in the context of nature courses from the students' point of view. The form was designed to collect student opinions under the headings of Preparation, Material, Course Process, and Contribution, which are the main dimensions of the education and training program, in line with experts' opinions after a relevant literature review. To ensure the validity and reliability of the form, opinions were obtained from three experts. Two experts are faculty members in education programs and teaching, while the third expert is a faculty member working in Instructional Technologies. Necessary corrections were made after obtaining expert opinions, and expression errors were corrected to finalize the form. Obtaining opinions from people who have general knowledge about the research topic and specialize in qualitative research methods is another precaution that can be taken regarding credibility. The expert helps the researcher increase the quality of the research by providing feedback at various stages of the study, from the research design to the collection and analysis of data and writing of the results (Şimşek & Yıldırım, 2018).

When designing the courses, the interdisciplinary STEM approach was adopted, which supports 21st-century skills and provides a rich environment for developing these skills (Kavak, 2020). The courses are divided into two groups: nature-based and technology-integrated. Nature courses were carried out by experts specialized in different fields, who are familiar with the STEM education approach, in natural environments and outdoors. technology-integrated courses were conducted by experts specialized in their fields in a laboratory environment and who are also familiar with the STEM education approach. During the courses, each nature course was connected to an technology-integrated course, and concrete examples were given of how nature inspires technology. The studies focused on integrating STEM concepts and practices, and the disciplines were interrelated to create a holistic learning environment.

All the courses were designed for the interdisciplinary approach underlying STEM. For example, in the Ecoprint workshop, students learned how to obtain colors with the materials they collected from nature, calculated the ratio in which they needed to mix these colors, got to know the natural chemical components used in obtaining colors, experienced which fabric absorbs how much colors, and analyzed the right techniques and weather conditions to obtain the colors they wanted in the drying process. All courses were carried out in this direction by adopting the interdisciplinary approach required by the STEM discipline. After learning how to obtain colors in the nature activity, they learned how colors are created in the digital environment, saw how digital colors are created with special software on the graphical screen, wrote their programs by performing the necessary mathematical operations and designing their algorithms, designed an experimental setup where they could see the program they wrote concretely, and developed projects that produce different colors according to the data from different sensors. For example, one of our students stated that he was inspired by the chameleon in his project and designed a project that changes color according to light and heat. In the meantime, he discovered that sensors such as heat and light, which are used in digital projects, exist naturally in animals. Since environments such as summer camps provide students with flexible and collaborative contexts and engage them in more hands-on and cognitive activities (Ayar, 2015), the course activities were carried out for 70 hours over ten days during the summer.

The descriptive analysis method was used to analyze student opinions. Based on the data obtained from students' opinions about the Preparation, Material, Course Process and Contribution dimensions of both technology-integrated and Nature-based Activities, codes were created and presented numerically in the tables. The repetitions frequency was determined and frequencies were included in the table. Another researcher also analyzed the sentences and the evaluation from filled out, and the reliability formula suggested by Miles and Huberman (1994) was used for the reliability calculation of the study. Reliability = Agreement / (Agreement + Disagreement). As a result of the calculation (1814/1814+45), the reliability of the study was calculated as 97% which indicates the process of

coding and analysis are reliable.

To ensure that the study results are transferable, the data obtained were tried to be transferred by organizing them according to concepts and themes without disturbing their natural state or adding comments. The participants' statements about the themes and concepts that emerged in the findings section are given by direct quotation to achieve this. The frequency numbers of the findings obtained are given in the tables.

Participants were given some codes such as Ö1,Ö2,Ö3, etc. to follow their replies for different activities. Opinions structured under two different themes, namely "nature-based" and "technology-integrated", were analyzed in the preparation category, and the findings collected under three sub-categories named "course duration", "environment" and "preparedness for the lesson". For example, one of the students, [Ö5], "Duration of the activity is adequate and the environment is nice". The coding was constructed as;

Name of student= Student5

Theme= Nature based course

Sub-theme= Ecoprint

Category= Preparedness

Sub categories: Duration and environment

Codes= Sufficient and suitable

Ethic

The necessary ethics committee permissions for the research were obtained from the Social Sciences Ethics Committee of Kırşehir Ahi Evran University with the decision dated 03.12.2019 and numbered 35/04.

FINDINGS / RESULTS

The preparations, materials, lesson process, and contributions to students regarding the courses carried out within the scope of STEM-based education for students have been analyzed, and the codes and concepts obtained have been divided into two different course groups under the titles of Nature and technology-integrated courses.

Preparations for the Courses

Depending on the categorical content analysis, opinions structured under two different themes, namely "nature-based" and "technology-integrated", in a category (preparation), and the findings collected under three sub-categories named "course duration", "classroom environment", and "preparedness for the lesson" are presented in Figure 1.

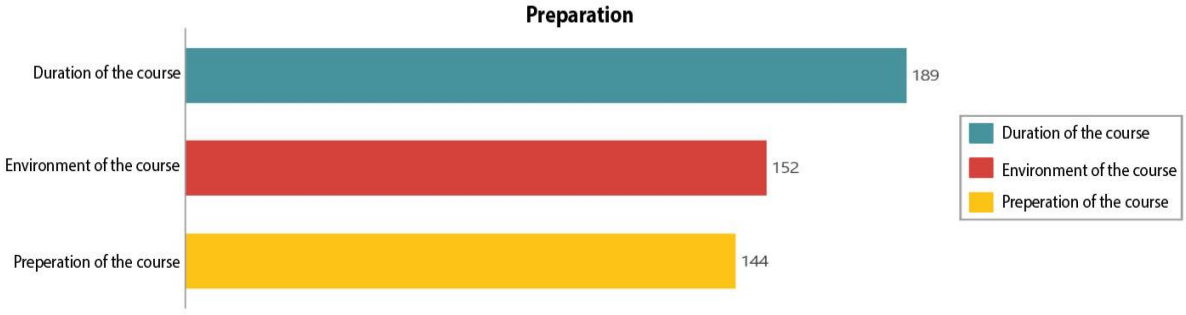

Figure 1. *Students' views on the preparation category*

Upon examining Figure 1, it can be observed that the opinions of the students (n=189) regarding

the duration of the lesson in the context of the courses they participated in are more prominent than their opinions on the classroom environment (n=152) and come ready prepared to the lesson (n=144). The hierarchical code-subcode model was used to analyze these opinions based on which course they belong to, and the results were presented in the form of figures and tables.

Course Duration

Students' views on the duration of courses in the preparation phase were categorized under two different themes, nature-based and technology-integrated, and codes, "sufficient", "insufficient", and "excessive" were given with the distribution of frequencies to the courses is presented in Table 1.

Table 1. *Students' views on the duration of the course*

	Nature-based courses						***Technology-integrated course***			
Course Duration	Drama	Biomimicry	Ecoprint	Basic Electricity	Metamorphose	Build bridge with science.	*Digital Storytelling*	*Algorithm*	*Augmented reality /Visual Blk*	∑
Sufficient	9	9	16	14	14	12	*19*	*8*	*13*	114
Insufficient	8	12	5	-	6	9	*3*	*2*	*5*	50
More than necessary	3	-	1	1	3	-	*3*	*11*	*3*	25
Total	20	21	22	15	23	21	*25*	*21*	*21*	189

Upon examining Table 1, it can be seen that for both Nature-based and Technology integrated courses, except for the "biomimicry course," the frequency of opinions indicating that the duration of the courses during the preparation is "sufficient" is greater than those stating it is "insufficient" or "more than necessary." In the case of the "biomimicry course," there are 12 opinions stating that the duration is "insufficient" while 9 opinions consider it "sufficient." Additionally, the number of opinions claiming that the duration of the "Algorithm course" is "more than necessary" (n=11) is greater than those of other courses. While there are 40 opinions indicating that the time allocated for Nature-based courses is "insufficient," there are 17 opinions stating that the duration of İnformatics-based courses is "insufficient." Therefore, it can be said that more time should be allocated to Nature-based courses based on the 40 opinions claiming that the duration is "insufficient." The visualization of the opinions regarding the duration of courses is presented in Figure 2.

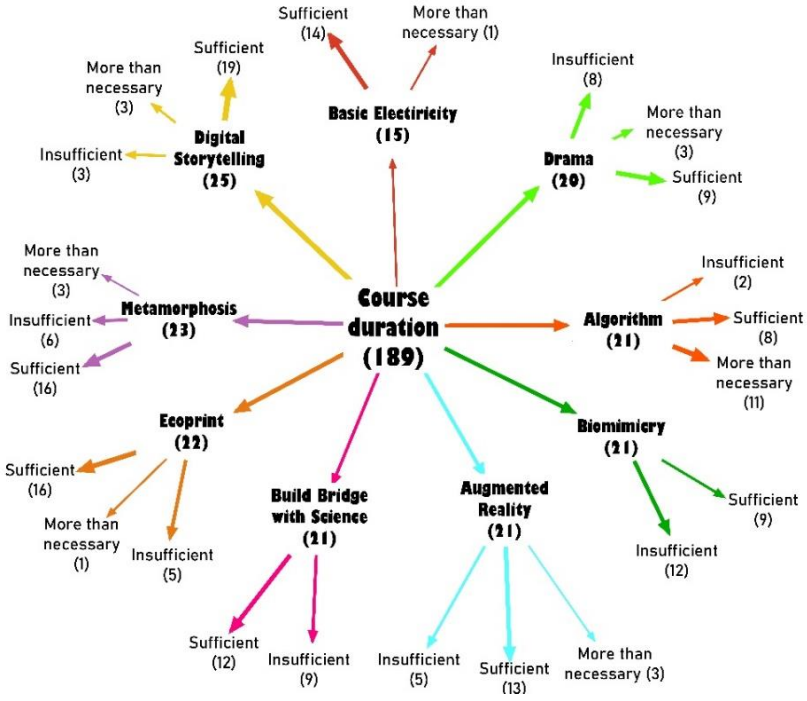

Figure 2. *Students' Views on the Duration of the Activities*

When examining the duration of the nine courses in Figure 2, it is understood that a total of 189 opinions on Nature-Based (n=122) and İnformatics-Based (n=67) courses were expressed. In addition, it is observed that the opinions regarding the "Digital Storytelling" course (n=25) are the highest and those related to the "Basic Electricity" course (n=15) are the least.

Sample quotations:

[Ö5]: “Duration of the activity (Drama) is adequate and the environment is nice”.

[Ö12]: “The teacher has already done the preparations, duration of the activity (Biomimicry) could be longer and the environment is nice”.

Course Environment

It was observed that the students’ opinions regarding the course environment during the preparation were grouped under two different themes, namely nature-based and informatics-based, and the codes, namely "suitable" or "not suitable" were given with the distribution of the frequencies for these categories according to the courses is presented in Table 2.

Table 2. *Students' views on the course environment*

	Nature-based Courses						***Technology-integrated Courses***			
Course Environment	Drama	Biomimicry	Ecoprint	Basic Electricity	Metamorphosis	Build a bridge with science	*Digital Storytelling*	*Algorithm*	*Augmented Reality /Visual Blk.*	Σ
Suitable	20	14	23	10	16	11	*17*	*8*	*11*	**130**
Not suitable	-	1	-	4	1	4	*1*	*7*	*4*	**22**
Total	20	15	23	14	17	15	*18*	*15*	*15*	**152**

Upon examining Table 2, it is understood that the number of views stating that the environment of nature-based and technology-integrated courses is suitable is considerably higher than those claiming it is unsuitable. While there are 94 views stating that the environment of nature-based courses is suitable only 10 claim it is unsuitable. Similarly, for technology-integrated courses, there are 36 views stating that the environment is suitable, while only 12 views are claiming it is unsuitable.

Additionally, it is noteworthy that the views claiming that the environment of the Algorithm Course is unsuitable are close in number to those stating it is suitable. The visuals for all the course's views on the course location are presented in Figure 3.

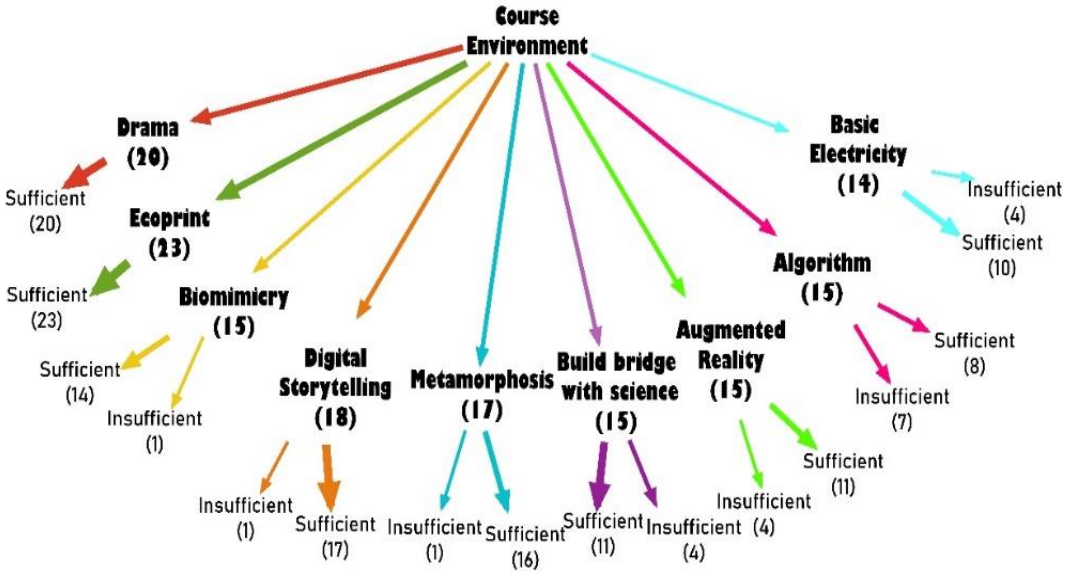

Figure 3. *Students Views on the Course Environment*

Upon examination of the environment of the courses presented in Figure 3, it is understood that there are 152 opinions regarding Nature-Based courses (n=104) and Informatics-Based courses (n=48). In addition, it is observed that the "Ecoprint" course has the highest number of opinions (n=23), while the "Basic Electricity" course has the lowest number of opinions (n=14). Furthermore, given that 130 out of 152 opinions express positive statements about the course environment, it can be inferred that the course arrangements are sufficient.

Sample quotations:

[Ö30]: "The duration of the lesson (Basic Electricity) is good, the place is nice, I've had a lot of fun."

[Ö18]: "The lesson is nice (Algoritm) but, there is not enough fresh air in the classroom."

Preliminary Preparation of Instructors

Upon examination of the data, it is observed that the students' opinions regarding the instructors' preparedness for the courses were categorized under two themes, namely nature-based and technology-integrated, and two codes, "prepared" and "not prepared" were presented with the distribution of frequencies for these categories according to the courses is presented in Table 3.

Table 3. *Students' opinions on the preparedness of the instructors to participate in the courses*

	Nature-based Courses						***Technology-integrated courses***			
Preliminary Preparation of Instructors	*Drama*	*Biomimicry*	*Ecoprint*	*Basic Electricity*	*Metamorphosis*	*Build a bridge with science*	*Digital Storytelling*	*Algorithm*	*Augmented reality /Visual Blk*	∑
Prepared	11	13	21	16	15	13	*16*	*17*	*15*	**137**
Not prepared	-	-	-	-	2	2	*1*	*2*	-	**7**
Total	20	15	23	14	17	15	*17*	*19*	*15*	**144**

According to Table 3, it is observed that for both nature-based and technology-integrated courses, the views on the preparedness of instructors are categorized as "prepared". Moreover, the term

"not prepared" regarding instructors' preparedness is not mentioned, particularly for the Drama, Biomimicry, Ecoprint, Basic Electricity, and Augmented Reality courses.

According to Table 3, while there were 89 opinions indicating that the teaching staff were adequately prepared for the Nature-based courses, only 4 suggested inadequacy. Similarly, for the İnformatics-based courses, out of 48 opinions indicating adequate preparation by the instructors, only 3 opinions suggested "not prepared". All opinions regarding the preparedness of the teaching staff are presented visually in Figure 4.

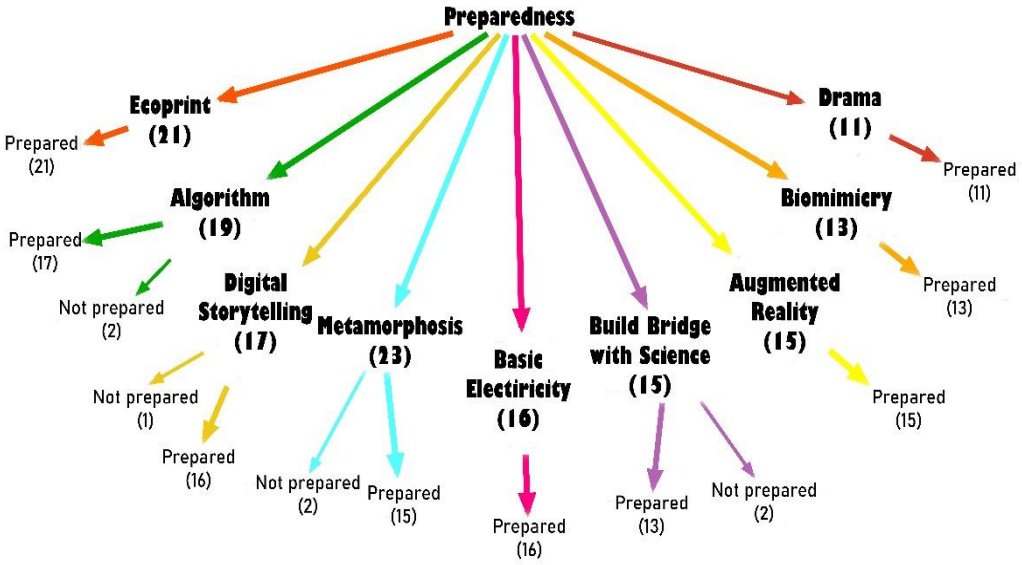

Figure 4. *Student Views on the Preparedness of Instructors*

When the preparedness of instructors who conducted the courses presented in Figure 4 is examined on a course basis, it is understood that there are 144 opinions regarding nature-based courses (n=93) and technology-integrated courses (n=51). In addition, it is observed that the opinions on the "Ecoprint" course (n=21) are the highest, while the opinions on the "Drama" course are the lowest (n=11).

Sample quotations:

[Ö26]: "Preparations for the activity (Digital Story Telling) is adequate but the course is little boring and the environment isn't nice, it is hot."

[Ö11]: "She comes to the classroom (Ecoprint) very prepared; she takes care of everything, the lesson has held in the garden, it is suitable for this event."

Material

Students' opinions regarding the teaching materials were classified under two different themes, nature-based and technology integrated, and seven codes (enough, interesting, not enough, not interesting, easy to use, difficult to use, not used) were given with the distribution of the frequencies of these categories for each activity is presented in Table 4.

Table 4. *Students' views on the course material*

	Nature-based Courses	***Technology-integrated Courses***

Material	*Drama*	*Biomimicry*	*Ecoprint*	*Basic Electricity*	*Metamorphosis*	*Build a bridge with science*	*Digital Storytelling*	*Algorithm*	*Augmented Reality /Visual Blk.*	Σ
Enough	19	18	16	20	15	19	*23*	*20*	*16*	**166**
Interesting	9	28	28	27	24	21	*14*	*17*	*24*	**192**
Not enough	-	2	1	1	4	5	*1*	*3*	-	**17**
Not interesting	5	-	1	4	4	4	*4*	*12*	*5*	**39**
Easy to use	8	14	19	18	18	16	*16*	*17*	*12*	**138**
Difficult to use	-	7	-	3	-	1	*1*	-	*3*	**15**
Not used	14	1	-	-	-	-	*3*	*2*	*1*	**21**
Total	55	70	65	73	65	66	*62*	*71*	*61*	**588**

According to Table 4, it is observed that the positive aspects of the learning materials used in nature-based and technology-integrated courses, such as being interesting (n=192), "enough" (n=166), and "easy to use" (n=138), stand out. However, it is also understood that there are negative aspects expressed such as" not enough" (n=17), "uninteresting" (n=39), and difficulty to use (n=15) regarding the materials used in these courses. Additionally, it should be noted that materials weren't used in 5 courses (n=21). All the opinions regarding the quality of the materials used in the courses are presented in Figure 5.

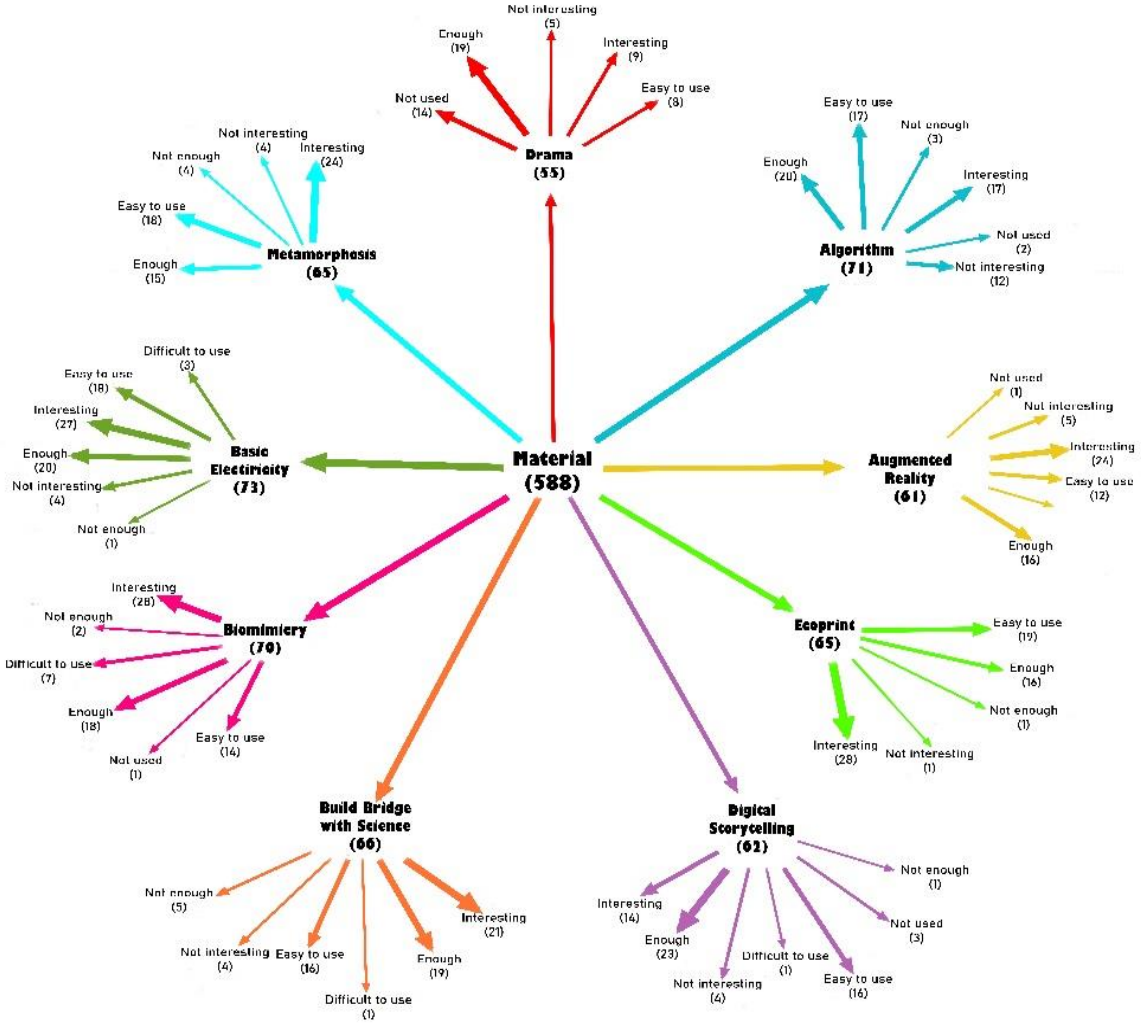

Figure 5. *Student Views on the Materials Used in the Courses*

When the opinions regarding the materials used in nine courses in Figure 5 are examined, it is

understood that there are 588 opinions for nature-based courses (n=394) and technology-integrated courses (n=194). Moreover, it is observed that there is the highest number of opinions about the materials used in the "Basic Electricity" course (n=73), while the lowest number of opinions is about the materials used in the "Drama" course (n=55).

Sample quotations:

[Ö15]: “Materials of the activity (Drama) are very interesting and sufficient.”

[Ö20]: “The materials are interesting, easy to use and sufficient (Augmented Reality).”

Process

It has been observed that students' opinions regarding the activity process are grouped under two different themes, nature-based and technology-integrated, and four different codes, namely "student-centered", "interesting", "suitable methods/techniques used", or "boring" were given with the frequency distributions of these categories by activity are presented in Table 5.

Table 5. *Students' views on the activity process*

	Nature-based courses						***Technology-integrated Courses***			
Process	Drama	Biomimicry	Ecoprint	Basic Electricity	Metamorphosis	The science builds a bridge	*Digital Storytelling*	*Algorithm*	*Augmented Reality /Visual Blk.*	Σ
Student-centered	17	11	10	11	8	10	*13*	*8*	*13*	**101**
Interesting	23	18	22	18	17	15	*14*	*10*	*16*	**153**
Suitable Method	8	18	19	14	10	17	*15*	*13*	*17*	**131**
Boring	1	-	-	4	6	1	*3*	*12*	*2*	**29**
Total	49	47	51	47	41	43	*45*	*43*	*48*	**414**

According to Table 5, students' opinions on the nature-based and technology-integrated activity process are predominantly expressed in positive terms, with the categories of student-centered, interesting, and suitable methods used (n=385); however, there are also a small number of students who find the process boring (n=29). The visual representation of all opinions on the activity process can be found in Figure 6.

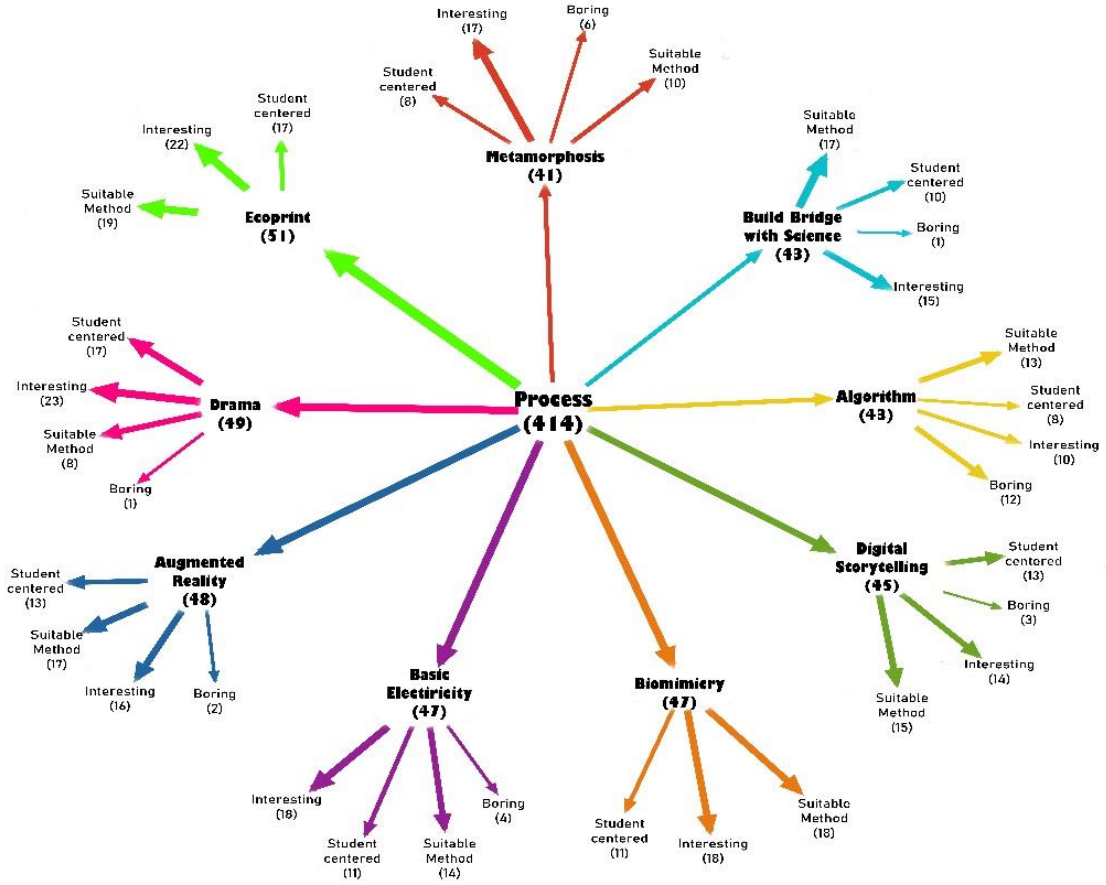

Figure 6. *Student Views on the Activity Process*

When the opinions on the activity process of nine courses presented in Figure 6 are examined, it is understood that a total of 414 opinions were expressed in the context of nature-based courses (n=278) and technology-integrated courses (n=136). In addition, it is observed that the opinions on the activity process in the "Ecoprint" course (n=51) are the most, while the opinions on the activity process in the "Metamorphosis" course (n=41) are the least.

Sample quotations:

[Ö20]: "In the course (Augmented Reality), teacher's instructing method is attractive, I've participated the activities."

[Ö3]: "The activity (Building Bridge) is enjoyable, we perform team work.'

Contribution

The students' views regarding the courses' contribution were grouped under two different themes nature-based and technology-integrated, and eight different codes (academic development, contribute the science, social development, environmental awareness, self-confidence, disciplinary knowledge, information tools, no contribution) with the distribution of the frequencies of these categories according to the courses is presented in Table 6.

Table 6. *Students' views on the contribution of the courses*

	Nature-based courses	***Technology-integrated Courses***

Contribution	Drama	Biomimicry	Ecoprint	Basic Electricity	Metamorphosis	Build a bridge with science	*Digital Storytelling*	*Algorithm*	*Augmented Reality /Visual Blk.*	Σ
Academic Development	-	4	3	5	2	3	*9*	*4*	*5*	**35**
Contribute to Science	2	4	4	5	5	4	*3*	*3*	*4*	**34**
Social Development	21	8	7	2	5	8	*4*	*6*	*5*	**66**
Environmental Awareness	5	2	19	2	6	2	*3*	*1*	-	**40**
Self-confidence	2	1	-	-	-	1	-	-	-	**4**
Disciplinary knowledge	3	5	11	12	12	17	*10*	*8*	*15*	**93**
Information Tools	-	13	-	6	2	-	*8*	*7*	*6*	**42**
No Contribution	-	*1*	-	*4*	-	-	*2*	*5*	*1*	***13***
Total	33	38	44	36	32	35	*39*	*34*	*36*	**327**

Upon examination of Table 6, it can be seen that 314 views on the contribution of nature-based and technology-integrated courses expressed" individual, social, and disciplinary contributions". At the same time, only 13 states "did not contribute". Notably, the courses' contribution to self-confidence (n=4) is low. Another point that attracts attention is that the views expressing contribution to disciplinary knowledge (n=93) are numerically high. The views on the duration of the courses are presented in Figure 7.

Sample quotations:

[Ö9]: "Normally I think I'm bad at architecture, but this course changed my mind on that subject."

[Ö30]: "It contributes to socialization, it is good in terms of contribution to science, I've had a lot of fun, and it helps to look from the perspective of nature and information tools (Ecoprint)."

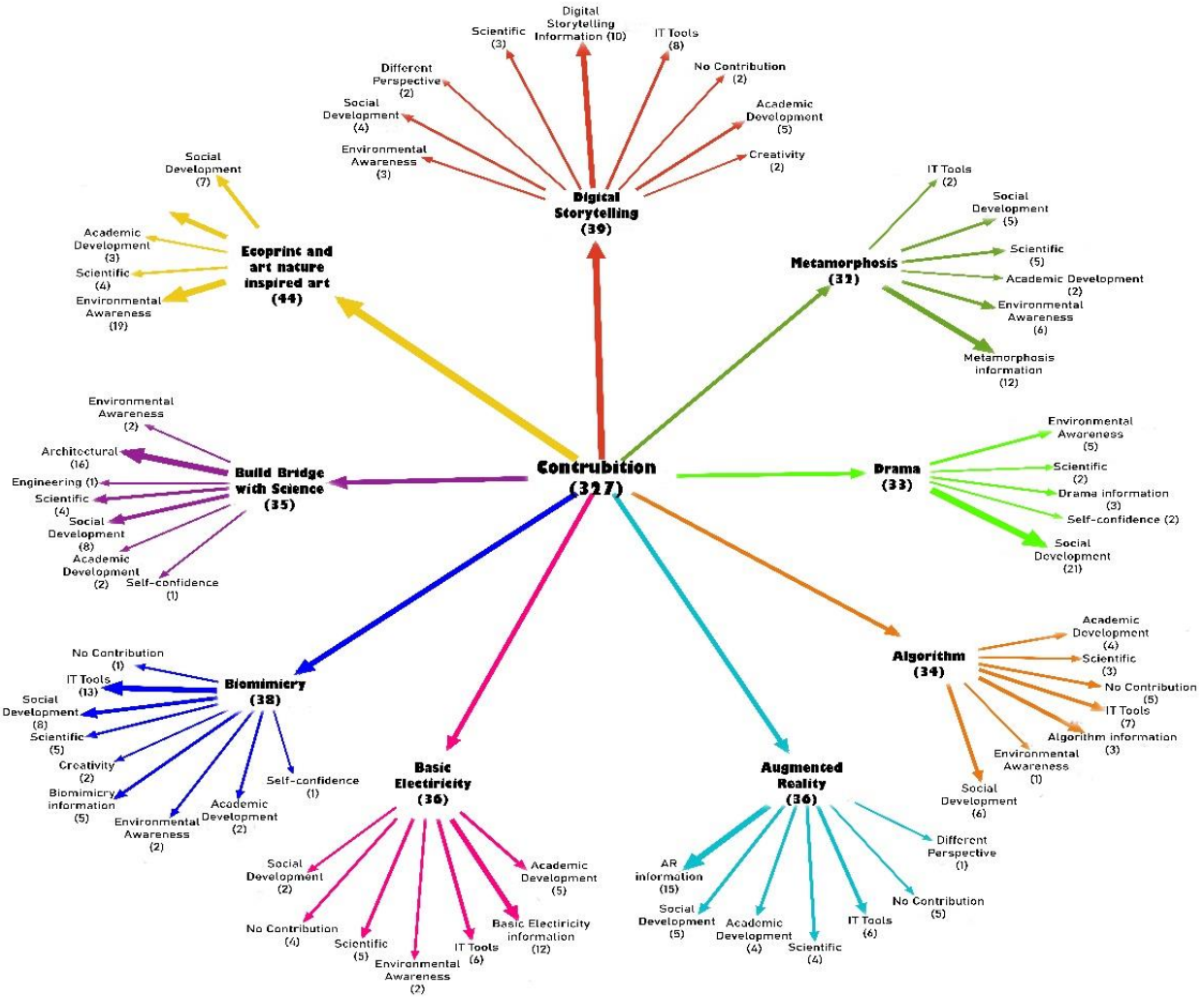

Figure 7. *Student Views on Contribution of the Courses*

When the student views on the contribution of the courses in the 9 courses presented in Figure 7 were examined, it was understood that there were 327 views on nature-based courses (n=218) and science-based courses (n=109). In addition, while there were views that the "Ecoprint" course contributed the most (n=44), the views on the "Metamorphosis" course were the least (n=32).

DISCUSSION, CONCLUSION, RECOMMENDATIONS

When the research results are examined, the students found the duration of the courses sufficient in both nature-based and technology-integrated courses. Still, the predominant view was that there should be more time, especially in nature-based courses. Although more time is allocated to nature-based courses due to their nature, students have expressed a desire to spend more time in these courses. This demonstrates that children living in today's digital age are willing to spend time in a carefully planned and effective natural learning environment. In the technology-integrated courses, there was a predominant view that the duration of the biomimicry course was too short. In this course, the information about how the natural environment inspires technology was explained with examples, and its connection to real life was demonstrated concretely throughout the course. In addition, students were asked to design an effective airplane and wing using a 3D pen. The 3D pen they used attracted their attention and they wanted to spend more time with this tool. Therefore, it is thought that the course duration may have been perceived as too short for them. Furthermore, most students in the algorithm course stated that the duration was longer than necessary. According to the literature, even at the university level, computer programming and the fundamental skill of algorithm creation are considered difficult skills (Özmen and Altun, 2014). Algorithms are inherently abstract skills, which makes them

difficult to understand. Indeed, in Gökoğlu's (2017) metaphor analysis of algorithm perception, it was found that students had a negative view of algorithms. It is expected that the duration of learning a difficult concept is perceived as long for students.

In the study, the environment suits nature-based courses while only 10 opinions of 94 suggest the opposite. For technology-integrated courses, 36 consider the environment suitable, while 12 suggest it is not. Of 152 opinions, 130 conclude that the learning environment is sufficient for the courses. Similarly Bybee (2013) concluded that the selected environments for both types of courses are adequate to meet the needs of students and the curriculum. Additionally, it is noteworthy that the opinions regarding the suitability of the Algorithm Course's environment are closer to those who consider it suitable. Therefore, it is believed that collaboration with stakeholders is necessary to create environments that require specific arrangements for the field.

A study found that the instructors who conducted the courses in 9 courses within the scope of the study were prepared for the courses, and only 7 of the total 144 views related to nature-based courses (n=93) and technology-integrated courses (n=51) contained negative comments. Additionally, it was found that the instructor of the "Ecoprint" course was the most prepared (n=21), while the responsible teacher of the "drama" course was the least prepared (n=11). This may be because drama lessons are open to changes before and during the lesson and can be subject to instant changes. In summary, it is seen that the opinions on the preparedness of the teaching staff for the lesson are largely "sufficient". Guven's (2004) study emphasized that effective teachers have knowledge about objectives, attach importance to time management, enter the lesson on time, leave on time, and continue teaching without panicking or hesitating with good planning and preparation. Sönmez (2017) named education as teaching in schools. Teaching is making necessary preparations for a lesson according to the teaching program, carrying out the process, and continuing the process until the goals are reached (Özçelik, 2014). Teaching is a difficult process that requires long working hours, preparation and planning skills (Moore, 2001). According to the results of the current study, it was concluded that the teaching staff successfully carried out these processes and supported student motivation with effective preparations.

At the same time, it was observed that the positive characteristics of the materials used in nature-based and technology-integrated courses, which were expressed as interesting, enough, and easy to use, were prominent. However, it was also understood that the teaching materials have negative aspects, such as being "not enough, uninteresting, and difficult to use". Although this is thought to be because most students encounter the material for the first time and do not have any experience with it, it is a topic that needs to be investigated. Günbatar & Tabar (2019) stated that since STEM is an integrated approach, studies where researchers, teachers, and participants from different fields come together, would be more suitable for the STEM philosophy. In this study, since different education and research courses from the fields of information and basic sciences were included, it is considered that a learning environment suitable for the STEM philosophy was created. Indeed, the views of the students on the activity process, expressed as student-centered, interesting, and appropriate methods, and the predominance of positive views support this idea. Regarding the students' views on the contribution of nature-based and technology-integrated courses to themselves, they mentioned their domain-specific knowledge, social development, environmental awareness, use of information tools, and problem-solving skills. Therefore, it can be said that these courses contribute to the holistic development of the students.

The results are similar to the study conducted by Gencer, Doğan, Bilen, & Bilge (2019), which shows that the integration of STEM concepts and practices, which constitute the focus of the current study, supports the gains in the field of engineering and technology, as well as providing promising information that the integration of STEM concepts and practices leads to increased conceptual learning within disciplines.

It is important for students to see where they can use the knowledge they have learned in daily life and to realize the relationship between disciplines at an early age (Dilber, Tertemiz & Taşdemir, 2020). In this study, unlike previous STEM studies in the literature, it is thought that supporting nature and technology-integrated courses with each other and including applications that have not been done before on a course basis, enables students to see where they can use their knowledge in daily life and to realize the relationship between disciplines. Still, it is recommended to be investigated by applying it to a larger sample.

The limitations of this study include the fact that the data is specific to a particular geographical region, the limited size of the research sample, and the short duration of the implementation. Therefore, the generalizability of the obtained results to a broader population may be limited.

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Examining of STEM Motivations and Entrepreneurship Levels of Pre-Service Teachers

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ABSTRACT

The purpose of the current research was to highlight the STEM motivation and entrepreneurship skills of pre-service teachers educating on different programs. For this purpose, the quantitative research approach was conducted, and a survey model was employed. The sample of this research comprised 285 pre-service teachers enrolled in the various departments of faculty of education in a state university in Türkiye. "Entrepreneurship Scale for Teacher Candidates" and "STEM Motivation Scale" were utilized as data collection tools. It was found statistically significant differences between early childhood education and elementary mathematics education, between elementary education and elementary mathematics education, and also between science and elementary mathematics education in favour of elementary mathematics education regarding the mean scores of pre-service teachers' mathematical motivation (MM) in the significance level of .05. It was also found that there was a significant difference between elementary education and elementary mathematics education in favour of elementary education regarding the mean scores of pre-service teachers' self-confidence (SC) in the significance level of .05 in Entrepreneurship Scale for Pre-service Teachers. Also, it was found that there was a significant difference between elementary education and elementary mathematics education in favour of elementary education regarding the mean scores of students' emotional intelligence (EI) in the significance level of .05 on the Entrepreneurship Scale for Teacher Candidates. According to the results, further implementation suggestions were given.

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INTRODUCTION

There is globalisation all over the world, so for a long time countries have competed with each other in science and technology to improve their economic situation. Constructing or revising new scientific knowledge would give occasion to much better and more advanced technologies, whereas using the latest technologies would cause further and upper metacognitive scientific knowledge constructions or revisions. This is a circle making countries compete with each other in science, technology, and so in an economy that would make countries bring up qualified citizens competing in job markets. For bringing up eligible citizens to compete in job markets, there have been new trends in educational policies, especially in the last few decades, namely STEM education. These innovative or adapted recent educational policy trends require bringing up students from all academic levels with high metacognitive abilities, especially being able to integrate and use scientific, technological, engineering, and mathematical (STEM) knowledge and gaining entrepreneurship thinking (Tozlu et al., 2019; Turgutalp, 2021).

STEM education is an approach that has come to the fore in the international discourse in the fields of education, manufacturing, revelation, and competition. (Marrero et al., 2014). STEM-based education has been receiving increasingly greater importance and attention worldwide (Aydin-Gunbatar et al., 2020) due to the need to train citizens enriched with 21st century skills such as offering solutions to problems, effective interactions, collaboration and creative thinking. STEM education is essential to increase students' STEM interests and career motivation in STEM fields (Miller & Roehrig, 2018). In STEM education, instead of integration, a more plausible philosophy could be adapted to demonstrate detailed, robust, and appropriate links between STEM disciplines by using constant interactions with a daily-life domain (Williams, 2011). Hence, STEM philosophy is a map to make students learn more connected (Stohlmann et al., 2012).

STEM education is a meta-discipline, a multidisciplinary effort that goes beyond science, technology, engineering and mathematics subjects. Instead, it focuses on the innovative process of constructing solutions to complex daily-life problems using innovative technologies. Engaging students from all educational levels in qualified STEM education needs educational programs including objectives focusing on STEM education, alternative instructional strategies, and alternative assessment methods by relating technology and engineering disciplines to the science and mathematics curriculums and also by increasing scientific inquiry, scientific reasoning, scientific argument construction, entrepreneurship skills and the engineering design processes. Hence, during teacher education programs, pre-service teachers should experience STEM-based education and learn how to conduct STEM education in the classrooms to guide their future students in achieving STEM literacy (Kennedy & Odell, 2014).

Researchers defined STEM education in different domains in literature. For an illustration, Moore et al. (2014) determined the STEM education as a philosophy to relate more STEM disciplines into a lesson focused on real-world issues. Similarly, according to Kelly and Knowles (2016), STEM education should include two or much more STEM disciplines. The STEM education interdisciplinary nature requires a multidisciplinary approach, interactions among contents, connected learning targets, skills, concepts, and skills in specific fields, integrating at least two or much more STEM disciplines. STEM education also requires problem-based learning, project-based learning, meaningful learning, motivating, enjoyable, engaging context domains, defining, formulating, evaluating, and solving problems, and open-ended, accurate word, authentic problems (Rosicka, 2016). Constructing questions, carrying out inquiries, analyzing gathered data, interpreting the findings and utilizing authentic processes are also needed. Students must benefit from using models, designing solutions, engineering-based designing prototypes, justifying the designs, and/or learning from failures and redesigning based on that learning. Collaborative learning, communication in groups, group work, student-centred pedagogies, and hands-on activities are needed through the STEM education processes. Highlighting

student misunderstandings, integrating assessment in instruction, utilizing alternative assessments, employing reflective writing, and considering the previously learned concepts are the factors that must be considered through the assessment process of STEM education. By this way, instruction integrated with STEM education create an opportunity to gain 21st century skills (Tytler, 2020). "Entrepreneurship" is one of 21st-century skills included in the category of "career and life skills" (Trilling & Fadel, 2009). Science, technology, engineering, and math (STEM) education has a lot in common with 21st-century society in that it is an educational model that allows people to learn how to do business and work together, as well as how to develop high-quality skills namely entrepreneurial and team work skills (Walan, 2021). Entrepreneurship skills refer to individual investment and focus on the personal benefit to the efforts at getting work done through risk-taking to satisfy human wants. Thus, a person with operative entrepreneurship skills understands their environment people's needs, takes a risk to solve persistent problems, sets solutions in motion for solving the issues, has foresight about the probable risks, and searches for success. Then entrepreneurship skills gaining based education would make students for their future life being able to manage small and medium enterprises, be innovative and creative in their jobs, being able to access funds for solving problems and contribute to the global economy on the scale of their employment (Dumebi-Moemeke, 2013). In literature, entrepreneurship skills gained based on education made individuals take risks, see the opportunities, be innovative, and think emotionally (Deveci & Çepni, 2017). In addition, the use of the term "entrepreneur" under the heading of "life skills" in the new mid-school science curriculum shows that the objectives of the new program are in line with the STEM methodology (Deveci, 2016). Moreoever, Farwati et al. (2021) mentioned that teachers integrate STEM education into tehir instruction to develop students' entrepreneurial skills and various 21st century skills. Hence, STEM education and entrepreneurship skills are closely related.

Motivation is defined as the intention of behavior (Elliot & Coverton, 2001). Considering studies conducted on motivation, it was found that there was a relationship between students' motivation on learning and academic achievement (Linnenbrink & Pintrich, 2002; Schick & Phillipson, 2009). In literature, STEM motivation was defined as the target to enhance students' motivation towards the STEM disciplines. The determination of students' motivation for STEM, as well as the maintenance of that interest, may be viewed as a significant factor in explaining their performance in STEM areas (Dönmez, 2020). Experimental designs were demonstrated to increase students' motivation towards STEM, and some of these efforts had positive effects whereas further studies were recommended (Rosenzweig & Wigfield, 2016). Starr et al. (2022) highlighted in their research that parents' STEM support caused an increase in students' STEM motivation. Cheng and her colleagues (2020) examined the influence of teachers' beliefs, and 3D modelling integration in teaching on students' science-technology-engineering and mathematics motivation. Finally, it was concluded that teachers' STEM integration ability predicted students' math motivation whereas teachers' beliefs and 3D modelling integration levels were not predictors (Cheng et al., 2020). Restivo et al. (2014) utilized augmented reality in teaching environments to improve students' STEM motivation, Starr et al. (2020) utilized authentic science practices to improve STEM motivation. In addition, Dönmez et al. (2022) utilized argumentation-based STEM activities for improving STEM motivation. To improve STEM motivation, Starr et al. (2019) utilized virtual reality experiences, where all the researches' differed teaching domains affected the research results positively. In the literature, there were also studies searching entrepreneurship education's effect on improving students' entrepreneurship skills. In Oosterbeek et al.'s (2010) research, the content was not appropriate for the previously determined targets: the impact on students' entrepreneurial skills was not meaningful, and the effect on planning to become an entrepreneur was also significantly not positive.

However, there are many impediments in STEM education, such as rigid school timetables and rigid curriculum targets, deficient teachers' awareness of STEM education and inadequate content knowledge of teachers to other subject areas, inflexible and unergonomic classroom designs, and

insufficient assessment strategies. With a focus on STEM interaction rather than integration driven by teachers, interventions can be developed to overcome these impediments (Williams, 2011). This is likely if only teachers had enough awareness of STEM philosophy, enough multidisciplinary content knowledge, practical thinking, high metacognitive thinking skills such as entrepreneurship skills and the ability to use alternative assessment strategies. These mentioned characteristics could only be given to teachers through teacher education programs if only tutors in the education faculty were aware of pre-service teachers' previous STEM motivation, especially their entrepreneurship skills.

Significance of The Study

The main aim of the investigation is to determine the STEM motivation and entrepreneurship skills of pre-service teachers enrolled in different departments. As it is known, STEM education is explained as an integrated and interdisciplinary approach from kindergarten to 12th grade that focuses on the education of students in four disciplines (Bybee, 2010; Wang et al., 2011). Integrated STEM education should be started in preschool education to be more effective in increasing students' creativity (Üret & Ceylan, 2021). Also, early-age STEM education may lead students to gain knowledge and skill in STEM-related disciplines (Park et al., 2017). Unfortunately, one of the main themes in science education literature is the increasing unwillingness of students to participate in science, technology, engineering and mathematics (STEM) (Bøe et al., 2011; De Loof et al., 2021). Teachers have an essential role in implementing STEM education, so teacher education programs should train pre-service teachers in terms of implementing STEM education (Aydn et al., 2020). Teachers have difficulty implementing STEM in their courses due to a lack of knowledge (Wang et al., 2011) and motivation regarding STEM education (Abdullah et al., 2017).. Before becoming a teacher, teachers should equip pre-service teachers with STEM awareness and motivation for implementing STEM in their lessons. In order to increase students' motivation and engagement in STEM, it is important to investigate teachers' motivation towards STEM and their entrepreneurship skills. Also, entrepreneurial integrated STEM education would offer learners an interactive environment for communication, emotional needs, and learning analysis (Kaya-Capocci & Peters-Burton, 2023; Kaya-Capocci & Ucar, 2023). In the current study, we focus on the STEM motivation and entrepreneurship skills of preservice teachers who are STEM teachers in the future.

The related literature highlighted a need for further research and discussions on the knowledge, experiences, and backgrounds of teachers effectively teaching STEM education (Stohlmann et al., 2012). However, most of the STEM studies focused on a single point as achievement, motivation, conception etc. In the current research, being different from the literature, both STEM motivation and entrepreneurship skills of pre-service teachers enrolled in various departments were aimed to determine simultaneously to be able to make a much more detailed and connected interpretation based on the findings in order to allow teacher educators to construct STEM-based teaching environments for also improving pre-service teachers' entrepreneurship skills being aware of their pre-knowledge.

METHOD

Research Design

The quantitative research approach was conducted in the current research, and a survey design was employed. A survey design was used to investigate the views of a large group of people regarding a particular topic (Fraenkel & Wallen, 2006). A survey design was employed in the research with the aim of conducting a situational analysis of a broader sample group using questionnaires to determine the STEM motivations and entrepreneurial skills of prospective teachers studying in different departments. In quantitative research, researchers collect data by using surveys or interviews to explain the attitudes, opinions, behaviors, or characteristics of a population or a sample from the population to test hypotheses through statistical analysis of the responses to the questions (Creswell, 2009).

Participants

The sample of this research was comprised of 285 pre-service teachers enrolled in the departments of early childhood education, elementary education, science education, and elementary mathematics education programme in a state university in Turkey. Table 1 shows the frequency and distribution of the pre-service teachers. In Table 1, frequency was shown by f, and percentages by %. The population of the study comprises prospective teachers studying in STEM-related fields (science, mathematics, chemistry, physics, biology, elementary education, and preschool education) at state universities in Turkey. The sample of the research consists of students pursuing education in STEM-related fields, specifically preschool education, science education, mathematics education, and classroom teaching, at a state university in the Central Anatolia region. Non-probability sampling, specifically convenience sampling, was employed in the selection of the sample. Data were collected from teacher candidates on a voluntary basis, and no distinction was made based on the grade level, as teacher candidates did not take a specific course related to STEM or Entrepreneurship.

Table 1. *Frequency and percentage distribution of the pre-service teachers*

		f	%
Gender	Female	229	80.4
	Male	56	19.6
Departments	Early child education	63	22.1
	Elementary education	64	22.5
	Science education	79	27.7
	Elementary mathematics education	79	27.7
	Total	285	100.0

Research Instruments and Processes

This research used two scales to collect data: the "Entrepreneurship Scale for Teacher Candidates" and the "STEM Motivation Scale". "Entrepreneurship Scale for Teacher Candidates" was developed by Deveci and Cepni (2015), composed of 38 items and five sub-categories: risk-taking (7 item), emotional intelligence (8 item), confidence (7 item), seeing opportunities (9 item), and innovation (7 item). The Cronbach's alpha reliability coefficient of the scale was .77. The Cronbach's alpha reliability coefficient of the Entrepreneurship Scale for Teacher Candidates applied on the sample in which the study was found .805.

"STEM Motivation Scale" was translated from English into Turkish through appropriate methodology by Dönmez (2020). The scale included 25 items and four sub-categories: science (6 item), technology (7 item), engineering (5 item) and mathematics (7 item). The scale's Cronbach's alpha reliability coefficient was .84. Moreover, the Cronbach's alpha reliability coefficient of the STEM Motivation Scale applied to the sample in which the study was found .807. Since the values obtained for both scales were close to the original value, they were used in the research as high-reliability scales.

Data Analysis

Statistical Package for Social Sciences (SPSS 26.0) program was employed for the gathered data. The descriptive and inferential statistical analyses were utilized to examine gathered data and interpret the findings. The demographic characteristics of the participants were obtained by using descriptive statistics. Moreover, the skewness and kurtosis values were utilized to explore the normal distribution of the data. One-way multivariate analysis of variance (MANOVA) was utilized to determine the differences between groups in this research. MANOVA is also utilized to determine whether multiple independent variables, alone or in combination, impact the dependent variables. In this research, it was preferred to use this analysis because there are nine dependent variables (including entrepreneurship and motivation sub-dimensions) and one categoric independent variable (four different disciplines). Instead of

performing ANOVA for these dependent variables separately, MANOVA, which allows the dependent variables to be analyzed simultaneously, should be applied to reduce the Type I error rate (Tabachnick ve Fidell, 2013) and it was determined the relationships between variables with Pearson correlation analysis. This current research determined the significance level as $p<.05$.

Ethic

The necessary ethics committee permissions for the research were obtained from the Scientific Research and Publication Ethics Social Sciences and Humanities Ethics Committee of Cumhuriyet University with the decision dated 30.12.2021 and numbered 113051.

RESULTS

Assumptions of MANOVA Analysis

In this part, the procedures and the assumptions of MANOVA were explained because being able to perform this analysis, the assumptions were necessary. MANOVA had a series of assumptions. These were the level of independent and dependent variables, size of the sample, observation independency, normality, outliers, linearity and multicollinearity, and variance-covariance matrices' homogeneity.

Level of both dependent and independent variables

There must be two or more dependent variables, and their type of measurement should be interval or proportional. Also, there must be two or more groups containing independent variable. The measurement type of this variable should be categorical, and the groups should be independent (Mayers, 2013). This study had nine dependent variables: risk-taking (RT), emotional intelligence (EI), self-confidence (SC), seeing opportunities (SO), being innovative (BI), science motivation (SM), technology motivation (TM), engineering motivation (EM), and mathematics motivation (MM). Moreover, one categorical independent group included early childhood education (ECE), elementary education (EE), elementary mathematics education (EME), and science education (SE). Thus, these assumptions were satisfied.

Sample size

Generally, each group should have more samples than the dependent variable. In each cell the minimum participants number in the current research is nine. In the research, there were at least 63 students in each cell. Thus, the sample size was sufficient.

Independence of observation

Observations must be independent. That is, in each group or between the groups there must be no relationship (Pallant, 2005). In this study, this assumption was met as the groups consisted of students from different fields.

Normality

In MANOVA analysis, multiple normality should be sought among the assumptions. Still, this assumption could be tested by looking at the normality of the dependent variable in each independent variable group. When the number of observations is less than 29, the Shapiro-Wilks test is used, and when the number of observations is more, the Kolmogorov-Simirnov test is checked (Kalaycı, 2008). Thus, Kolmogorov-Simirnov test values were considered since the number of observations in this study was more than 29. In Table 2, it was seen that the p values obtained for some variables according to the Kolmogorov-Smirnow normality tests were less than .05.

Table 2. *Tests of normality*

		Kolmogorov-Smirnov[a]		
	Departments	Statistic	df	Sig.
SM	ECE	,130	63	,010
	EE	,165	64	,000
	EME	,160	79	,000
	SE	,098	79	,056
TM	ECE	,109	63	,060
	EE	,097	64	,200*
	EME	,113	79	,015
	SE	,109	79	,021
EM	ECE	,101	63	,179
	EE	,118	64	,027
	EME	,116	79	,010
	SE	,095	79	,078
MM	ECE	,098	63	,200*
	EE	,129	64	,010
	EME	,123	79	,005
	SE	,130	79	,002
RT	ECE	,122	63	,021
	EE	,161	64	,000
	EME	,089	79	,188
	SE	,131	79	,002
SO	ECE	,133	63	,008
	EE	,186	64	,000
	EME	,158	79	,000
	SE	,183	79	,000
SC	ECE	,182	63	,000
	EE	,143	64	,002
	EME	,103	79	,036
	SE	,093	79	,086
EI	ECE	,151	63	,001
	EE	,135	64	,005
	EME	,103	79	,038
	SE	,133	79	,001
BI	ECE	,126	63	,015
	EE	,121	64	,021
	EME	,082	79	,200*
	SE	,118	79	,009

Hence, according to skewness and kurtosis values, the scores' distribution normality must be checked with univariate analysis. Theoretically, skewness and kurtosis values must be equal to zero (Tabachnick & Fidell, 2007) whilst Field (2009) previously determined that skewness and kurtosis values could be among -2 and +2 for normal distribution. Values given in Table 3 below were generally between +1 and -1 values. Thus, this assumption is likely met.

Table 3. *Skewness and kurtosis values*

D. Variables	Departments	Skewness	Std. Error	Kurtosis	Std. Error
SM	ECE	-,490	,302	,937	,595
	EE	-,550	,299	-,051	,590
	EME	-,415	,271	-,206	,535
	SE	,002	,271	-,364	,535
TM	ECE	-,063	,302	-,824	,595
	EE	,022	,299	-,298	,590
	EME	-,044	,271	,001	,535
	SE	,033	,271	-,202	,535
EM	ECE	,293	,302	-,710	,595
	EE	,542	,299	,121	,590
	EME	,203	,271	-,818	,535
	SE	,202	,271	-,836	,535
MM	ECE	,203	,302	-,286	,595

	EE	-,452	,299	-,073	,590
	EME	-,266	,271	-,837	,535
	SE	,289	,271	-,754	,535
RT	ECE	,094	,302	,098	,595
	EE	,723	,299	,065	,590
	EME	,113	,271	,234	,535
	SE	,205	,271	-,536	,535
SO	ECE	,288	,302	-,351	,595
	EE	,991	,299	1,341	,590
	EME	,116	,271	,766	,535
	SE	,400	,271	,051	,535
SC	ECE	,719	,302	,114	,595
	EE	,435	,299	-,376	,590
	EME	-,083	,271	-,321	,535
	SE	,220	,271	-,019	,535
EI	ECE	,146	,302	,217	,595
	EE	,523	,299	,293	,590
	EME	-,140	,271	-,235	,535
	SE	,121	,271	-,536	,535
BI	ECE	-,268	,302	,135	,595
	EE	-,241	,299	,931	,590
	EME	-,220	,271	-,229	,535
	SE	,296	,271	,515	,535

Then, to see variance-covariance matrices in groups are equal or not, Box's test of equality of covariance matrices must be analyzed to validate the multivariate normality. If the matrices are equal, the statistic is non-significant. As could be seen in Table 4, for this study, Box's test significance values (p= .868) were more meaningful than the alpha level (.05). Also, the covariance matrices were nearly equal to each other since the statistic was non-significant for this study. Hence, the multivariate normality assumption was provided too.

Table 4. *Box's test of equality of covariance matrices*

Box's Test of Equality of Covariance Matrices[a]	
Box's M	123,952
F	,866
df1	135
df2	159692,190
Sig.	,868

Outliers

An important essential assumption was outliers for MANOVA analysis since the analysis was susceptible to univariate and multivariate outliers. Therefore, it must be investigated the univariate and multivariate outliers. It is accepted for the univariate outliers that "there are cases (one or more) with exemplifying extreme value on one variable" (Tabachnick & Fidell, 2007, p.73). According to the findings, it was needed to highlight whether the outliers had a meaningful effect on the average. Thus, all continuous variables' data are used to standardize scores (z-scores), and then "if the z-scores are higher than +3.29 or lower than -3.29, these cases are the potential outliers" (Tabachnick & Fidell, 2007, p.73). The findings of all variables' minimum and maximum z values are shown in Table 5. It could be stated that for the variable all min. and max standardized scores were among -3.29 and +3.29. Hence, there were no extreme z-scores in the data.

Table 5. *Minimum and maximum z scores values*

Variables	Min. z scores values	Max. z scores values
BI	-3,09	+2,86
EI	-2,43	+2,99
SC	-2,97	+,272
SO	-2,44	+2,94
RT	-2,64	+2,57
MM	-2,37	+2,44
EM	-1,55	+2,97
TM	-2,59	+2,47
SM	-2,92	+2,92

Another important assumption was determined to found multivariate outliers on the dependent variables. "Mahalanobis distance measures the distance of a particular case from the centroid of the remaining cases, where the centroid is the point created by means of all the variables" (Tabachnick & Fidell, 2007, p. 74). Mahalanobis distance for multivariate outliers in the data was calculated by using the regression section in the SPSS. Also, this value must be compared to a critical value to see the number of multivariate outliers. The critical value could be assessed for each case by the chi-square table with dependent variable numbers as being the freedom degree (df), and the value of alpha is .001 (Pallant, 2005, p. 280). On the basis of the chi-square table, nine dependent variables' column showed that the critical value was a maximum value of 15,507 for this study (Warner, 2012, p.1063).

Table 6. *Residuals statistics*

Residuals Statistics[a]

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	1,86	3,33	2,61	,264	285
Std. Predicted Value	-2,833	2,706	,000	1,000	285
Standard Error of Predicted Value	,087	,265	,202	,039	285
Adjusted Predicted Value	1,73	3,34	2,61	,267	285
Residual	-2,061	2,138	,000	1,081	285
Std. Residual	-1,876	1,946	,000	,984	285
Stud. Residual	-1,898	2,004	,000	1,002	285
Deleted Residual	-2,110	2,269	,000	1,120	285
Stud. Deleted Residual	-1,907	2,015	,000	1,003	285
Mahal. Distance	**,785**	**15,468**	**8,968**	**3,537**	**285**
Cook's Distance	,000	,025	,004	,004	285
Centered Leverage Value	,003	,054	,032	,012	285

a. Dependent Variable: Departments

The Mahalanobis distance maximum value for this study should be at most 15,507 for a nine-variable MANOVA analysis. In the obtained SPSS analysis, Mahal. A distance value of 15,468, as can be seen in Table 6, was obtained. Thus, this assumption was met for the MANOVA analysis.

Linearity

This assumption states that a linear relationship between each pair of dependent variables should exist. When the graph given below in Figure 1 was examined, there was a linear relationship between the variables since it generally started from the bottom left and went to the top right or from the top left and went to the bottom right. Thus, this assumption was also provided.

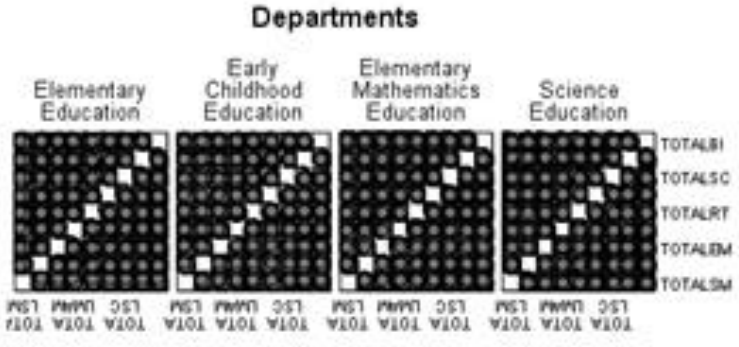

Figure 1. *Scatter plots showing linearity for the dependent variables regarding departments*

Multicollinearity

The multicollinearity is to be discussed when the input variables have a high correlation bigger than .90 (Tabachnick & Fidell, 2007). So, when this assumption was analyzed, as shown in Table 7., among the dependent variables there was no high correlation since all the correlations were lower than .90. Then, it was determined that the assumption was sufficient.

Table 7. *Pearson Correlation among the dependent variables*

		SM	TM	EM	MM	RT	SO	SC	EI	BI
SM	Pearson Correlation	1	,171**	,361**	,393**	,153**	,228**	,214**	,170**	,418**
	Sig. (2-tailed)		,003	,000	,000	,007	,000	,000	,003	,000
	N	304	304	304	304	304	304	304	304	304
TM	Pearson Correlation	,171**	1	,250**	,144*	,069	,071	,103	,134*	,032
	Sig. (2-tailed)	,003		,000	,012	,229	,220	,073	,020	,575
	N	304	304	304	304	304	304	304	304	304
EM	Pearson Correlation	,361**	,250**	1	,249**	,084	,086	,094	,060	,394**
	Sig. (2-tailed)	,000	,000		,000	,146	,135	,101	,300	,000
	N	304	304	304	304	304	304	304	304	304
MM	Pearson Correlation	,393**	,144*	,249**	1	,177**	,195**	,076	,066	,231**
	Sig. (2-tailed)	,000	,012	,000		,002	,001	,186	,251	,000
	N	304	304	304	304	304	304	304	304	304
RT	Pearson Correlation	,153**	,069	,084	,177**	1	,611**	,534**	,441**	,491**
	Sig. (2-tailed)	,007	,229	,146	,002		,000	,000	,000	,000
	N	304	304	304	304	304	304	304	304	304
SO	Pearson Correlation	,228**	,071	,086	,195**	,611**	1	,597**	,566**	,422**
	Sig. (2-tailed)	,000	,220	,135	,001	,000		,000	,000	,000
	N	304	304	304	304	304	304	304	304	304
SC	Pearson Correlation	,214**	,103	,094	,076	,534**	,597**	1	,613**	,489**
	Sig. (2-tailed)	,000	,073	,101	,186	,000	,000		,000	,000
	N	304	304	304	304	304	304	304	304	304
EI	Pearson Correlation	,170**	,134*	,060	,066	,441**	,566**	,613**	1	,407**
	Sig. (2-tailed)	,003	,020	,300	,251	,000	,000	,000		,000
	N	304	304	304	304	304	304	304	304	304
BI	Pearson Correlation	,418**	,032	,394**	,231**	,491**	,422**	,489**	,407**	1
	Sig. (2-tailed)	,000	,575	,000	,000	,000	,000	,000	,000	
	N	304	304	304	304	304	304	304	304	304

**. Correlation is significant at the .01 level (2-tailed) .

*. Correlation is significant at the .05 level (2-tailed).

Homogeneity of Variance

According to Table 8 below, because the p value as .868 is bigger than .05, the dependent variables' covariance matrices are homogeneous across the groups. Thus, this assumption was provided for the MANOVA analysis.

Table 8. *Box's test of equality of covariance matrices*

Box's M	123,952
F	,866
df1	135
df2	159692,190
Sig.	,868

For assessing homogeneity assumption for variances for MANOVA analysis could be utilized with Levene's test, so it could be controlled whether dependent variable variances' values are similar for the groups. Levene's test checks the homogeneity of group variances for each dependent variable. In Table 9 obtained in SPSS analysis, the variances of all dependent variables were found to be equal (homogeneous) (p>.05).

Table 9. *Levene's test of equality of error variances*

		Levene Statistic	df1	df2	Sig.
SM	Based on Mean (M)	,585	3	281	,625
	Based on Median (Md)	,544	3	281	,653
	Based on Median and with adjusted df (Md+df)	,544	3	270,215	,653
	Based on trimmed mean (TM)	,641	3	281	,589
TM	(M)	,810	3	281	,489
	(Md)	,662	3	281	,576
	(Md+df)	,662	3	278,385	,576
	(TM)	,799	3	281	,495

EM	(M)	,168	3	281	,918
	(Md)	,203	3	281	,894
	(Md+df)	,203	3	279,994	,894
	(TM)	,180	3	281	,910
MM	(M)	,414	3	281	,743
	(Md)	,382	3	281	,766
	(Md+df)	,382	3	279,374	,766
	(TM)	,400	3	281	,753
RT	(M)	,735	3	281	,532
	(Md)	,604	3	281	,613
	(Md+df)	,604	3	274,632	,613
	(TM)	,729	3	281	,535
SO	(M)	,451	3	281	,717
	(Md)	,475	3	281	,700
	(Md+df)	,475	3	279,758	,700
	(TM)	,480	3	281	,696
SC	(M)	,855	3	281	,465
	(Md)	,901	3	281	,441
	(Md+df)	,901	3	279,694	,441
	(TM)	,835	3	281	,476
EI	(M)	,830	3	281	,478
	(Md)	,817	3	281	,486
	(Md+df)	,817	3	275,888	,486
	(TM)	,815	3	281	,487
BI	(M)	,609	3	281	,610
	(Md)	,622	3	281	,601
	(Md+df)	,622	3	273,705	,601
	(TM)	,655	3	281	,580

Descriptive Statistics

Table 10. *Descriptive statistics for the dependent variables*

D. Variables	Departments	Mean	Std. Deviation	N
SM	ECE	19,59	2,768	63
	EE	19,69	2,259	64
	EME	19,14	2,630	79
	SE	19,65	2,592	79
	Total	19,50	2,569	285
TM	ECE	21,60	2,459	63
	EE	21,20	2,431	64
	EME	20,90	2,432	79
	SE	21,00	2,154	79
	Total	21,15	2,367	285
EM	ECE	9,68	2,983	63
	EE	9,08	2,961	64
	EME	9,30	2,738	79
	SE	9,93	2,932	79
	Total	9,51	2,901	285
MM	ECE	15,32	2,421	63
	EE	16,04	2,597	64
	EME	17,85	2,656	79
	SE	16,11	2,494	79
	Total	16,40	2,705	285
RT	ECE	26,83	2,397	63
	EE	27,41	2,629	64
	EME	26,59	2,858	79
	SE	27,59	2,703	79
	Total	27,11	2,686	285
SO	ECE	35,77	2,739	63
	EE	36,30	2,599	64
	EME	35,13	2,696	79
	SE	36,09	2,962	79
	Total	35,80	2,783	285
SC	ECE	26,99	2,569	63
	EE	27,49	2,422	64
	EME	26,03	2,824	79
	SE	26,99	2,500	79
	Total	26,84	2,634	285
EI	ECE	31,89	2,673	63
	EE	32,19	2,867	64
	EME	30,95	2,564	79
	SE	31,96	2,853	79
	Total	31,71	2,768	285
BI	ECE	24,15	3,308	63
	EE	24,67	2,912	64

EME	24,03	3,059	79
SE	24,57	2,846	79
Total	24,35	3,023	285

It was seen that there were minor differences between the mean scores of the dependent variables (SM, TM, EM, MM, RT, SO, SC, EI, BI) of the departments in Table 10 above. The significance of these differences was checked by MANOVA analysis.

Table 11. *Multivariate tests result table*

Effect		Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power[d]
Intercept	Pillai's Trace	,996	8170,45[b]	9,000	273,00	,000	,996	73534,05	1,000
	Wilks' Lambda	,004	8170,45[b]	9,000	273,00	,000	,996	73534,05	1,000
	Hotelling's Trace	269,35	8170,45[b]	9,000	273,00	,000	,996	73534,05	1,000
	Roy's Largest Root	269,35	8170,45[b]	9,000	273,00	,000	,996	73534,05	1,000
Departments	Pillai's Trace	,277	3,11	27,000	825,00	**,000**	,092	84,057	1,000
	Wilks' Lambda	,735	3,29	27,000	797,94	**,000**	,098	86,380	1,000
	Hotelling's Trace	,345	3,47	27,000	815,00	**,000**	,103	93,718	1,000
	Roy's Largest Root	,293	8,93[c]	9,000	275,00	**,000**	,226	80,447	1,000

a. Design: Intercept + Departments
b. Exact statistic
c. The statistic is an upper bound on F that yields a lower bound on the significance level.
d. Computed using alpha = ,05

In this current investigation, for interpreting the independent variable effect on dependent variables, Wilks' Lambda was used. When the main effect was interpreted, Wilks' Lambda analysis in Table 11 showed that the combined dependent variables significantly different across all the education departments were revealed. Thus, there were statistically significant mean differences among the groups on the combined dependent variables of SM, TM, EM, MM, RT, SO, SC, EI, and BI since Wilks' Lambda value (.735, F(27, 797,94) = 3,29, p = .000) was less than .05. Thus, the first null hypothesis was rejected. Also, the partial eta squared was a small effect size as .098 (Cohen, 1988). So, approximately 9,8% of the multivariate variance of the dependent variables was explained. Another essential statistic was that the test observed power was 1.00, and the calculated power was .80 at the beginning of the study. Thus, the differences among the groups had meaningful significance.

The second table in the MANOVA output was the "Tests of Between-Subjects Effects" to investigate further concerning each dependent variable (Table 12). If one was different, it must be found which group differed from the study findings regarding the mean scores (SM, TM, EM, MM, RT, SO, SC, EI, and BI). Thus, it was necessary to evaluate MANOVAs with Bonferroni posthoc tests. Therefore, the test was utilized, and the pairwise comparisons were shown in Table 12.

Table 12. *Tests of between-subjects effect table*

Dependent Variable		(I) Departments	(J) Departments	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval Lower Bound	95% Confidence Interval Upper Bound
SM	Bonferroni	ECE	EE	-,10	,457	1,000	-1,31	1,11
			EME	,45	,435	1,000	-,71	1,60
			SE	-,06	,435	1,000	-1,22	1,09
		EE	ECE	,10	,457	1,000	-1,11	1,31
			EME	,55	,433	1,000	-,60	1,70
			SE	,04	,433	1,000	-1,11	1,19
		EME	ECE	-,45	,435	1,000	-1,60	,71
			EE	-,55	,433	1,000	-1,70	,60
			SE	-,51	,409	1,000	-1,60	,58
		SE	ECE	,06	,435	1,000	-1,09	1,22
			EE	-,04	,433	1,000	-1,19	1,11
			EME	,51	,409	1,000	-,58	1,60
TM	Bonferroni	ECE	EE	,40	,420	1,000	-,71	1,52
			EME	,71	,399	,469	-,36	1,77
			SE	,61	,399	,783	-,46	1,67
		EE	ECE	-,40	,420	1,000	-1,52	,71
			EME	,30	,398	1,000	-,75	1,36
			SE	,20	,398	1,000	-,85	1,26
		EME	ECE	-,71	,399	,469	-1,77	,36
			EE	-,30	,398	1,000	-1,36	,75
			SE	-,10	,376	1,000	-1,10	,90
		SE	ECE	-,61	,399	,783	-1,67	,46
			EE	-,20	,398	1,000	-1,26	,85
			EME	,10	,376	1,000	-,90	1,10

EM	Bonferroni	ECE	EE	,60	,514	1,000	-,77	1,97
			EME	,37	,489	1,000	-,93	1,67
			SE	-,25	,489	1,000	-1,56	1,05
		EE	ECE	-,60	,514	1,000	-1,97	,77
			EME	-,23	,487	1,000	-1,52	1,07
			SE	-,86	,487	,482	-2,15	,44
		EME	ECE	-,37	,489	1,000	-1,67	,93
			EE	,23	,487	1,000	-1,07	1,52
			SE	-,63	,461	1,000	-1,85	,60
		SE	ECE	,25	,489	1,000	-1,05	1,56
			EE	,86	,487	,482	-,44	2,15
			EME	,63	,461	1,000	-,60	1,85
MM	Bonferroni	ECE	EE	-,71	,452	,693	-1,92	,49
			EME	-2,53*	,430	**,000**	-3,67	-1,38
			SE	-,78	,430	,421	-1,93	,36
		EE	ECE	,71	,452	,693	-,49	1,92
			EME	-1,81*	,428	**,000**	-2,95	-,67
			SE	-,07	,428	1,000	-1,21	1,07
		EME	ECE	2,53*	,430	**,000**	1,38	3,67
			EE	1,81*	,428	**,000**	,67	2,95
			SE	1,74*	,405	**,000**	,67	2,82
		SE	ECE	,78	,430	,421	-,36	1,93
			EE	,07	,428	1,000	-1,07	1,21
			EME	-1,74*	,405	**,000**	-2,82	-,67
RT	Bonferroni	ECE	EE	-,58	,473	1,000	-1,84	,68
			EME	,23	,450	1,000	-,96	1,43
			SE	-,77	,450	,543	-1,96	,43
		EE	ECE	,58	,473	1,000	-,68	1,84
			EME	,81	,449	,423	-,38	2,01
			SE	-,18	,449	1,000	-1,38	1,01
		EME	ECE	-,23	,450	1,000	-1,43	,96
			EE	-,81	,449	,423	-2,01	,38
			SE	-1,00	,424	,116	-2,13	,13
		SE	ECE	,77	,450	,543	-,43	1,96
			EE	,18	,449	1,000	-1,01	1,38
			EME	1,00	,424	,116	-,13	2,13
SO	Bonferroni	ECE	EE	-,53	,490	1,000	-1,83	,77
			EME	,64	,466	1,000	-,60	1,88
			SE	-,32	,466	1,000	-1,56	,92
		EE	ECE	,53	,490	1,000	-,77	1,83
			EME	1,17	,464	,074	-,06	2,40
			SE	,21	,464	1,000	-1,03	1,44
		EME	ECE	-,64	,466	1,000	-1,88	,60
			EE	-1,17	,464	,074	-2,40	,06
			SE	-,96	,439	,175	-2,13	,20
		SE	ECE	,32	,466	1,000	-,92	1,56
			EE	-,21	,464	1,000	-1,44	1,03
			EME	,96	,439	,175	-,20	2,13
SC	Bonferroni	ECE	EE	-,50	,460	1,000	-1,72	,73
			EME	,97	,438	,166	-,19	2,13
			SE	,00	,438	1,000	-1,16	1,17
		EE	ECE	,50	,460	1,000	-,73	1,72
			EME	1,47*	,436	**,005**	,31	2,62
			SE	,50	,436	1,000	-,66	1,66
		EME	ECE	-,97	,438	,166	-2,13	,19
			EE	-1,47*	,436	**,005**	-2,62	-,31
			SE	-,96	,412	,121	-2,06	,13
		SE	ECE	,00	,438	1,000	-1,17	1,16
			EE	-,50	,436	1,000	-1,66	,66
			EME	,96	,412	,121	-,13	2,06
EI	Bonferroni	ECE	EE	-,29	,486	1,000	-1,59	1,00
			EME	,95	,463	,250	-,28	2,18
			SE	-,06	,463	1,000	-1,29	1,17
		EE	ECE	,29	,486	1,000	-1,00	1,59
			EME	1,24*	,461	**,045**	,02	2,46
			SE	,23	,461	1,000	-,99	1,46
		EME	ECE	-,95	,463	,250	-2,18	,28
			EE	-1,24*	,461	**,045**	-2,46	-,02
			SE	-1,01	,436	,128	-2,17	,15
		SE	ECE	,06	,463	1,000	-1,17	1,29
			EE	-,23	,461	1,000	-1,46	,99
			EME	1,01	,436	,128	-,15	2,17
BI	Bonferroni	ECE	EE	-,52	,537	1,000	-1,95	,91
			EME	,12	,511	1,000	-1,24	1,48
			SE	-,42	,511	1,000	-1,77	,94
		EE	ECE	,52	,537	1,000	-,91	1,95
			EME	,64	,509	1,000	-,71	1,99
			SE	,10	,509	1,000	-1,25	1,46
		EME	ECE	-,12	,511	1,000	-1,48	1,24

	EE	-,64	,509	1,000	-1,99	,71
	SE	-,54	,482	1,000	-1,82	,74
SE	ECE	,42	,511	1,000	-,94	1,77
	EE	-,10	,509	1,000	-1,46	1,25
	EME	,54	,482	1,000	-,74	1,82

Based on observed means.
The error term is Mean Square(Error) = 9,160.
*. The mean difference is significant at the ,05 level.

Table 12 indicated that there were statistically significant differences both between early childhood education and elementary mathematics education (p<.05) and elementary education and elementary mathematics education (p<.05) about the mean scores of students' MM. Also, there was a statistically significant difference between science and elementary mathematics education (p<.05) regarding the mean scores of students' MM. The mean differences between early childhood education and elementary mathematics education were 2,53 in favour of elementary mathematics education. It was also seen that elementary mathematics education's mean score was again higher than elementary education's (1,81). Moreover, the mean differences between science and elementary mathematics education were 1,74 in favour of elementary mathematics education.

Table 12 showed a statistically significant difference between elementary education and elementary mathematics education (p<.05) regarding the mean scores of students' SC. The mean differences between elementary education and elementary mathematics education were 1,47 in favour of elementary education.

Table 12 showed a statistically significant difference between elementary education and elementary mathematics education (p<.05) regarding the mean scores of students' EI. The mean differences between elementary education and elementary mathematics education were 1,24 in favour of elementary education.

Finally, the analysis results found no statistical difference between the mean values, other dependent variables and departments. Finally, according to the findings of the analysis, no statistical difference was found among the mean values, other dependent variables and departments.

DISCUSSION, CONCLUSION, RECOMMENDATIONS

In the current research, STEM motivation and the entrepreneurship skills of pre-service teachers educating in different departments were determined by utilizing two different scales simultaneously, as “Entrepreneurship Scale for Teacher Candidates”, and “STEM Motivation Scale” and by analysing the gathered data. Based on the findings of the research, it was found that statistically significant differences between early childhood education and elementary mathematics education, between elementary education and elementary mathematics education, and also between science and elementary mathematics education in favour of elementary mathematics education regarding the mean scores of students’ mathematical motivation (MM) in the significance level of .05. In other words, elementary mathematics education department’s pre-service teachers’ mathematical motivation scores in STEM Motivation Scale were higher than the other teacher education departments’ pre-service teachers’ mathematical motivation scores. The high mathematical motivation scores could be explained by pre-service mathematics teachers’ high university entrance exam mathematics scores and also by the lessons related to pure mathematics the pre-service mathamathics teachers have studied on through the teacher education program. According to the research results, it was important that the pre-service mathematics teachers’ high mathematical motivation for their further classes to plan, monitor and evaluate alternative mathematics teaching espeacillay in means of STEM and entrepreneurship education. Also, in literature ıt was seen that the mathematics teachers’ mathematical motivation, in means of self-efficiacy, the value they attribute in mathematics, and their emotional commitment to their profession was so important to interpret the strategies they use to plan, monitor and evaluate mathematics instruction and also the strategies they use to activate and enhance students' self-regulated learning in mathematics (Chatzistamatiou et al., 2014). The mathematics teachers’ mathematical motivation was also highlighted important in literature for their technology use in their calsses through mathematics teaching (Reinhold et al., 2021).

It was also found that there was a significant difference between elementary education and elementary mathematics education in favour of elementary education regarding the mean scores of students' self-confidence (SC) in the significance level of .05 in the Entrepreneurship Scale for Teacher Candidates. This result may be due to multidisciplinary pre-service elementary teacher education program courses. Just like the current research's results in literature, Kaasila et al. (2004) studied with 269 pre-service elementary teachers for determining their self-confidence and they found four fifth of their participants had high self confidence. Gunning and Mensah (2011) also searched the pre-service elementary school teachers' self efficiacy and self-confidence since tey believed first of all it was an important factor for student own lerning. Also, they made suggestions for further elementary teacher education programs. In the current research, it was also thought high self confidence scores of pre-service elementary school teachers would probably have a positive effect in their further classes in means of planning, organizing, monitoring, and evaluating effective teaching domains. It would be benefical to state that the research's positive self confidence results in favour of pre-service elementary teachers could make a positive contribution for academicians educating these pre-service teachers being aware of this self confidence level would positively affect their future classes, so the academicians alternative teaching-learning experiences for the pre-service teachers would contribute to this self confidence too. It could also be benefical to state that the other pre-service teacher educating departments'educators would construct verified teaching and learning domains experiences for their candidate teachers to make their self confidence high for their future classes.

Also, it was found that there was a significant difference between elementary education and elementary mathematics education in favour of elementary education regarding the mean scores of students' emotional intelligence (EI) in the significance level of .05 on the Entrepreneurship Scale for Teacher Candidates. This could be because the pre-service elementary teachers had been working with little children but with an extensive age scale being different from early childhood education, elementary mathematics education, and science education through their internships at schools as well as this could be because of the elementary teacher education program's culture came into existence through years. Being different form the current research, in literature Kaufhold and Johnson (2005) analyzed elementary school teachers' emotional intelligence levels and found not so highly results. Since it was so important to highlight that the pre-service elementary teachers' emotional intelligence level was so important for their further students to understand tham emotionally, the positive results of the current research would make a positive contribution to literature.

In the current research, there was no significance different was found beetween two grouped combinations of the different departments as early childhood education, elementary education, elementary mathematics education, and science education in means of risk taking, seeing opportunities, being innovative, sicence motivation, technology motivation, and engineering motivation sub-dimensions since the significance level was bigger than .05 for different two grouped combinations of different pre-service teacher education program. On the basis of the current research results it could be offered much more entrepreneurship skill enhanching programs and STEM educating programs in pre-service teacher education departments. In literature as offered Arruti and Panos-Castro (2020) made an international entrepreneurship education program for pre-service teachers as a longitudinal study.

In summary in literature, there were so many searching the effectiveness of alternative teaching domains on students' STEM motivation and entrepreneurship skills of students (Dönmez et al., 2022; Oosterbeek et al., 2010; Restivo et al., 2014; Starr et al., 2019; Starr et al., 2020), but being different from the literature, in the current research it was aimed to highlight pre-service teachers' STEM motivation and entrepreneurship skills together whom would be further responsible for constructing teaching domains for improving the same skills for their students. Thus, for further studies, different sub-dimensions of these skills could be studied on pre-service teachers to allow academicians to construct alternative teaching domains to improve the pre-service teachers' STEM motivation and

entrepreneurship skills together.

The research was conducted on only at one state university in Turkey so this was stated as one of the limitations of the current research. Another limitation of the research was the studied programs. Only early childhood education, elementary education, elementary mathematics education, and science education departmants found place in the current research since chemistry education, physics education, biology education, mathemathics education, special education departmants' students were not availavle at the studied university. The third and the last limitation of the research was stated as the utilized scales were limited by only "Entrepreneurship Scale for Teacher Candidates", and "STEM Motivation Scale". For further researches, more than one university, high school pre-service teacher educating programs, and different scales could be employed for further contribution to literature.

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Refugee Students' Perspectives on Science Lessons

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ABSTRACT

This study aims to determine the opinions of Syrian students who have migrated to Turkey regarding science subjects. The present study is a non-experimental descriptive design accompanied by qualitative data collection and analysis procedure. This study was conducted with 87 (41 female, 46 male) Syrian students, who are learning Turkish in the Turkish Teaching Center (TÖMER) in a big city located in the southeastern Anatolia region of Turkey. A questionnaire with two sections developed by the researchers was used for data collection. In the first section of the questionnaire, there are 6 questions related to the demographic features of the participants. In the second section, there are five open-ended questions, which aimed at determining the attitudes of the participants towards science. Each of these five open-ended questions was designed as a writing activity. Content analysis technique was used to analyze the data obtained from the open-ended questions. At the end of the study, refugee students stated that they liked biology the most and least enjoyed the physics lesson because it was easy in science lessons and because it studied living things. Results indicated that science does indeed have an impact on their lives, and they provided the following statements as their reasons. They stated that science is more beneficial for humanity and has a significant influence on our lives.

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INTRODUCTION

Since the beginning of human existence, individuals have been compelled to migrate from one place to another for various reasons. Migration is defined as the process of individuals or communities changing their living environments due to economic, social, political, and cultural reasons (Turkish Language Association, 2020). This migration flow occurs both within countries and internationally. In today's world, the scale and speed of transnational migration are progressing at an unprecedented pace compared to previous eras. As migration has become a global phenomenon, the number of immigrant students in school systems worldwide is increasing (Hernandez, Denton, Macartney, & Blanchard, 2012). For example, in 2015, it was reported that there were approximately 244 million international migrants, accounting for about 3.3% of the world's population (Morrice et al., 2017). Turkey, located in the migration corridor geographically, is both a destination and a source country for migration (Ersoy & Turan, 2019). Especially since the start of the civil war in neighboring Syria in 2011, there has been an increase in the number of refugees migrating to Turkey. According to a report published by the United Nations High Commissioner for Refugees (UNHCR) in 2017, the number of refugees settled in Turkey exceeded 3 million. As of June 16, 2021, the number of school-age children between the ages of 5 and 18 who migrated and were under temporary protection was reported as 1,242,379, according to the Directorate General of Migration Management (Directorate General of Migration Management, 2021). Migrating individuals expect their basic needs such as nutrition, shelter, and security, which are initially considered essential, to be met (Sarıer, 2020). From the perspective of countries hosting refugees, one of the main goals after meeting the basic needs of incoming asylum seekers is to provide education for refugees. In OECD countries, immigrant students tend to underperform in the education system compared to native students. This is particularly pronounced among students coming from socio-economically disadvantaged areas (Brussino et al., 2022). The right to receive quality education and the process itself is one of the areas most affected by migration. Considering that 54% (1,471,958) of the arrivals are children (UNICEF, 2016), the importance of this issue becomes evident once again. In many participant countries, immigrant students' significantly lower scores compared to native students in the Programme for International Student Assessment (PISA) (Entorf & Minoiu, 2005) have necessitated more careful planning of educational activities for immigrant students. This is because the use of a common program and curriculum in the education system also concerns the participation and adaptation of migrant students to the learning process, closely involving native students. Bravo Moreno (2009) argued that refugee and migrant groups influence the identities and education systems of host countries. Similarly, Padilla (2004) demonstrated how Mexicans coming to America affect American culture and the education system (Yurdakul and Top, 2018). However, the United States, which has citizens of different ethnic origins and has gaps in achievement due to socioeconomic differences, has reformed education, and when we look at the subjects that constitute the focus of the reforms, it is seen that attempts are mainly aimed at increasing the number and quality of mathematics and science courses (Güneş et al., 2021).

It can be argued that it is important to identify the problems related to the education of immigrants from the perspective of teachers and school administrators and to propose solutions, as this is a significant need for both Turkish and refugee students (Sarıer, 2020). According to Unicef (2016), there are some problems in the participation of these children in education. One of the most significant problems among these is the language barrier faced by these students. If immigrants want to adapt to the country they migrated to, their first priority should be to learn the language of that country (Temiz, 2020). Indeed, students who do not know the language of the country they migrated to cannot continue their education or, if they do, they struggle to succeed (Yurdakul and Top, 2018). Considering all these reasons, if prioritization is to be made regarding the education of immigrant students, the first step should be learning the language of the host country. Acquiring a language or languages reinforced by society is closely related to the process of becoming a competent member of that community. Conversely, a lack of proficiency in the language(s) reinforced by the host community and taught at

school can be associated with a lack of academic success (Cummins, 2015; Heller and McLaughlin, 2017; Weber, 2009). Following the language learning process, it is necessary for individuals to acquire knowledge in science subjects. In today's world, where countries compete in areas such as science and technology, it is crucial to raise individuals who can understand and utilize the scientific knowledge and technology required by the era. Therefore, countries, especially developed ones, are continuously striving to improve the quality of education they provide, particularly in science and technology education (Eş and Sarıkaya, 2010). In Turkey, as in all countries, students' success in science subjects holds great importance for the country's economic, social, and cultural development. Considering that education is not only determined by the school, teachers, or curriculum, when it is understood that the student is also an integral part of education, the interest and willingness of immigrant students to learn directly affect their academic success. Teachers have reported that immigrant students face obstacles such as language-related problems, cultural difficulties, exclusion by peers, adaptation issues, lack of motivation, inadequate learning environment, lack of guidance and counseling, lack of resources/materials, non-experts teaching the classes, economic issues, and lack of family support (Aydeniz and Sarıkaya, 2021).

At this point, it is important to determine students' thoughts about the subjects, their reasons for being interested or uninterested in certain subjects, in order to change their attitudes towards those subjects and increase their motivation. Motivation is a significant factor that affects students' learning achievements and serves as a driving force for their academic efforts (Chen, 2001; Martin, 2001). In fact, studies have shown that students with high intrinsic motivation tend to have higher academic achievements compared to students with low motivation (Deci and Ryan, 1985; Gottfried, 1990; Lepper et al., 2005).

This study aims to determine the opinions of Syrian students who have migrated to Turkey regarding science subjects. Based on their views, it is possible to identify how their motivation towards science can be enhanced, as well as to uncover strategies to help them succeed in these subjects. Considering all these reasons, the study is deemed important and its results are expected to contribute to the field.

METHOD

This research is a case study (Creswell, 2016) as it descriptively discusses the refugee students' perspectives on science lessons in detail and explaining the events that are assumed to be causal connections (Yin, 1992). Merriam (2013) defines a case study as an in-depth description and examination of a limited system. The case discussed in the present research is the refugee students' perspectives on science lessons. In the study, it was thought that collecting the opinions of refugee students with open-ended questions would lead to more accurate results instead of collecting data using a scale due to various reasons such as language problems, so the case study model was used.

Research Sample

This study was conducted with 87 Syrian students, who are learning Turkish in the Turkish Teaching Center (TOMER). In this center, the criteria named Common European Framework of Reference for Languages: Learning, Teaching, Assessment (Retrieved from: http://www.coe.int/t/dg4/linguistic/Source/Framework_EN.pdf in13.10.2016) is used in teaching Turkish. The Turkish proficiency of the participants is in the level of effective operational proficiency. The findings related to the demographic features of the participants are presented in Table I. All of the participants completed their high school education in Syria in the pre-war period and are students who registered at TOMER to provide the necessary language proficiency to continue their university education in Turkey. Participants were selected by purposeful sampling method (Creswell, 2016) to obtain accurate and qualified data regarding the research questions of this study.

Table 1. The Demographic Features of the Sample

Demographic Features	N	%	X	SD
Age			21.931	4.15063
Gender				
Female	41	47.1		
Male	46	52.9		
(How long they have been living in Turkey)				
6-9 months	2	2.3		
9-12 months	17	19.5		
2 years	33	37.9		
3 years	19	21.8		
more than 3 years	16	18.4		
Type of Income				
Emloyed	22	25.3		
I get a scholarship	13	14.9		
My parents meet my expenses	52	59.8		
Marital Status				
Married	16	18.4		
Single	71	81.6		
Accomodation				
I live at home with my parents	65	74.7		
I live in a refugee camp with my parents	1	1.1		
I live in a flat with my friends	10	11.5		
I live at home with my relatives	2	2.3		
I live in a student dormitory	9	10.3		
Total	87	100.0		

As can be seen in Table 1, 41 participants are women (47.1%) and 46 participants are men (52%); The average age of the participants is 21.9 (std.Dv=4.15); 16 participants are married (18.4%), and 71 participants are single (81.6%). 33 participants (37.9%) have been living in Turkey for three years. The expenses of 52 of the participants (59.8%) are met by their parents. 22 participants are employed (25.3%), while 13 participants (14.9%) get a scholarship. 65 participants (74.7%) stated that they live at home with their parents, 10 participants (11.5%) said that they live in a flat with their friends and 9 participants (10.3%) said that they live in a student dormitory.

Research Instruments and Processes

The participants were told the content and the purpose of the study. It was also emphasized that participation was on a voluntary basis. A questionnaire with two sections developed by the researchers was used for data collection. In the first section of the questionnaire, there are 6 questions related to the demographic features of the participants. In the second section, there are five open-ended questions. Each of these five open-ended questions was designed as a writing activity which aimed at determining the attitudes of the participants towards science. The second part of the scale was designed as 5 separate writing activities which aimed at determining the attitudes of the participants towards science. The questions in the questionnaire were created by taking the opinion of a senior science education researcher that the questions and writing activities in the questionnaire were suitable for determining

refugee students' opinions about science courses. The writing skills determined for C1 level as part of the Common European Framework of Reference for Languages: Learning, Teaching, Assessment program are stated as follows: "I can express myself in clear, well-structured text, expressing points of view at some length. I can write about complex subjects in a letter, an essay or a report, underlining what I consider to be the salient issues. I can select style appropriate to the reader in mind." These skills show that the students are competent enough in Turkish to answer the questions in the questionnaire. It took approximately 40 minutes for students to fill in the questionnaire as a writing activity. The handwritten answers of the participants formed the basic data source of this study.

Data Analysis

In the present study, descriptive statistics were used to analyse the data related to the demographic features of the Syrian students. Content analysis technique was used to analyze the data obtained from the writing activities which aimed at determining the attitudes of the participants towards science. The answers to each question were read carefully and repeteadly. Students' answers were transferred to an Excell file, answers with similar meaning were coded using the same color, and categories were created using codes based on the semantic similarity criterion (Creswell, 2016). Write down the data analysis of your research without changing the format. Write down the data analysis of your research without changing the format.

FINDINGS

1- The science subject that students liked the most

The statements of the Syrian students about the science subject that they liked the most have beenreported in table 2 in detail.

Table 2. *The Attributes of Syrian Students Related to Their Favourite Science Subject*

The Attributes of Syrian Students Related to Their Favourite Science Subject	f	%
I like Biology because it is about living beings, easy and involves very little math; I like Biology teachers, I can understand biology more than other courses and I find it very entertaining.	14	
I like biology because the subject that I chose to study at university is related with health sciences	4	
Participants who did not state any reason	12	
Those who stated biology as their favorite science subject (Total)	30	34.4
It has a huge impact on our lives, and it is important and useful for human beings.	7	
I like Physics because I am interested in maths, scientific and mechanical issues; I find Physics very intersting, the most entertaining science subject it requires logical and analytical thinking, and does not require memorization.	10	
Participants who did not state any reason	3	
Those who stated physics as their favorite science subject (Total)	20	23
I like Chemistry because it involves experiments, it is fun, easy and entertaining.	6	
I just can understand Chemistry better than Physics and Biology and I like Chemistry because I like my Chemistry teacher.	2	
I like Chemistry because it is important in our lives, I would like to be a (pharmacist).	3	
Participants who did not state any reason.	5	
Those who stated chemistry as their favorite science subject (Total)	16	18.3
I do not like any of these science lessons, because they are difficult, boring and not entertaining	5	
I do not like any of these science lessons, because I like social sciences lessons.	14	
Those who do not like any science subject (Total)	19	21.8
I like all the science lessons, because I do not get bored, I do not feel sleepy, and I feel excited in science lessons, I like to comprehend rather than memorizing.	2	
Those who love all science subjects (Total)	2	2.3
Total	87	100

As seen in Table 2, 30 students (34.4%) stated biology, 20 students (23%) stated physics, and 16 students (18.3%) stated chemistry as the science subjects they liked the most. In addition, 2 students said

that they liked all three subjects, while 19 students (21.8%) stated that they liked none of them. The majority of the participants (f=14), who said that they liked the biology lesson the most, stated that they liked this lesson for the following reason; "I like Biology because it is about living beings, easy and involves very little math; I like Biology teachers, I can understand biology more than other courses and I find it very entertaining." The majority of the participants (f=10), who said that they liked the physics lesson the most, stated that they liked this lesson for the following reason;" I like Physics because I am interested in maths, scientific and mechanical issues; I find Physics very intersting, the most entertaining science subject it requires logical and analytical thinking, and does not require memorization." The majority of the participants (f=6), who said that they liked the chemistry lesson the most, stated that they liked this lesson for the following reason; "I like Chemistry because it involves experiments, it is fun, easy and entertaining." The most common reason given by the participants (f= 14) who stated that they did not like any of the courses; "I do not like any of these science lessons, because I like social sciences lessons." The most common reason given by the participants (f=2) who stated that they did like all of the courses; "I like all the science lessons, because I do not get bored, I do not feel sleepy, and I feel excited in science lessons, I like to comprehend rather than memorizing."

2- I like science learning more/less (please indicate by underlining your choice) than learning in other subjects because …

It has ben presented the reasons why students like/do not like science learning more than learning other subjects in table 3.

Table 3. *The reasons why students like/do not like science learning more than learning other subjects*

Responses	f
I like science learning more than learning in other subjects because …(Total)	**54**
Science Lessons are more entertaining and useful what I learn from science lessons sticks in my mind. Science lessons attract my attention more than the other lessons. They do not require memorization, they involve reason and logic.	7
I like science lessons more than the other lessons, because science is more useful for mankind, science lessons give us more information about our environment and help us understand our environment better.	5
I like science lessons because they require more thinking and effort, improve our imagination. We can think differently and discover new things.	3
In science lessons, we learn about living things; I like to learn Biology more than the other science lessons. In the Biology books there are many colorful pictures. They impact my learning.	3
There are experiments in science lessons. I find science lessons easy and entertaining. Our ideas get stronger.	3
I do not have any difficulty in understanding science lessons, I do not get bored in these lessons and I believe that I am talented in the field of science. I feel more comfortable while learning and studying science. I enjoy it.	8
I find science lessons very interesting. I like science lessons because my science teachers teach these courses really well.	4

It is very important to learn science, it is widely used in daily life. It is necessary to learn sciences in order to improve our society. Science learning is useful for countries and cultures.	10
I like these lessons because I like science and math; I would like to become a biologist; medical doctor	6
Students who stated that they liked science courses but did not provide any reason	5
I like science learning less than learning in other subjects because …(Total)	**19**
I believe that science lessons do not have any impact on my life; I find the science lessons very difficult and I have difficulty in understanding them; I felt that in Syria science lessons were not that important, because my science teachers used to lecture and leave. S/he did not approach us.	7
I like social sciences more than sciences	12
No response(Total)	**14**
Total	**87**

As seen in Table 3, 54 Syrian students in the study group stated that they liked science more than other courses.The reason for the students who think this way is the most frequently mentioned that "It is very important to learn science, it is widely used in daily life. It is necessary to learn sciences in order to improve our society. Science learning is useful for countries and cultures." 19 Syrian students in the study group stated that they like science learning less than learnng in other subjects. Most of the participants (f=12) stated that they liked social lessons more than sciences. 14 of the participants did not answer this question.

3 – I feel / I do not feel (please indicate by underlining your choice) that science impacts on my life a lot because …

The reasons, why students feel/ do not feel that science impacts on their life a lot, have been presented in table 4 in detail.

Table 4. *The reasons why students feel/ do not feel that science impacts on their life a lot*

Responses	*f*
I feel that science impacts on my life a lot because …(Total)	**58**
Science is more useful for mankind and has a huge impact on our lives. All inventions and phenomena that changed human life are based on science. Science is very important and we can see its influence on our lives every moment. Science makes our lives easier and faster. It improves our lives. For example, physicists discovered electricity. The developments in medicine and technology are based on science.	21
People learn how to experiment and how to be patient with the help of science; I learn new things with the help of science and I see what I learnt in science everywhere around me.	3
The technological devices that we use and the technological facilities that we have, developed with the help of science.	23
Participants who had positive opinions, but did not provide any reason	11
I do not feel that science impacts on my life a lot because …(Total)	**9**
I do not like science, I find it very difficult and I am not interested.	9
No response(Total)	**20**
Total	**87**

As seen in Table 4, 21 Syrian students in the study group stated that science is more useful for mankind and has a huge impact on their lives. 23 Syrian students in the study group stated that the technological devices that mankind used and the technological facilities that mankind had, developed with the help of science. 11 Syrian students in the study group had positive opinions, but did not provide any reason but 9 Syrian students in the study group stated that they do not feel that science impacts on their life a lot.

4- I am/I am not (please indicate by underlining your choice) thinking of a future career in science related

jobs (scientist, engineer, lab technician, medical doctor, …), because.....

It has been presented, the reasons why students think/ do not think of a future career in science related jobs (scientist, engineer, lab technician, medical doctor, …) in table 5.

Table 5. *The reasons why students think/ do not think of a future career in science related jobs (scientist, engineer, lab technician, medical doctor, ...)*

Responses	*f*
I am thinking of a future career in science related jobs (scientist, engineer, lab technician, medical doctor, …), because..... (Total)	**44**
I would like to become a scientist because,	**4**
There is no medicine to cure some illnesses, so I can discover medicine for these illnesses; Maybe I will make new discoveries and become a very famous scientist; Our country needs this.	4
I would like to become a biologist because I have been interested in this field since my childhood	**1**
I am thinking of a future career in science related jobs because...(Total)	**9**
My country has been destroyed in the war, so we need absolutely science to restructure our country.	2
I like these jobs because they are more useful for me, mankind and society; I would like to create new things for the people; I can discover new medicine for epidemic diseases and help the people.	2
I would like to develop my country, we use these jobs in our lives and they are very useful for the whole world.	2
Participants who did not provide any reasons	1
I would like to become an engineer because.....(Total)	**13**
I like this profession	3
I like math; physics and would like to make physics experiments	2
Everything in our lives is related to engineering; Our country needs this.	2
Participants who did not provide any reason	6
I would like to become a medical doctor because.....(Total)	**17**
I like this profession and would like to save people; I like this profession and believe that I can be useful for people; It is a compassionate profession; It is very important in our lives and I like this profession; It is nice to be a doctor, because I can serve both people and my country; It is the best and most useful profession in the world. I love helping people.	11
I like this profession and I believe that I will be successful; medicine is a good profession and I can make money.	4
Participants who did not provide any reason.	2
I am not thinking of a future career in science related jobs (scientist, engineer, lab technician, medical doctor, …), because..... (Total)	**24**
I am not thinking of a future career in science related jobs	4
I am not interested in science related jobs, I do not like these jobs.	2
Science is important but because I do not like these subjects and I just cannot understand them, I find them very difficult.	2
I prefer to choose a profession related to social sciences	16
No response (Total)	**19**
Total	**87**

As seen in Table 5, 44 Syrian students in the study group stated that s/he was thinking of a future career in science related jobs whereas, 24 Syrian students in the study group stated that s/he was not thinking of a future career in science related jobs. Besides, 16 Syrian students stated that s/he prefered to chose a profession related to social sciences.

5- I think/I do not think (please indicate by underlining your choice) investing in learning science is very important to restructuring my country for the future because.....

It has been presented, the reasons why students think/ do not think investing in learning science is very important to restructuring their country in table 6.

Table 6. *The reasons why students think/ do not think investing in learning science is very important to restructuring their country*

Responses	**f**
I think investing in learning science is very important for restructuring my country for the future	**53**

because.....	
My country has been destroyed in the war, everything has gone since the war. So teaching science is very important for restructuring and improving our country.	18
Development of the countries depends on science and scientists.	6
Science has an important place in our lives, science is in every part of our lives.	6
I believe that countries which give importance to science develop and progress.	3
Engineers, doctors, scientists, and technicians will play an important role in the restructuring of my country.	6
There is a need for every branch of science for the development of society; the path leading to civilization passes through science	4
My country needs to be restructured. Many people have been subject to harm and disease because of the war. My country will need doctors, engineers and scientists in the future.	4
It is important to teach science for the restructuring and development of our country, and also for the peace and health of future generations.	6
No response (Total)	**34**
Total	**87**

As seen in Table 6, 18 Syrian students in the study group stated that her/his country had been destroyed in the war, so teaching science was very important for restructuring and improving her/his country.

DISCUSSION, CONCLUSION, RECOMMENDATIONS

In this study, which focuses on the views of students who migrated from Syria regarding science subjects, it was observed that biology is the most liked science subject among students (f=30), while physics is the least liked subject (f=16). Only 2 students stated that they liked all three subjects, while 19 students mentioned that they didn't like any science subject. The reasons for their dislike of science can be listed as: believing that science lessons have no impact on their lives; finding science lessons very difficult and having difficulty in understanding them; and feeling that science lessons are not that important in Syria. In a study conducted by Ornek et al. (2008), students expressed that physics is a difficult subject due to lack of motivation and interest, not studying extensively, not reading the textbook, not practicing enough problems, only working on assigned problems, not doing homework, lack of previous experience, lack of physics background, and lack of advanced mathematics skills.

Among the students who liked biology (f=14), some stated that they liked the subject because it is related to living organisms, easy, has minimal mathematics content, they like biology teachers, they understand biology better than other subjects, and they find it very enjoyable. Some of them (f=4) mentioned that they like biology because it is related to health sciences, which they chose to study at the university. 12 participants did not provide a reason for liking biology. In a study by Özbaş (2016), students stated that they see biology as a fun, enjoyable, and liked subject. Similarly, in their study, Ekici and Hedevanlı (2010) concluded that students have a positive attitude towards biology, while Gül and Yeşilyurt (2010) found that students perceive biology as an important and beneficial subject but do not like it. In another study, Çimer (2011) listed various reasons for students experiencing difficulties in learning biology, including the nature of the subject, teachers' teaching methods, students' learning and studying habits, students' negative feelings and attitudes towards the subject, and lack of resources.

Among the students who liked physics more (f=7), some stated that they like physics because it has a significant impact on our lives and is important and beneficial for people. Some of them (f=10) mentioned that they find physics very interesting because it deals with mathematical, scientific, and mechanical concepts; it is the most entertaining scientific discipline that requires logical and analytical thinking and does not require rote memorization. The number of students who did not provide any reasons for liking physics is 3. Despite the fact that physics is present in every aspect of our lives and facilitates our lives, national and international studies indicate that achievement in physics education is lower compared to other disciplines (Dieck, 1997; Gök and Silay, 2008; Mattern and Schau, 2002; Rivard and Straw, 2000). Özyürek and Eryılmaz (2001), Tamir et al. (1975), and Simpson and Oliver

(1990) stated in their studies that teachers' behavior, teaching methods, and willingness to learn have an impact on students' attitudes towards physics. Based on these studies, increasing students' motivation to learn is crucial for them to like physics more.

Sixteen of the students in the study group stated that they liked Chemistry course more than other courses. The most common reason given by these students was that chemistry course includes experiments, is fun, easy and entertaining. Freedman (1997) has found that a positive attitude toward science was related tothe laboratory program. In Greece, chemistry is being taught theoretically without hands-onactivities and this practice decreases students'interest for chemistry lessons (Salta & Tzougraki, 2004).

It has been observed that the majority of students (f=54) express a greater liking for science subjects compared to other subjects. The reasons they mentioned for liking science subjects include the importance of learning science (f=7), not having difficulty understanding science subjects, not getting bored in these classes, believing that they are talented in the field of science, feeling more comfortable when learning and studying science (f=8), recognizing that science is widely used in daily life, finding science enjoyable, understanding that learning knowledge is necessary for societal development, and acknowledging the benefits of science education for countries and cultures (f=10). On the other hand, students who dislike learning science subjects less than other subjects listed their reasons as believing that science subjects have no impact on their lives, finding science subjects difficult and challenging to understand, feeling that science subjects are not as important in Syria because they do not like the approach of science teachers (f=7), and expressing a greater preference for social subjects (f=12). The finding that the majority of participant students like science subjects aligns with the results of studies by Akça (2017), Oskay (2019), Şahin and Kaya (2020), and Özbuğutu (2021), which indicate that middle school students have low levels of anxiety related to science.

In response to another question regarding whether science significantly affects their lives or not, the majority of students (f=58) indicated that science does indeed have an impact on their lives, and they provided the following statements as their reasons. They stated that science is more beneficial for humanity and has a significant influence on our lives. All inventions and phenomena that change human life are based on science. Science is very important, and we can see its impact in our lives at every moment (f=21). Science makes our lives easier and faster. It improves our lives. For example, physicists discovered electricity. Developments in medicine and technology are based on science (f=24). However, some students (f=9) believe that science does not significantly affect their lives because they do not like it, find it difficult, and lack interest in it. Chala et al. (2020) emphasize the need for science educators to establish closer connections between science and students' cultural environments and daily lives in order to generate more interest in science education among students.

In another question where students were asked whether they consider a career related to science (such as scientist, engineer, laboratory technician, medical doctor), the majority of students (f=44) stated that they would choose a profession related to science. They expressed their intentions to pursue a career in science in the future without specifying a particular field, citing reasons such as the need for science to rebuild their country, which has been destroyed by war, and its potential to be beneficial to themselves, humanity, and society. They mentioned the desire to create new things for people, discover new drugs for infectious diseases, and help others (f=4). Some students expressed their desire to become a scientist due to reasons such as finding a cure for currently incurable diseases, making new discoveries and becoming a renowned scientist, and the need for scientists in their country (f=4). One student mentioned considering a career as a biologist due to their interest since childhood. The number of students considering becoming engineers (f=13) because they enjoy physics, mathematics, and the applications of physics, and the number of students considering becoming doctors (f=17) due to the belief that it is the most beneficial profession and a compassionate profession that saves lives, are also significant. However, students who prefer working in social sciences expressed that they do not

consider a career related to science (f=24). According to Lindner et al. (2004), although the implementation of science is emphasized in middle school curricula, the importance of science is generally not taught to students in middle school. To better influence students in choosing science-related careers, there is a need for information on what middle school students believe about science and who has the greatest influence on their career choices in science. Their study concluded that students' attitudes towards science were not low, but they had negative perceptions regarding career choices related to science because they did not find science enjoyable. In the study by Salta and Tzougrad (2004), the majority of students agreed that chemistry knowledge is useful in interpreting their daily lives, but only 4% of the students stated that they would like to continue studying chemistry. In Greece, the profession of chemist is one of the least preferred professions. On the other hand, it is promising that most students believe that chemistry contributes to solving environmental problems and improves our lives. Greek students have a more positive attitude towards the importance of chemistry rather than the use, difficulty and interest of chemistry courses.

The majority of students (f=53) who were asked about their views on the importance of investing in science learning expressed that their countries have greatly suffered after war and emphasized the significance of investing in science education for reconstruction and development purposes (f=18). According to the OECD's (2022) report on building the future of education, "we are facing unprecedented social, economic, and environmental challenges caused by accelerated globalization and rapid technological advancements. At the same time, these forces offer countless new opportunities for human progress. The future is uncertain, and we cannot predict it, but we need to be open and prepared for it. Children who entered education in 2018 will become young adults in 2030. Schools can prepare them for jobs that have not yet been created, technologies that have not yet been invented, and unforeseen problems to solve. Seizing opportunities and finding solutions will be a shared responsibility. To navigate through such uncertainty, students will need to develop curiosity, imagination, resilience, and self-regulation; they will need to respect and appreciate others' ideas, perspectives, and values," as mentioned in the report regarding student attributes. One of the courses that can provide these qualities is the science course. Therefore, due to all these reasons, students need to allocate more time and importance to science in order to elevate their countries to better levels.

In this study with 87 refugee students, the majority of the students stated that they liked science courses (physics, chemistry, biology), while a small number of them stated that they did not like science courses. Students who stated that they liked science lessons stated that they found these lessons important for their lives and that they liked them because they were fun and exciting, while students who did not like science lessons stated that they did not like them because they were difficult and boring. The students who stated that they liked science lessons less than other lessons stated that the reason for this was that they had difficulty in understanding science lessons and that these lessons were not considered important in their country of origin. Lastly, the students thought that investing in learning science is very important and the reason for this was that science is necessary for the development and development of countries where their countries have suffered great losses in the war.

In line with these results, the following recommendations can be made

- lessons can be taught using effective and innovative methods to make students love science.
- Additional lessons, studies and practice hours can be planned for subjects they have difficulty understanding.
- students can be encouraged to do additional activities such as watching documentaries, movies, and reading books about the contribution of learning science lessons to the development of countries.

- teachers should adopt research based teaching strategies to be able to afford students needs.

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Reflections on Online Instructional Technologies and Materials Used During the COVID-19 Pandemic

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ABSTRACT

In the process of the COVID-19 pandemic, the traditional face-to-face education system was transitioned to a distance education system. Undoubtedly, this significant change in the education field has affected teachers and students the most. Therefore, shedding light on the experiences of teachers and students in online classes is believed to contribute to the success of future distance education practices. For this purpose, in this study, the experiences and views of English teachers and high school students regarding the instructional technologies used in online teaching were investigated. The phenomenological design, which is one of the qualitative research designs, was used in the study. Twenty English teachers and thirty high school students participated in the study from the schools within the research permission. A semi-structured interview form developed by the researcher was used in the study. The findings obtained from the interviews were analyzed using content analysis method. It was found that in the early stages of distance education, teachers and students faced difficulties in adapting to technology usage. Teachers who were interested in technology usage experienced fewer challenges in using instructional technologies and materials. Students who had internet and device access and were motivated to attend classes benefited more from online class opportunities. Students mentioned that using lesson materials that appealed to their interests would be a driving force for their participation in online classes, while teachers stated that they had to use various instructional technologies to actively engage their students in classes and, therefore, they improved their technology proficiency.

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INTRODUCTION

Before the COVID-19 outbreak, the use of technology in education was limited to teachers' preferences for incorporating technology into their teaching activities. However, after the outbreak of the pandemic, conducting teaching and learning activities have become challenging when learners and educators cannot interact in person. On the other hand, thanks to technological advancements, teaching is no longer confined by distance or time limitations and can occur anywhere and anytime (Chisango et al., 2020; Kalimullina et al., 2021; Konyana & Motalenyane, 2022). Consequently, the incorporation of technology in education has become a necessity for the sustainability of teaching and learning activities. Using technology in education is seen as a tool that can improve teaching, learning, and assessment in creative ways, as stated by Lotherington et al. (2021). This means that incorporating technology has the potential to enhance how teachers teach and how students learn (Maja, 2023). Moreover, it is stated that online learning and classes are progressively becoming integral parts of the worldwide educational system (Kanojiya, 2020). On the other hand, the COVID-19 pandemic has brought a different perspective toward online education globally due to the large-scale use of online platforms by learners and educators (Hoofman & Secord, 2021). The transition to online learning has brought forth several advantages, including flexibility, convenience, accessibility, and a personalized learning experience. However, there are also associated challenges- it has posed numerous difficulties for universities worldwide and encountered various barriers such as infrastructure deficits, extracurricular activities, technical issues, and ensuring sufficient resources for effective and efficient knowledge dissemination (Aguilera-Hermida, 2020). Futhermore, it's certainly not easy for students to embrace and put into practice the transition from traditional learning approaches to online methods, which require them to adapt (Ahdiyah, 2023).

Throughout the period of distance education, both teachers who are familiar with technology and those who are less experienced found themselves deeply engaged in technological endeavors. Foreign language teaching, in particular, requires practical lesson activities aimed at developing four key language skills. At this point, the use of technology comes to the rescue of the teachers. The use of technology has significantly mitigated the lack of interaction opportunities that were originally present in face-to-face education environments during distance education. By incorporating technology into teaching activities and presenting diverse information sources and visually engaging activities, the quality of educational experiences can be greatly enhanced (Gülcü et al., 2013).

Teaching materials refer to all the content presented through various tools to achieve lesson objectives (Yanpar & Yıldırım, 1999). In another definition, teaching materials are the application of existing knowledge to achieve certain purposes (Özdemir & Özdemir, 2019). Teaching materials can be divided into classic and modern categories. Traditional teaching materials include items such as whiteboard, textbooks, classroom board, pictures, graphics, posters, etc., while modern teaching materials include projection devices, computers, digital teaching materials, and similar tools (Sever & Koçoğlu, 2017). With the pandemic, distance education has taken the lead in teaching processes, and the use of modern teaching materials has become inevitable in instructional practices. In this context, the diversity and effectiveness of digital teaching materials are essential to engage students in the learning process, which means establishing teacher-student and student-student interactions in online education classes.

Teaching a skill-based lesson in online education can be quite challenging. Engaging students actively during the lesson, managing the lesson duration, and motivating all students to achieve educational objectives are not easy tasks for teachers. However, with the inclusion of appropriate tools, applications and techniques, online classes can become truly enjoyable for both teachers and students.

The problem of research

1. What are views and experiences of the teachers and students regarding online classes?
2. What are pros and cons of online instructional technologies from the teachers' viewpoint?
3. What instructional technologies were used during online classes?

METHOD

Research Design

This research was designed in accordance with the phenomenological design which is one of the qualitative research methods, aiming to gather the views of English teachers and students regarding the instructional technologies and materials used during the distance education process. When there is a need to explore a problem or issue and understand how participants approach a problem or issue in a specific context or setting, qualitative research is conducted (Creswell, 2020). The phenomenology (phenomenological) design was preferred to conduct an in-depth investigation by making inferences from the views expressed by English teachers conducting online classes and students attending online English lessons during the distance education process, regarding the relevant technologies. The phenomenology design is a research approach derived from philosophy and psychology. In this kind of research, the researcher attempts to analyze the shared experiences of individuals about a phenomenon. In this study, which is based on the experiences of a small number of individuals, the researcher reaches the essence he/she wants to achieve in the research through the data obtained (Giorgi, cited in Creswell, 2014, p. 42).

Research Sample/Study Group/Participants

This research was conducted during the months of February-March of the 2021-2022 academic year and involved English teachers working in high schools in Bolu province and their students. Participant selection was conducted on a voluntary basis. Table 1 illustrates the composition of the study group.

Table 1. *Study Group*

Gender	Teachers	Students
Female	17	22
Male	3	8
Total	20	30

Data Collection And Analysis Process

The data collection and analysis process followed a qualitative research design. Qualitative data were gathered from a total of 20 teachers (17 female, 3 male) and 30 students (22 female, 8 male). Prior to conducting interviews with student participants, parental consent forms were obtained. The data collection process commenced upon receiving the necessary consents. Due to the pandemic conditions, semi-structured interviews were conducted through phone calls and Zoom connections, with each interview lasting approximately 10-15 minutes.

For the analysis of the semi-structured interviews, content analysis, a commonly used technique in qualitative research, was employed. Content analysis is a method within qualitative research that involves analyzing documents, records, and similar materials using specific rules, such as coding, category creation, and theme determination (Metin & Ünal, 2022). During content analysis, the audio files obtained from the recorded interviews were transcribed. The coding process was manually carried out by the researcher, wherein findings were expressed with words or symbols based on their purpose (Yıldırım & Şimşek, 2018). The text files were read multiple times, and similar views were grouped and labeled accordingly. The creation of codes, categories, and themes was guided by the research questions and theoretical framework. According to Karasar (2007), it is crucial to establish

codes based on research questions and the theoretical framework. After the codes were established, categories and themes were created. Expert views were sought for the emerging codes, categories, and themes. The frequencies and percentages of the codes were calculated. The data, systematically brought together and organized, were described and interpreted in line with the research aims (Huberman & Miles, 1994).

The coding, frequency, and percentage calculations, as well as content analysis, were used to explore English teachers' perceptions of self-efficacy in the context of technology during the pandemic period of distance education, their usage of instructional technologies and digital materials in classes, and the advantages and disadvantages of these technologies and online teaching in general. Additionally, their views and suggestions regarding the process were examined. Similarly, coding, frequency, and percentage calculations, along with content analysis, were used to explore students' perceptions and suggestions regarding the instructional technologies and digital materials they encountered in classes, as well as the advantages and disadvantages of these technologies.

Ethic

The research implementation obtained ethical approval from the Institutional Review Board of Bolu Abant İzzet Baysal University with decision number 2021/470 dated November 29, 2021 and from the Bolu Provincial Directorate of National Education with a document dated January 4, 2022.

FINDINGS / RESULTS

Reflections On Online Instructional Technologies and Materials

In this section, the findings related to the problem of research are presented. The findings cover various aspects, including the online teaching process, the relationship between technology usage and learning, the use of digital teaching materials in online classes, as well as the advantages and disadvantages of using technologies in distance education. The collected responses are summarized in Table 2.

Table 2. *Views and experiences of the teachers regarding online classes*

Theme	Category	Code	f	%
Experiences	Positive Experiences	Well-conducted classes	9	45.0
		Use of resources	3	1.0
		Technological competence	2	10.0
		Cooperation with colleagues	2	10.0
		A different teaching experience	1	5.0
		Time saving	1	5.0
	Negative Experiences	Misuse of online education	7	35.0
		Increase in technology addiction	4	20.0
		Forgetting to turn off the microphone	2	10.0
		Forgetting school rules	1	5.0

During the interviews with the participating teachers, 10 codes under 2 categories in 1 theme were obtained in response to the question "What are your views and experiences regarding online classes?" (Table 2). Under the theme of experiences, the codes in the positive experiences category were; “well-conducted classes (n=9), use of resources (n=3), technological competence (n=2), cooperation with colleagues (n=2), a different teaching experience (n=1), time-saving (n=1)”, while in the negative experiences category; “misuse of online education (n=7), increase in technology addiction (n=4), forgetting to turn off the microphone (n=2), forgetting school rules” (n=1) codes were identified.

The following statements are highlighted participant comments regarding positive experiences during the online education process.

T1: "We watched a video with the students and provided explanations; it was a truly rewarding

experience. When they expressed how useful it was to them, I felt delighted. We tailored educational technologies according to the students' requests, breaking the monotony of our lessons. Visual and auditory aids are crucial in language teaching, especially when we lack the opportunity for a Native speaker. These materials allowed me to bring the experience of a Native speaker into my classroom, which was a tremendous blessing."

T2: "I consistently received positive feedback from the children, and I believe they grasped that learning goes beyond just paper and can happen anywhere. It reminded me of the famous scene from the Turkish movie 'Hababam Sınıfı' - 'The school is not just four walls.' During this process, they learned that learning can take place in various ways, with mutual effort, of course. While it can never fully replace face-to-face education, we witnessed that learning can continue in this manner too."

T3: "Even our colleagues who were initially unfamiliar with technology had to embrace it. Joining this system, which is inevitable for the 21st century, was an advantage for everyone, including our older colleagues. Sometimes, unfortunately, we even had to assist our friends with the e-school (electronic school management system). In this way, they were compelled to become competent in technology. I believe it's an advantage for them."

T8: "With Canva presentations, my students created captivating showcases of different countries' cultures based on the topic. These presentations were so wonderful and precious to me. Even now, when I assign them a performance project, they come up with amazing Canva presentations."

Along with positive experiences during the online education process, there have also been negative experiences, as illustrated by the following examples.

T13: " Once, a student playfully scribbled on my screen during an online class. The child thought it was a joke, but I quickly resolved the situation by closing the relevant tab."

T17: "In online classes, 5-6 students out of a class of 20 attended the lessons. So, the negative aspect is not being able to reach all the children, not being able to communicate with all of them. Even now, they say there's a difference between the lessons we covered there and the ones now. -Of course, it will be different. I managed with only 5-6 students in those classes."

T18: "Since we are conducting face-to-face education now, students themselves confess: 'We used to listen to you while playing games.' Or when I said 10 points for those who know the answer, 5 points for others, they would look at something behind and answer, I can tell."

T20: "I think the student opens the lesson and listens to me actively, but sometimes their parents sit there, watching me as a family, on behalf of the student."

This section of the research examines students' views and experiences concerning online classes and related technologies. The participant students were interviewed through semi-structured questions, and their responses are presented in Table 2.

Table 3. *Experiences and views of the students regarding online classes*

Theme	Category	Code	f	%
	Positive experiences and views	Engaging/Fun lessons	7	23,3
		Efficiency	5	16,6
		Effective time management	5	16,6
		Like private tutoring	4	13,3
		Reinforcement opportunities	4	13,3
		More conversational	3	10,0
		Comfortable learning atmosphere	3	10,0
		Unrestricted access to resources	2	6,6

		No connection problems	1	3,3
		Protection from COVID-19	1	3,3
		Activity at home	1	3,3
		Advantageous for introverted students	1	3,3
		Effortless usage of dictionaries	1	3,3
		Technological competence	1	3,3
Experiences and Views	Negative experiences and views	Technical/Infrastructure Issues	17	56,6
		Unlike traditional face to face education	11	36,6
		Self management issues	9	30,0
		Distracting factors	7	23,3
		Ineffective for practical skills	4	13,3
		Negative impact on eye health	3	10,0
		Inequality of opportunities	3	10,0
		Insufficient reinforcement activities	3	10,0
		Lack of feedback/ correction	2	6,6
		Teacher centered	2	6,6
		Challenges with screen-based learning	2	6,6
		Insufficient visuals	1	3,3
		Lack of long-lasting learning	1	3,3
		Numerous drawbacks	1	3,3
		Limited use of resources	1	3,3
		Long duration of lessons	1	3,3

During the research, participant students were asked about their views and experiences regarding the online classes. As a result, two themes, two categories, and 30 codes were identified. Under the category of "positive experiences and views" in the Experiences and Views theme, the following codes were identified: "engaging/fun lessons (n=7), efficiency (n=5), effective time management (n=5), like private tutoring (n=4), reinforcement opportunities (n=4), more conversational (n=3), comfortable learning environment (n=3), unrestricted access to resources (n=2), no connection problems (n=1), protection from COVID-19 (n=1), activity at home (n=1), advantageous for introverted students (n=1), effortless usage of dictionaries (n=1), technological competence (n=1) ". On the other hand, under the category of "negative experiences and views," the following codes were identified: "technical/infrastructure issues (n=17), unlike traditional face-to-face education (n=11), self-management issues (n=9), distracting factors (n=7), ineffective for practical skills (n=4), negative impact on eye health (n=3), inequality of opportunities (n=3), insufficient reinforcement activities (n=3), lack of feedback/correction (n=2), teacher-centered (n=2), challenges with screen-based learning (n=2), insufficient visuals (n=1), lack of long-lasting learning (n=1), numerous drawbacks (n=1), limited use of resources (n=1), long duration of lessons (n=1).

Here are a few responses provided by the participating students:

S1: "Despite some advantages like uninterrupted education without connectivity issues and having more time for individual study, I found online learning to be more distracting compared to in-person education."

S3: "From the teacher's perspective, distance education posed challenges in terms of monitoring student engagement and providing necessary support, especially for students without internet access, leading to disparities in accessing education."

S6: "Online education, particularly in English classes, proved to be more engaging due to fun activities and motivating platforms like Kahoot and Quizizz. However, it lacked the immersive feeling of face-to-face learning, and I felt disconnected from the classroom environment when learning

through a computer."

S9: "In my opinion, there are no limitations to learning English online as it primarily involves listening, reading, and speaking. I perceived it as akin to having private lessons, which I considered a positive aspect."

S11: "The 11th grade distance education period focused heavily on grammar, which seemed better suited for one-on-one exercises in the classroom. The lack of sufficient practice during online learning resulted in a slight deficiency in language retention."

S13: "The remote nature of online learning provided comfort for individuals with social anxiety, as teachers couldn't observe them closely during virtual classes."

S17: "During online lessons, the background sounds of my home environment led to conversations with teachers and friends, creating a sense of happiness as they could glimpse into my surroundings."

S23: "Interacting with teachers was made easy during online classes. When we encountered difficulties or didn't understand a topic, teachers organized special broadcasts for personalized explanations, which was a positive experience."

Pros and Cons of the Instructional Technologies and Materials

During the semi-structured interviews, teachers were asked about the advantages and disadvantages of the instructional technologies and materials they used in online English classes, and the responses obtained are presented in Table 4.

Table 4. *Pros and cons of the online instructional technologies and materials*

Theme	Category	Code	f	%
Advantages	Advantages of ITM	Ease of implementation	5	25,0
		Ease of Access	4	20,0
		Attractiveness	4	20,0
		Effective time management	2	10,0
		Visualization	2	10,0
		Opportunity for reinforcement	2	10,0
Disadvantages	Disadvantages of ITM	Insufficient participation	5	25,0
		Challenges in student management	3	15,0
		Prolonged lesson planning duration	2	10,0
		No disadvantageous	2	10,0
		Distracting factors	2	10,0
		Technical/Infrastructure Issues	2	10,0
		Unlike traditional face to face education	2	10,0
		Lack of interest in traditional approaches	1	5,0
		Costly	1	5,0
		Failure to comply with school rules	1	5,0
		Inability to promote practical skills	1	5,0
		Free version limitations	1	5,0

In the analysis of the responses to the question 'What are the advantages and disadvantages of instructional Technologies and materials used during online classes?', two themes with two categories and 18 codes have been identified. Under the theme of advantages, the category of advantages of using instructional technologies and materials includes the following codes: “ease of implementation (n=5), ease of access (n=4), attractiveness (n=4), effective time management (n=2), visualization (n=2), opportunity for reinforcement (n=2)”. On the other hand, under the theme of disadvantages, the category of disadvantages of using instructional technologies and materials includes the following codes: “insufficient participation (n=5), challenges in student management (n=3), prolonged lesson planning duration (n=2), no disadvantageous (n=2), distracting factors (n=2), technical/infrastructure

issues (n=2), unlike traditional face-to-face education (n=2), lack of interest in traditional approaches (n=1), costly (n=1), failure to comply with school rules (n=1), inability to promote practical skills (n=1), free version limitations (n=1).

The teachers' views regarding the advantages of instructional technologies and materials in distance education are as follows:

T4: "Children are already naturally interested in such things because they are born into technology. They are more interested. Also, If I were to prepare a material about words, I would have to work separately for matching, and separately for other things. But, for example, in the Quizlet app, you just tap once, and the whole test appears in front of you. It is much more facilitative in this sense."

T7: "It provides convenience and practicality in terms of time. It creates the necessary suitable environment. For example, it is not always possible to motivate students in the classroom at the same time. However, these students- we call them Generation Z: they are more comfortable and can speak more freely in technological environments. I noticed this. In this way, students became more receptive to learning."

T10: "I sent a lot of tests through EBA (Education Information Network). I constantly sent them quizzes. I used to do this. I can't do this in the classroom. But when I send it through EBA, I can see how many of them have been done, how many have participated. Because you can't check homework now. I send homework and ask them to send me their answers privately via WhatsApp. I write them one by one. But now in EBA, they are all calculated and given to me with percentages."

T12: "I think online lessons were much more efficient because we could spend all 30 minutes with the necessary activities. We didn't have to say sit down, stand up, or be quiet like in the classroom. I mean, if we think about switching from screen to screen, opening the screens we prepared beforehand, we used it very efficiently without wasting time. We didn't just stick to the textbook. I also believe that; the students of this period are naturally more interested in technology. And especially when it's interactive, programs where they can quickly get their answers and receive feedback are much more enjoyable."

Regarding the disadvantages of instructional technologies and materials in distance education, the following teacher views are worth to mention:

T6: "Due to students attending the class with their phones, we encounter technical infrastructure problems. For instance, using Kahoot is challenging for many students who lack the opportunity. Additionally, either your or the students' internet connection might drop."

T7: "The most significant challenge I faced was the lack of infrastructure. A majority of the students did not have access to necessary technological tools or materials. Many of them lived in remote areas without internet, tablets, or phones. Moreover, the platform frequently froze or crashed initially, making it unstable in the beginning. Each student's limited access to necessary tools created some limitations due to unequal economic aspects among students."

T14: "We need to continuously improve our technological proficiency. Sometimes it might not be enough. We cannot master everything, which is why ongoing training is essential."

T19: "One disadvantage of using Zoom's free version is that we need to renew it every 40 minutes when there are multiple participants. This can cause delays in starting the class, especially when students join late. As a result, we may experience five to ten-minute losses in the class. For instance, in my language class with 10 hours a week, back-to-back sessions can lead to some time losses."

Online Instructional Technologies

Table 5 presents the frequency distributions of the responses obtained from the semi-structured interviews conducted with teachers regarding the technologies used during online classes. The table comprises 4 themes, 9 categories, and 32 codes related to the technologies used during online classes.

Table 5. *Technologies used during online classes 1*

Theme	Category	Code	f	%
Video Communication Applications	Virtual Classroom Platforms	Zoom	19	95,0
		EBA	10	50,0
		Google Meet	1	5,0
Supporting Resources	Supporting Platforms	British Council	2	10,0
		EBA	2	10,0
		OGM Materyal	1	5,0
		Duolingo	1	5,0
	Digital Documents	Interactive books	7	35,0
		Ms Office	3	15,0
		Materials created by teachers	1	5,0
	Activity-based web platforms	All Things Grammar	1	5,0
		Esl Games	1	5,0
		Isl Collective	1	5,0
		Wordtest	1	5,0
	Dictionary Applications	Cambridge dictionary	1	5,0
	Video Sharing Platforms	Youtube	3	15,0
		Voscreen	1	5,0
Communication Applications	Social Media Applications	Whatsapp	3	15,0
		Instagram	1	5,0
		Telegram	1	5,0
Digital Material Design	Web2.0 Tools	Kahoot	7	35,0
		Liveworksheets	5	20,0
		Quizizz	3	15,0
		Quizlet	3	15,0
		Canva	2	10,0
		Google Forms	2	10,0
		Sokrative	2	10,0
		Wordwall	2	10,0
		Edmodo	2	10,0
		Mindmeister	1	5,0
		WordArt	1	5,0
	Content Creation Software	EBA VFabrika	1	5,0

During the analysis of the responses given to the question, "What instructional technologies were beneficial during the distance education process?", 4 themes, 9 categories, and 32 codes related to the relevant technologies were identified. The theme of Video Conferencing Applications included the category of Virtual Classroom Platforms, with responses such as: "Zoom (n=19), EBA (n=11), Google Meet (n=1)". It was observed that Zoom and EBA platforms were mostly used simultaneously. Under the theme of Supporting Resources, the category of Educational Support Platforms had responses like: "British Council (n=2), EBA (n=2), OGM Materyal (n=1), Duolingo (n=1)". The category of Digital Documents included responses such as: "Interactive Books (n=7), Ms Office applications (n=3), materials created by the teacher (n=1)". In the theme of Activity-Based Web Platforms, responses included: "All Things Grammar (n=1), Esl Games (n=1), Isl Collective (n=1), Wordtest (n=1)". The category of Dictionary Applications had the response "Cambridge Dictionary (n=1)". Under the category of Video Sharing Platforms, responses included: "Youtube (n=3) and VoScreen (n=1)". For the Communication Platforms, the category included: "Whatsapp

(n=3), Instagram (n=1), Telegram (n=1)" codes. Under the theme of Digital Material Design (Web2.0 Tools), the category included: "Kahoot (n=7), Liveworksheets (n=5), Quizizz (n=3), Quizlet (n=3), Canva (n=2), Google Forms (n=2), Sokrative (n=2), Wordwall (n=2), Edmodo (n=2), Mindmeister (n=1), WordArt (n=1)". Lastly, in the category of Content Creation Software, the response was "EBA VFabrika (n=1).

Below are some responses provided by the participant teachers:

T1: "I could effectively use many video and game programs online, especially the videos and activities related to vocabulary teaching, speaking, and writing on the British Council website, which I couldn't use on the internet or in the classroom. I used Google Forms a lot. I used it for quizzes as well. Not for grading purposes, but to monitor what I taught and evaluate my students. I also used Quizizz, but I felt more comfortable using Google Forms. Students found it very easy to use, as they could access it from their phones. I extensively used Kahoot, especially for games and competitions."

T1: "During online classes, I effectively utilized various video and game programs, especially the ones related to vocabulary teaching, speaking, and writing from the British Council website, which were not feasible to use in the traditional classroom setting. Google Forms became an essential tool for me; I employed it not only for quizzes but also to monitor my teaching progress and evaluate my students. Although I also tried Quizizz, I felt more at ease using Google Forms since students found it user-friendly and accessible from their phones. Additionally, Kahoot played a significant role in making my classes engaging through games and competitions."

T2: "I found OGM materials and interactive books to be highly beneficial in my teaching approach. Interactive books surpassed regular PDFs, as they allowed students to listen to audio and then solve tests with just a click. Alongside these, I also integrated web2.0 tools like Kahoot and Quizlet into my teaching repertoire."

T3: "In the past, I was aware of platforms like Kahoot and Socrative, but we had limited opportunities to utilize them effectively. However, during online teaching, we embraced these platforms more enthusiastically. Interactive textbooks have been a valuable resource, streamlining our work and enabling swift progress in lessons. They spared us from excessive time spent on preparing extra materials. In addition to interactive books, I discovered the versatility of Wordwall, which offers numerous activities, as well as Liveworksheets."

T8: "During the previous academic year, while teaching preparatory students, I seized the opportunity to motivate them through various means. Notably, they prepared beautiful presentations using Canva. Subsequently, I incorporated resources like Isl Collective and Liveworksheets to introduce different sources for exercises."

T9: "Zoom served as my primary platform for conducting classes. Although I initially faced challenges with EBA, I eventually adapted well to Zoom. The glitches and problems during EBA meetings prompted me to switch platforms. Although I didn't use many games with high school students, I effectively employed screen sharing to explain concepts and content, which proved to be quite valuable."

T18: "In the in-service trainings, I became acquainted with VFabrika, a platform focused on creating programming-related questions within EBA's content. I made an effort to undergo their training and also explored tools like Wordwall from Web2.0."

T20: "I found interactive sites like Liveworksheets highly beneficial, as they appealed to students due to their interactive nature. Additionally, I discovered a game site called EslGames, which allowed me to organize word contests and quizzes, making the learning experience more enjoyable for the kids."

On the other hand, Table 6 presents the frequency distributions of instructional technologies and materials that are used during online lessons, derived from the responses of students during semi-

structured interviews.

Table 6. *Technologies used during online classes 2*

Theme	Category	Code	f	%
Video conferencing applications	Virtual classroom platforms	Zoom	29	96,6
		EBA	25	83,3
		Google Meet	1	3,3
		Vedubox	1	3,3
Digital material design	Web2.0 tools	Kahoot	2	6,6
		Quizizz	2	6,6
		Padlet	1	3,3
Supplementary resources	Digital documents	Ms Office applications	9	30
		Unnamed resources	5	16,6
		Interactive books	3	10,0
		Teacher'sown resources	2	6,6
	Educational support platforms	British Council	2	6,6
		OGM Materials	2	6,6
		Duolingo	1	3,3
		Morpa Campus	1	3,3
	Video sharing platforms	Youtube	5	16,6
	Quiz makers	Flexiquiz	1	3,3
	Dictionary applications	Tureng	2	6,6

The responses provided by the participating students to the question "What instructional technologies are used in online classes?" were analyzed, resulting in 18 codes across 7 categories and 3 themes. The theme of Video conferencing applications includes the Virtual Classroom Platforms category with the following codes: "Zoom (n=29), EBA (n=25), Google Meet (n=1), Vedubox (n=1)"; the Digital material design theme includes the Web2.0 tools category with the following codes: "Kahoot (n=2), Quizizz (n=2), Padlet (n=1)"; the Supplementary resources theme includes the Digital documents applications category with "Ms Office applications (n=9), Unnamed resource (n=5), Interactive books (n=3), Teacher's own resources (n=2)"; the Educational support platforms category includes "British Council (n=2), OGM Materials (n=2), Duolingo (n=1), Morpa Campus (n=1)"; the Video sharing platforms category includes YouTube (n=5); the Dictionary applications category includes Tureng (n=1); and the Quiz makers category includes Flexiquiz (n=1) responses.

Here are some of the prominent student responses:

S2: "We primarily used Zoom for our lessons, although EBA was also utilized. Zoom was preferred due to the frequent crashing and functionality issues experienced with EBA."

S6: "Engaging in games and activities through platforms like Kahoot and Quizizz significantly impacted my English learning in a positive way."

S9: "Exclusively using e-books allowed us to access various exercises and activities from different books on the screen, which was a helpful and convenient learning experience."

S10: "OGM Material was utilized, providing a valuable resource for students who couldn't access or afford the test book, offering an alternative and useful solution."

S17: "Initially, we used EBA at the beginning of the quarantine period, and then transitioned to Zoom for the rest of the quarantine."

S25: "Our teacher effectively utilized internet resources, such as working sheets and explanatory pages, to reinforce the subjects covered in class, which were also used for homework assignments."

S27: "English websites on Google were utilized for various activities related to our topics, which was comparable to the teacher photocopying and distributing materials in a physical classroom,

providing us with valuable learning opportunities. Additionally, Liveworksheets was among the beneficial applications used."

S30: "We made use of multiple platforms, including Google Meet, Zoom, Flexiquiz, and Padlet, to facilitate our online learning experience."

DISCUSSION, CONCLUSION, RECOMMENDATIONS

In this section, the findings from the semi-structured interviews have been discussed in conjunction with relevant literature.

Discussion on Studies Conducted with Teachers

During the COVID-19 pandemic, when examining the perspectives of participating teachers on the online teaching process and the utilized technologies, positive views included codes such as "well-conducted classes, use of resources, technological competence, cooperation with colleagues, a different teaching experience, and time-saving." Being consistent with this research, Türküresin (2022) highlights that online courses offer advantages for teachers, including cost-effectiveness, repetition opportunities, and flexibility in terms of time and space. As for the negative views towards the process and technologies were identified as "misuse of online education, increase in technology addiction, forgetting to turn of the microphone, and forgetting school rules." In line with this research, Altan (2021) also highlighted in their study that participants considered "being able to interact even though it is on the screen" and "gaining distance education experience" as positive outcomes of the process, while "technical glitches and difficulties in classroom management" were expressed as negative consequences of the process. Similarly, Türküresin's (2022) research identifies the disadvantages of online education as "Lack of Permanence in Learning, Issues Stemming from Assessment and Evaluation, Discipline Problems, Internet Issues, System Glitches, and Lack of Interaction. In regard to the advantages and disadvantages of the online education process, the following advantages were identified: "ease of implementation, ease of access, attractiveness, effective time management, visualization, and opportunity for reinforcement". Conversely, the identified disadvantages include: "insufficient participation, challenges in student management, prolonged lesson planning duration, no disadvantageous, distracting factors, technical/infrastructure issues, unlike traditional face-to-face education, lack of interest in traditional approaches, costly, failure to comply with school rules, inability to promote practical skills, and free version limitations". It is noteworthy that this section exhibits a diversity of views, with more codes in the disadvantages category compared to the advantages. Upon analyzing the findings of this research, it was observed that teachers faced difficulties during the rapid transition to distance education. Teachers with a greater interest in technology experienced less difficulty adapting to the process compared to their colleagues. However, some teachers encountered disruptions in lessons due to technical and infrastructure inadequacies. In line with this research, according to a study conducted by Machmud (2011) with 4 English teachers, 3 faculty members, and 2 administrators, despite having the opportunity to access technology, many participating teachers preferred not to use technology in their classes; instead, they continued the process using traditional teaching methods. The study suggested that this situation stemmed from the participants' lack of knowledge on how to use digital tools and their reluctance to make efforts to use these tools.

Aligned with this research, Akden and Koç (2022) found in their study on the effectiveness of information technologies in distance education during the pandemic that the advantages of distance education included "easy access to resources, spatial and temporal independence, continuous education during the pandemic, protection from the pandemic, content richness, and increased technology use in education." Conversely, the disadvantages were determined as "opportunity inequality, difficulty in controlling the environment, inability to establish eye contact, insecurity in assessment, adaptation problems for practical lessons, and lack of school atmosphere." Another study discussing the advantages and disadvantages of distance education identified the following

advantages: "creating an opportunity for shy students to express themselves, being more economical due to the absence of expenses such as meals, transportation, and clothing, developing self-management skills, and digital literacy." The study also highlighted the following disadvantages: "lack of social interaction, effective time management, difficulty in assessment, misuse such as copying, changes in the social role of teachers, and ineffectiveness for lessons requiring practical skills" (Söğüt, 2022). In a different study found in the literature, Balaban and Tiryaki (2021) reported that during the distance education process, stakeholders (teachers, students, and parents) did not have the same conditions in terms of internet infrastructure, computer hardware, and other facilities. As a result, their participation in classes and the level of benefit they derived from the lessons varied, leading to a decrease in students' and teachers' interest, willingness, and motivation. Consequently, as stated in a study conducted by Gaquit (2020), which examined the perspectives of high school English teachers in Sweden on online education, it reveals that distance learning has both advantages and disadvantages.

When examining the applications and technological tools utilized by teachers during the distance education process, the following responses were identified as "Zoom, EBA, Google Meet, British Council, EBA, OGM Material, Duolingo, interactive books, Ms Office applications, and materials created by teachers, All Things Grammar, Esl Games, Isl Collective, WordTest, Cambridge Dictionary, Youtube and VoScreen, Whatsapp, Instagram, Telegram, Kahoot, Liveworksheets, Quizizz, Quizlet, Canva, Google Forms, Sokrative, Wordwall, Edmodo, Mindmeister, WordArt, EBA VFabrika".

Discussion on Studies Conducted with Students

During this stage of inquiring about students' experiences and opinions regarding online classes, positive views and experiences were identified as "engaging/fun, lessons, efficiency, effective time management, like private tutoring, reinforcement opportunities, more conversational, comfortable learning atmosphere, unrestricted access to resources, no connection problems, protection from COVID-19, activity at home, advantageous for introverted students, effortless usage of dictionaries, technological competence". These responses were consistent with the findings of Ülker's (2021) research in the relevant literature, which also highlighted "engaging/fun lessons, lesson efficiency, effective time management, reinforcement opportunities. On the other hand negative experiences and views regarding the interview question were identified as "technical/infrastructure issues, unlike traditional face to face education, self-management issues, distracting factors, ineffective for practical skills, negative impact on eye health, inequality of opportunities, insufficient reinforcement activities, lack of feedback/correction, teacher-centered, challenges with screen-based learning, insufficient visuals, lack of long-lasting learning, numerous drawbacks, limited use of resources, long duration of lessons". Notably, the number of negative experiences surpassed the positive ones in the students' responses. Consistent with the findings of this research, Kaya's (2020) study on challenges faced by learners during online education also revealed "lack of sufficient internet access, difficulty in following the class with a mobile phone, lack of learning motivation, low student participation, negative attitude towards distance education, lack of independent learning skills, lack of learning responsibility, lack of computer skills, failure of lessons to meet student expectations, lack of experience in online learning, unpreparedness for online learning, failure to actively participate in classes, disconnecting from the class after a while." Similarly, Akyıldız's (2020) study showed that students expressed dissatisfaction with the distance education period due to "insufficient teacher-student interaction in online classes, limited opportunities to ask questions, difficulty understanding lessons, lack of sufficient feedback-correction, leading to an overall perception of the process as unsuccessful". It is worth noting that although Akyıldız's (2020) study focused on university students, the problems faced in the online learning environment were similar from the student perspective,

including issues such as "insufficient interaction, difficulty in understanding lessons, inadequate feedback-correction". Being consistent with this study, in a study conducted by Lin (2019) with 46 students, opinions on open educational resources are divided into positive and negative aspects. According to the findings, students expressed that open educational resources are economically more affordable, have advantages in terms of richer multimedia content, are suitable for mobile learning, and support self-directed learning. On the other hand, they mentioned disadvantages such as the absence of a familiar tangible textbook, slow internet connection, insufficient clarity in instructions, and a lack of self-regulation. The participating students also mentioned that they primarily faced technical and infrastructure problems during the distance education process, leading to inequalities among students. Additionally, as the participants were at the high school level and had less parental supervision, they experienced difficulties in self-management and self-regulation. Especially after the Ministry of National Education (MEB) (2020) announced to the public that non-participation in online education would not affect attendance, and only the grades obtained in the first semester exams would be valid, some learners with external motivations, such as grades and attendance requirements, became complacent and stopped making efforts to attend classes. This situation became the main reason for the differences in learners' knowledge levels. Students emphasized the need for lessons to be designed with materials that appeal to their interests and are attention-grabbing during online education. On the other hand, online education provided an opportunity for shy students to express themselves, which is a positive effect of what might seem like a negative situation. Additionally, some learners mentioned that the absence of time-consuming elements like commuting during online education resulted in more effective use of class time. However, attending classes from home (as one participating student put it: "not having the seriousness of school") also had a negative impact on learners' focus during online education. Moreover, in the current era, many high school students use their computers, tablets, phones, etc., more for playing games, which may divert their attention while attending classes with these devices. The most effective way to encourage active participation in class over playing games is through online education activities that are fun, interactive, competitive, and at the same time, highlight the importance of collaboration".

The responses provided by the participating students to the question "What instructional technologies are used in online classes?" were analyzed, and the instructional technologies and digital materials were identified as "Zoom, EBA, Google Meet, Vedubox, Kahoot, Quizizz, Padlet, Ms Office tools, unnamed resources, interactive books, teacher's own resources, British Council, OGM Material, Duolingo, Morpa Campus, YouTube, Flexiquiz". These tools are beneficial technologies for diversifying learner-centered class environments, capturing students' attention, and reinforcing learning. In contrast to this study, Kayar (2019) found that English teachers in high schools mostly used Kahoot, Youtube, and MS Powerpoint slides in their classes. Inconsistent with this research, a study conducted by Gümüş (2023) revealed that, the students mostly used "WordArt, Canva, Toonytool and Padlet" during online classes. The limited use of technologies identified in Kayar's (2019) study may be attributed to the research being conducted before the pandemic period. However, looking at the period coinciding with the pandemic, a study by Hart (2021) involving 2077 participants from 33 countries revealed that Quizizz was the most widely used tool in distance education, ranking 21st; Kahoot ranked 10th, and Canva ranked 6th. Considering that Quizizz, Kahoot, and Canva were mentioned as the top three applications used by students, it was deemed appropriate to mention their rankings (cited in Sarıgül, 2021). The top 10 tools in the list were as follows: "Youtube, Google Docs, Powerpoint, Zoom, Google Search, Canva, Google Meet, Word, Google Classroom, and Kahoot" (cited in Sarıgül, 2021). When examining the technologies listed in Hart's (2021) study, it can be said that the current list is consistent with the research findings.

Conclusion

In conclusion, this study provides valuable insights into the experiences and challenges faced by teachers and students during the transition to online teaching. Consequently, it contributes to the ongoing discourse on the future of education while emphasizing the vital role of teachers in shaping students' learning experiences in the digital age. Overall, this study highlights the importance of creating a supportive and interactive online learning environment to maximize students' learning experiences. By understanding students' experiences, educators can better design online courses that cater to their needs and preferences. Hence, education should proceed as closely as possible to its previous state, regardless of any circumstances (Shereen et al., 2020). In this context, it is worth noting that learning activities based on technology can enhance critical thinking skills, creativity, collaboration, and communication to support the construction of social knowledge (Shi, 2021). However, some students also encountered challenges, including technical issues and difficulties in understanding lessons. These findings contribute to the existing literature by shedding light on the benefits and drawbacks of online education. While the inclusion of ICT elements can add an element of enjoyment to the teaching and learning process, students need to adopt a positive attitude and be motivated and skilled through a teacher-guided approach.

Recommendations

• Adequate technological tools, hardware, and software support can be provided to students who lack sufficient means to participate in distance education. Additionally, ensuring that all students have the necessary equipment and internet access is essential.

• Free internet access can be offered to teachers and students during the distance education process.

• Areas with weak internet infrastructure can be identified and strengthened nationwide.

• Attendance limits can be set for students participating in online classes.

• Teachers can receive face-to-face and hands-on in-service training to enhance the quality of distance education.

• More attention can be paid to ensuring that the materials used in classes are compatible with the learning outcomes and appropriate for the students' levels, as well as engaging and appealing to their interests.

• To prevent online classes from becoming boring, students can be supported with educational games and activities suitable for their levels.

• A space can be created in the EBA teacher module or another platform affiliated with the Ministry of Education, where subject-specific online lesson plans/resources are shared.

• This research is limited to the high school level. Further studies can be conducted on English classes at the elementary, middle school, and university levels to examine differences between different educational levels.

• This research specifically focuses on online English classes during the pandemic from the perspective of teachers and students. A more comprehensive study involving parents and school administrators could be conducted.

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What Does Symmetry Look Like? A Qualitative Research Based on Mental Images

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ABSTRACT

Symmetry, located within the field of transformation geometry, is a mathematical concept that plays an extremely important role as a problem-solving technique. Despite this, it is rarely used in solving mathematical problems in secondary school. This research was carried out to reveal the mental images of secondary school students regarding the concept of symmetry in the secondary school mathematics curriculum. In the study conducted based on a qualitative perspective, the metaphors developed by the students regarding the concept of symmetry and the visuals they drew were examined. The study was conducted in the spring semester of the 2022-2023 academic year with 223 students studying in the 5th, 6th, and 7th grades at a public school in Ankara, selected according to the convenient sampling method. Content analysis was used to analyze and interpret the data obtained from the students. Looking at the results of the research; it turns out that secondary school students generally perceive the concept of symmetry as "having similar functionality", "visually overlapping" and "perfect and meeting in differences".

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INTRODUCTION

Mathematics, which we encounter in almost every aspect of life, enters the lives of children from a very young age. An example of this phenomenon is that children become acquainted with the concept of symmetry, although not consciously, through rope printing during the preschool period. Similarly, activities such as finding the similar shape of a given shape or correctly identifying the matching shoe or sock can also be shown as effective activities in the formation of the concept of symmetry at this age.

The symmetry we see in many fields, from art to nature, can be defined in different ways. For example, Leikin, Berman, and Zaslavsky (1997) define symmetry as a transformation that does not change the properties of the shape when applied. On the other hand, one of the most general definitions of symmetry is the mathematical meaning in which symmetry concerning the line is emphasized. In this definition, children form the concept of shape. Another definition is the meaning, which includes the concepts of balance and proportion and is used to indicate the harmonious combination of various parts within a whole. In this sense, efforts are made to develop the aesthetic feeling (Olkun, 2006; Öçal and Öçal, 2021). Since symmetry can be defined in diverse ways, it can be difficult to determine whether a shape has symmetry or not. Van de Walle, Karp, and Bay-Williams (2019) stated that to determine whether a shape has line or mirror symmetry, it is sufficient that the shape can be divided into two equal parts when folded along the line.

Symmetry, located within the field of transformation geometry, is a mathematical concept that plays an extremely important role as a problem-solving technique. Despite this, it is rarely used to solve mathematics problems in secondary school. Studies have revealed that teachers do not attach sufficient importance to using symmetry as a problem-solving tool (Leikin, Berman, & Zaslavsky, 2000). The concept of symmetry, which perhaps does not receive the necessary importance among other subjects of mathematics, has a very widespread application in many branches. It is used a lot, especially in the field of art (Cereci, 2012; Hickman and Huckstep, 2003). The symmetry that exists in nature, art, humans, and their daily use products is an element that reveals what is beautiful in works of art. Elements of proportion and symmetry have been used in many works of art since ancient times, and the beauty of the work of art is expressed with these elements (Karagözlü, 2015). While it is stated that the concept of symmetry comes to the fore in studies on the association of mathematics and mathematics teaching with art, it is emphasized that harmony, order, and beauty in works of art are achieved through symmetry (Atasay and Erdoğan, 2017). Regarding the subject, Köse and Özdaş (2009), in their study examining how 5th-grade students determined the symmetry line, looked at how the students defined the concept of symmetry. Students gave explanations about the concept of symmetry, such as "sameness," "harmony," "repetition of the same," "reflection," "similarity," and "inverted states." In addition, some students use expressions such as "when we divide a shape in half, there are the same shapes and equal shapes on both sides" and "when we fold it in the middle" when defining symmetry; this shows that they are aware of the line of symmetry. Studies have found that both teachers and students have some difficulties with the concept of symmetry and, as a result, make mistakes (Grenier, 1987; Köse, 2012; Küchemann, 1981; Orton, 1999). Examining the literature, it was determined that students did not have difficulty finding the symmetry of a shape when it was in a correct, vertical, or horizontal position but had difficulty when it was in an inclined position (Köse, 2012). It has been shown in different studies that supporting the subject of symmetry with different fields or activities has a positive effect on student success and attitude. In their study with 4th-grade students, Özkartal and Öçal (2021) determined that enriched learning activities caused a significant difference in students' symmetry success and perceptions but had no effect on permanence. In his study with 7th-grade students, Dağdelen (2012) observed that students' success in symmetry increased at the end of the course supported by origami. Durmuş (2017) found that teaching lessons with animations about symmetry significantly differentiated students' mathematics achievement.

Looking at the studies in the literature, they are generally aimed at teaching symmetry through a method, technique, strategy, or material. The current study differs from previous studies in that it was

conducted to reveal students' mental images of the concept of symmetry. Revealing perceptions about a concept is considered important in terms of providing clues for later activities and teaching this concept. In this context, the research was carried out to determine the mental images of secondary school students regarding the concept of symmetry.

METHOD

The present study investigates the mental images of symmetry among secondary school students, a crucial concept in the transformation geometry sub-field of mathematics education. A qualitative research design was employed to achieve the research objectives.

Working Group

The participant group of the study consists of 223 students (72 fifth graders, 65 sixth graders, 53 seventh graders, and 33 eighth graders) studying in two public secondary schools located in the central district of Ankara province in the 2022-2023 academic year and determined according to the easily accessible sampling method. The fact that one of the secondary schools where the study was conducted was an educational institution where the author had previously worked, and the mathematics teacher at the other secondary school had met the researcher before, enabled the research to be conducted by easily accessible sampling. In the literature, the convenience sampling method is seen as a frequently preferred sampling selection method as it provides economy (time, speed, and a practical process) for researchers (Yıldırım & Şimşek, 2006).

Data Collection Tools

In the literature, studies have been conducted to collect data with metaphors to determine the mental images of secondary school students regarding the meanings they attribute to the concept of symmetry (Ablak & Aksoy, 2018; 2021; Aydın, 2010; Günaydın, 2021; Güven & Güven, 2009; Kılcan & Akbaba, 2018; Saban, 2004; 2008; 2009) and the visuals/cartoons drawn by the students in this form were used. It is stated in the literature that visual materials (cartoons) are used to reflect the thoughts and feelings of the participants, emphasize skills in commenting on something and producing solutions (Ersoy & Türkkan, 2010), and can be used as a tool to determine the situation in some achievements (Ersoy, 2010).

Data Collection Process

Before collecting the data for the study, the researcher went to the educational institutions she had previously determined and informed the school administration and teachers about the purpose of the study and the implementation step of the study. Responding to some questions and requests from mathematics teachers, especially about the process after the implementation phase of the study (output of the study), the researcher met with the teachers of the appropriate courses to move on to the implementation phase of the research, went to the classrooms and informed the students for the application. At this stage, the metaphor form was first distributed to the participants and a brief explanation was made about the metaphor. Then, without touching on the concept of symmetry, the participants were given examples of developing metaphors on different topics (Ankara traffic is similar to blood circulation because they are both complicated. The sun is like the yolk of an egg because they are both yellow. It is like a math calculator because they both contain numbers, etc.) presented. After this stage, students were asked to develop a metaphor for the concept of symmetry, as in the examples presented, and to provide a justification for why they developed this metaphor, and if they wished, to draw a visual for the metaphor they developed or its justification. They were then told not to write descriptive information such as name, surname, and class number on the given metaphor forms, that the metaphors created would not be evaluated as true or false, and that these metaphor forms could not be seen by anyone other than the researcher. Participants were reminded that the developed metaphors could be anything such as concrete or abstract, animate, or inanimate, positive, or negative, and time was given to the participants to collect data. Participants completed the study within an average of one class hour. After the completed study forms were collected from the participants, the researcher thanked the participants for

participating in the application and left the application schools.

Analysis and Interpretation of Data

The analysis of the data obtained from the participant group was conducted based on a qualitative research perspective and content analysis, which is frequently used in this perspective, was used. Content analysis is explained as a technique that provides the opportunity to make indirect inferences about the different behaviors exhibited by people in the participant group (Büyüköztürk, Kılıç-Çakmak, Akgün, Karadeniz, & Demirel, 2010). On the other hand, in addition to the content analysis used in the study, the analysis was carried out by following the five stages followed by Saban (2009). The first phase mentioned is the coding and extraction phase. The metaphor forms obtained from the participants during the coding and sorting phase were numbered from 1 to 223. Then, the forms were examined and the forms in which the reason for the metaphor was not explained, only the definition was presented (Symmetry is similar to a mirror because……) and the forms that were left blank were excluded from the analysis, and the remaining 87 forms constituted the data set of the research. In the sample metaphor compilation phase, which is the second stage, the "metaphor analysis" methods mentioned by Saban (2009) and the "content analysis" methods mentioned by Yıldırım and Şimşek (2006) were used, the metaphors developed by the working group were re-examined and similar, likened and the bond between the like and the likened was evaluated. As a result of this evaluation, metaphors with weak imaginary structures were eliminated and excluded from the evaluation. In another stage, category creation, the mental images produced by the participants regarding the concept of symmetry were divided into categories according to the reasons for which they were created. In the next stage, the validity and reliability stage, another researcher (a researcher at the university who has similar studies) was asked to match the connection between the metaphor and the category to ensure that the metaphors in the conceptual categories reached by the researcher were able to represent the relevant category. As a result of the agreement between the matching made by the expert consulted by the researcher and the matching made by the researcher, the conceptual categories of nine metaphors were changed. Then, in the final stage of transferring the obtained data to the electronic environment, the findings section was created by calculating the mental images divided into categories, the frequency of the participants representing the category they belong to, presenting verbatim quotations of the reasons for the mental images and coding the participants (S23, S37, S127, …). While reporting this part, the mental images developed by the participants were scanned visually with the help of the word cloud program, and the images related to the developed mental images and their reasons were scanned verbatim to create the findings part of the research.

Ethic

I confirm that the study adheres to scientific ethical principles and protocols at all stages. All data and information beyond the study's scope are duly cited in the bibliography. The study's contributions to the field are objective and valuable. In addition, I agree to the terms and conditions of the Publication Ethics Committee (COPE) and attest that I uphold ethical duties and responsibilities.

FINDINGS

The mental images developed by the participants regarding the concept of symmetry (according to their frequency of development) are shown in the word clouds below.

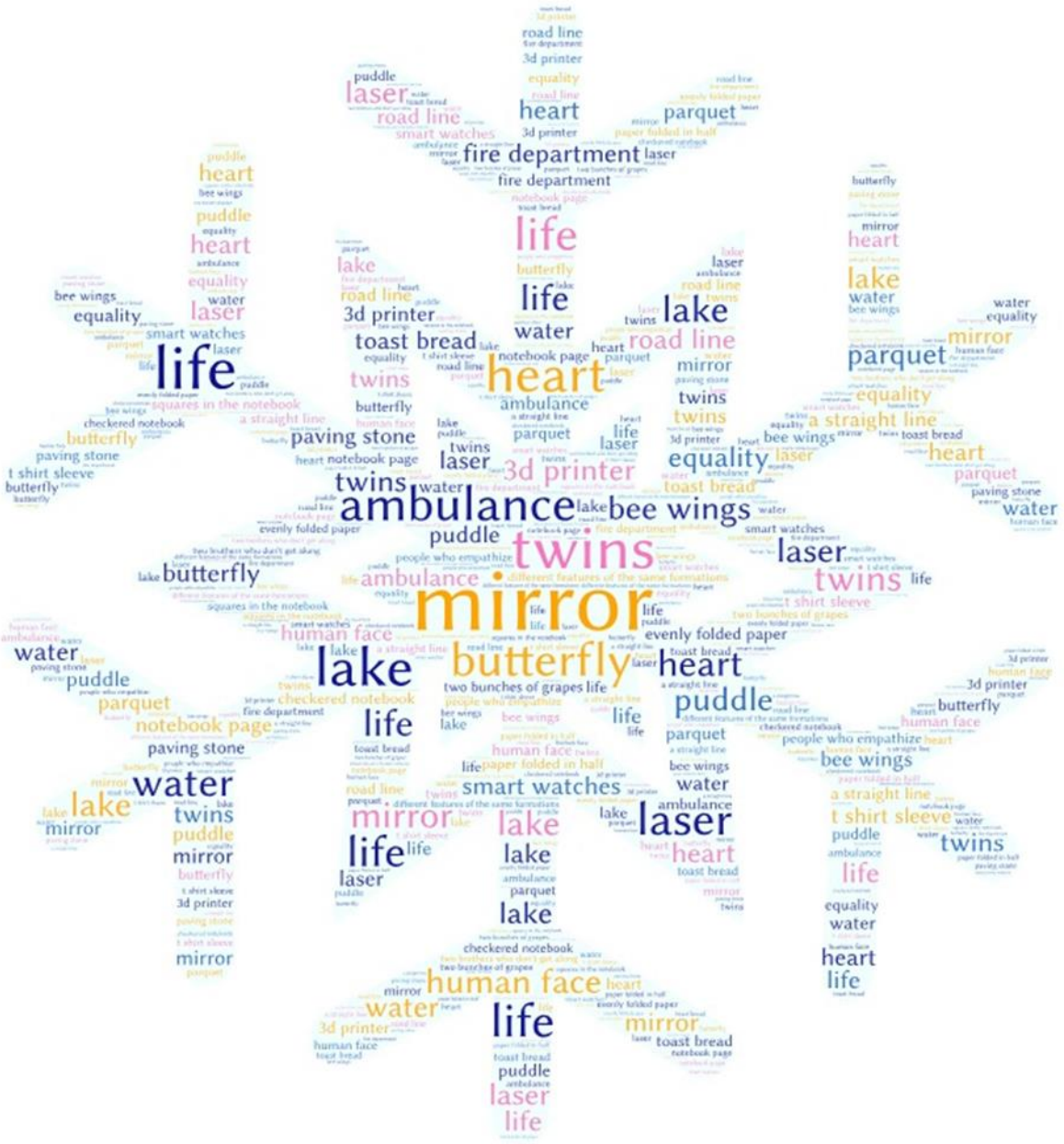

Figure 1. *Mental images developed by the participants regarding the concept of symmetry*

In the word cloud in Figure 1 above, the mental images developed by the students participating in the research regarding the concept of symmetry are shown, considering their frequencies. The students participating in the research developed a total of 87 metaphors related to symmetry. Among these mental images, the ones most developed by the students were "mirror", "ambulance" and "butterfly". Apart from these metaphors, "twins", "lake", "bee wings" and "human face" can also be shown among the frequently developed mental images. In addition, it was determined that 23 metaphors developed by the students were developed by only one student each.

Figure 2 below shows the metaphor categories created based on the mental images developed by the students participating in the study regarding the concept of symmetry.

Figure 2. *Metaphor categories created based on the mental images developed by the participants regarding the concept of symmetry*

The word cloud in Figure 2 above contains metaphor categories created by using the mental images developed by the students participating in the research for the concept of symmetry. The conceptual categories developed by the participants regarding symmetry are grouped under 3 headings in terms of their common features. Based on the mental images developed by the students participating in the research and the explanations they made, the thoughts that constitute the justification of the metaphor were grouped. Accordingly, it is the "having similar functionality" category that contains the most metaphors. This is followed by the "visually overlapping" and "perfect and meeting in differences" categories, respectively.

Having similar functionality. Examining Figure 2 above, it is understood that the category containing the most metaphors is the category of having similar functionality. Looking at the metaphors in this category, we see that the most common metaphors are "ambulance", "mirror" and "butterfly's wings". Looking at the reasons for the metaphors developed by the participants under this category and the drawings of some of these metaphors; *"Symmetry is like an ambulance sign because the word ambulance was written upside down and it was seen straight from the mirror, I drew it." (S, 24)*

Image 1. *Ambulance*

"Symmetry is like a mirror because when we look in the mirror, it gives a reverse movement. For example, if we raise our right hand, our image reflected in the mirror is left." (S, 164)

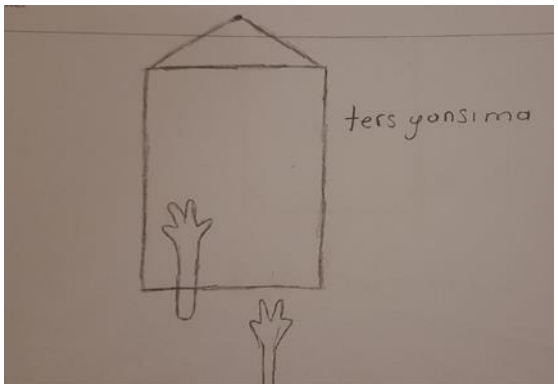

Image 2. *Mirror*

"Symmetry is like our reflection in a mirror because when we look in the mirror, we see the same version of ourselves, but with a changed direction. For example, when we put a watering can in front of the mirror, we see the same thing but in a changed direction." (S, 37)

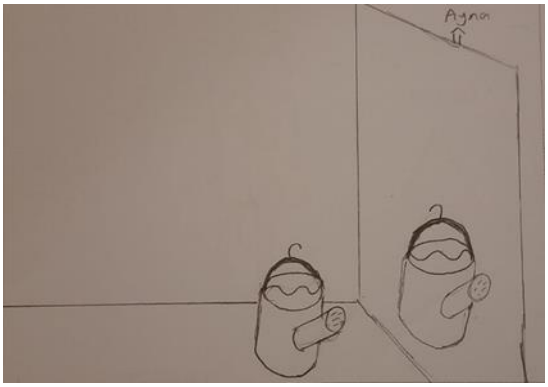

Image 3. *Reflection in the mirror*

"Symmetry is like a butterfly emerging from its cocoon because the opposite wings and antennas of a butterfly that has emerged from its cocoon are equal and symmetrical." (S, 143)

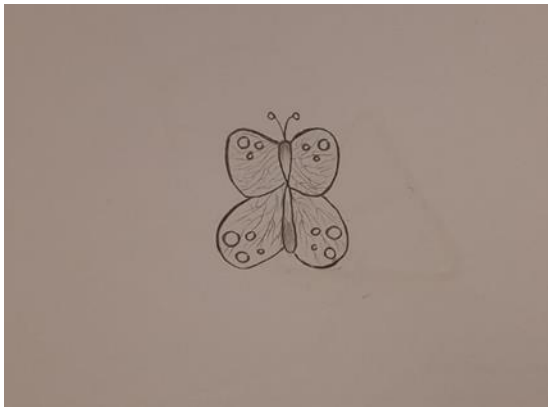

Image 4. *Butterfly wings*

Visually overlapping. Examining Figure 2, it is seen that the visual overlapping category is the second largest category in terms of containing metaphors. Examining the metaphors under this category, we see "lake", "life", "two brothers who don't get along", "two bunches of grapes", "paving stone", "checkered notebook", "laser", and "parquet". It was observed that the metaphors "puddle", "water", "t-shirt sleeve", "toast bread", and "paper folded in half" appeared only once in the category. Looking at the metaphors developed by the participants under this category, their justifications, and the drawings of these metaphors; *"Symmetry is like a lake because its reflection is equal to us." (S, 127)*

Image 5. *Lake*

"*Symmetry is like people who have twin siblings because in symmetry, things that are symmetrical to each other are identical to each other. Twin siblings also look alike. That's why symmetry is like twin brothers." (S, 36)*

Image 6. *Twins*

"Symmetry is like the human face because the human face is two equal parts." (S, 77)

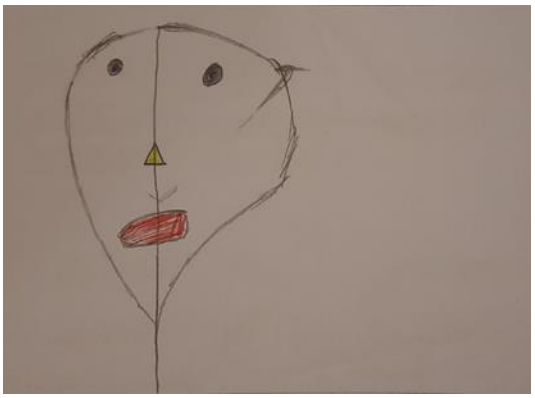

Image 7. *Human face*

"Symmetry is like a heart because the heart is symmetrical but not what humans have." (S, 113)

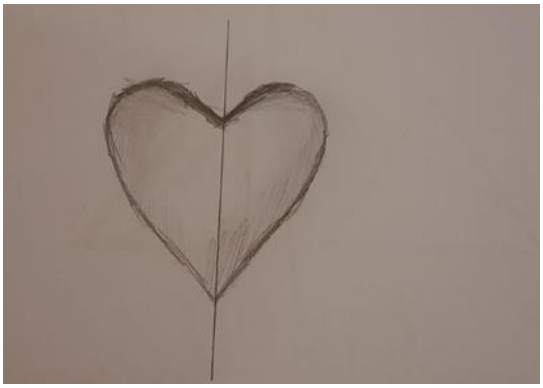

Image 8. *Heart*

Perfect and meeting in differences. Examining Figure 2 above, the Perfect and meeting in differences category is the third category containing the most metaphors. Examining the metaphors in this category, the metaphors "evenly folded paper", "equality" and "road line" appeared the same number of times and once each. Looking at the metaphor reasons and drawings of these metaphors of the participants who developed the metaphors under this category; *"Symmetry is like folding a sheet of paper evenly Because equality is ensured, and it is folded and regulated equally (S, 23).*

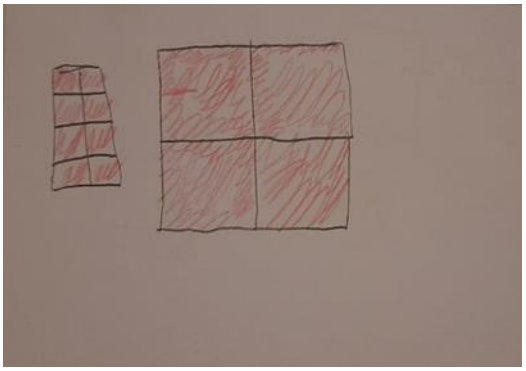

Image 9. *Evenly folded paper*

"Symmetry is like equality because everyone is equal." (S, 182)

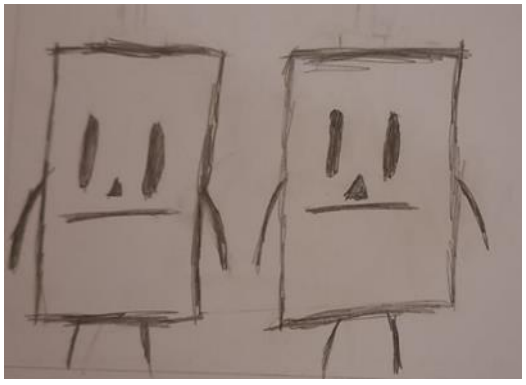

Image 10. *Equality*

"Symmetry is like a road line because their lines are the same." (P, 41)

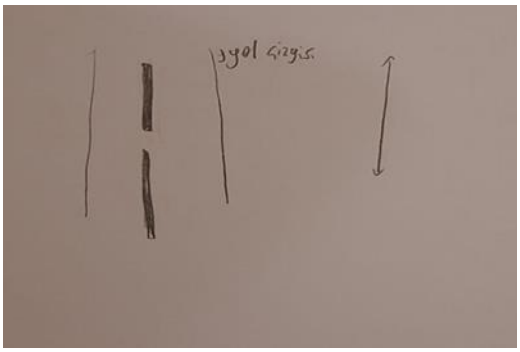

Image 11. *Road line*

DISCUSSION, CONCLUSION, RECOMMENDATIONS

In the results of this study, which was conducted to determine the mental images of secondary school students towards the concept of symmetry, the metaphors created by the participants for the concept of symmetry are generally in the "having similar functionality" category. It was determined that these were grouped under the categories of "visually overlapping" and "perfect and meeting in differences," respectively.

Looking at the research results, the category having similar functionality is the one containing the most metaphors. This can be considered evidence that most students think of symmetry as a reflection and create a mental image of it. In this category, the participants mostly created mental images such as mirrors and ambulances, which is similar to the findings of the study conducted by Köse and Özdaş (2009).

Looking at the metaphors in the "visually overlapping" category, the second category in which students produce the most metaphors, their justifications, and the drawings created by the students, it can be said that symmetry is perceived as an apparent similarity. The fact that the participants developed mental images in this way can be considered proof that they are at the "visualization" level stated by Van de Walle, Karp, and Bay-Williams (2019). It can be said that the reason for this is that the students participating in the research think of symmetry as the shape itself and its image after its symmetry is removed and compare the two images. From the mental images created by the students, "Symmetry is like twin brothers. Expressions such as "Because they are both similar to each other" can also be cited as examples of this.

In addition, another result of the research is that the participants touched on the principles of symmetry and equality in the mental images they created and the visuals they drew. These mental images are collected in the "perfect and meeting differences" category. Under this category, students emphasized that the shape and its appearance after the symmetry of the shape is taken are equal. According to the literature (Van de Walle, Karp, and Bay-Williams, 2019), this situation can be considered an indication that the participants are at the level of "informal inference." Individuals at this level think about discovering the relationships of geometric objects with each other from the characteristics of shapes. In this study, some participants' mental images about symmetry *(Symmetry is like equality because everyone is equal. Symmetry is like folding a piece of paper equally because equality is achieved, folded, and arranged equally*) supports the literature.

Looking at the results of the research in general, it shows that students think that their mental images of the concept of symmetry and the "shape and symmetry" of the drawings they deal with are similar. It is also supported in the literature (Grenier, 1987; Köse, 2012; Küchemann, 1981; Orton, 1999) that some drawings made by the participants regarding the concept of symmetry were made by considering the symmetry line only in vertical and horizontal positions. The fact that students mostly draw similar images

about symmetry and mostly use metaphors such as mirrors and ambulances may be because teachers generally use similar symmetry examples in teaching symmetry.

Based on the results given above, it is seen that the mental images of secondary school students regarding the concept of symmetry are generally similar, and they think of the symmetry line only in horizontal or vertical positions. Accordingly, while introducing the concept of symmetry to students, they should especially be taught that the symmetry line can be in different positions. In this study, students' mental images of the concept of symmetry and their drawings were examined from a qualitative research perspective. It may be recommended to conduct experimental studies by trying different teaching models for the relevant concepts in similar age groups.

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Evaluating knowledge levels of students with a Computerized Adaptive Test[1]

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ABSTRACT

The present study aims to develop and evaluate a Computerized Adaptive Test (CAT) system for multiple-choice success tests. In this regard the measurement results obtained from the CAT system based on Item Response Theory (IRT) and the test mode based on the Classical Test Theory (CTT) were compared in terms of the knowledge level of the students, reliability of measurement and number of items. The study was conducted on 873 students from a state-university in Turkey. The research took three years and involved three phases. According to the findings of the present study, with the developed CAT system, academic success levels of the students were determined with very high reliability. When all the items in the test were scored according to both constructs, the relationship between the scores obtained was found to be high and meaningful in a positive direction. Moreover, there is a high, positive, significant relationship between students' levels of knowledge that are estimated in CAT systems and the score of an achievement test they received from a Paper & Pencil test. Finally, the number of questions the students were exposed to in the CAT system was reduced by 50% compared to the test based on the CTT.

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1. INTRODUCTION

The idea of the tailored test first emerged in Binet's work to develop the IQ test in 1905 (Binet and Simon, 1905). This test Binet prepared had an item pool prepared in advance, items classified based on the level of difficulty, starting options, a scoring method defined in advance, and a rule for the selection from a pool of the items to be asked and for a termination defined in advance. Even if this first application revealed about 100 years ago appears basic, it can be said that it created a foundation for applications today. However, Binet's tailored test did not arouse much interest in that period because of the questions in practice. Because an IQ estimation needs to be done accurately and quickly based on the responses an individual provides to a specific item and then a new item needs to be selected from the item pool and answered. This is why such an application was adopted in the 1970s with advancements in computer technology.

Considering the history of measuring, it is seen that tests were developed in the context of two fundamental theories of testing, referred to as the Classical Test Theory (CTT) and the Item Response Theory (IRT) (Crocker and Algina, 1986). The score based on the CTT in the measurement of achievement is found with the compilation of the scores that students received from the items. The test and item statistics were conducted over the total scores and item scores obtained in this manner. Therefore, the scores individuals received based on the CTT vary based on the level of difficulty of that test (Lord and Novick, 1968). The difficulty indexes of items, however, are generally not taken into account, and if items are not weighted when scored, the contribution of each item to the total score is the same amount. Because individuals at different ability or achievement levels are tested in these tests, numerous items that encompass a wide interval must be administered. For example, on a test the contains some very easy items because the probability of individuals with a high ability level of answering these items correctly is high, these items do not serve a purpose in distinguishing upper-level individuals from one another.

The IRT is a theory that specifies that there is a relationship between the proficiency levels of individuals measured with the test and the response behaviour to any of the items on the test, and it explains this relationship based on a probability model (Embretson and Reise, 2000; Hambleton, et al., 1991; Wainer et al., 1990). The contribution of each item to the score calculated based on the IRT is not the same; scores for items that are affected by the difficulty of items based on the model used, by the strength of item discrimination, and by the probability of responding correctly by guessing are in question. The traits of the invariance of the item parameters and the invariance of the ability parameter in the IRT are the most important scores that separate this theory from the classical test theory and that provide for its use in Computerized Adaptive Test (CAT) systems.

The invariance of the item parameters means the parameters used to define the items (item discrimination, difficulty index, etc.) can be independently estimated from the ability levels of individuals. Even if the items are administered only to a specific group, the item parameters can be estimated to encompass all ability levels with a nonlinear regression method (Kalender, 2011). The invariance of the ability parameter means the ability estimations for individuals can be made independently of the items asked individuals (Kalender, 2011). Even if each individual receives different items, the ability estimations are found on the same scale for each individual and thus are comparable. Even if there are many different IRT models, the models most frequently used and most appropriate for the tests coded as true/false are 1, 2, 3PL: One, Two, Three parameter Logistic Models. These models try to explain the relationship between the ability level of an individual and the probability of correctly answering this question, by using different parameters. These parameters are referred to as item discrimination (a), difficulty index (b), and guessing parameter (c). The guessing parameter is the probability for individuals in the lowest ability level to incidentally answer an item correctly. The 1PL model uses only the item difficulty index, the 2PL model takes the item discrimination level of the item into account along with the difficulty index, and the 3PL model considers guessing parameter in addition to these two parameters. The items used in the administering of CAT are previously administered to a group, and its parameters are included in the item pool in a defined state (calibrated) based on one of the models above.

An item characteristic function is defined for each of the items in these models. This function forms a relationship between the ability level of individuals, using the item parameters mentioned above and the possibility of correctly answering the item; and it is used for the ability estimation of individuals during the administering of CAT.

The item information function is used for the selection of items in the administering of CAT. The standard error of the estimation of ability is inversely proportional to the test information function. Based on this, using items that have a high information value increases the reliability of the ability estimation by decreasing standard error and ensures the conclusion of the test in a shorter amount of time.

1.1. Literature

Researches examining the applicability of tests designed based on the IRT and whether these tests are an alternative tool of measurement to tests prepared based on the CTT are as follows.

Pelanek (2016) designed a system of rating that dynamically matched the relationship between the ability level of the student and the question. As a result of applying this, in educational applications the Elo rating system is simple, substantial and efficient and therefore suitable for development. Cisar, Cisar and Pinter (2016) conducted an experimental study with two groups of students. The result of the research shows that the students who studied on computer adaptive testing are more successful than the students studying in the paper pencil test (PPT). Çelen and Aybek (2013) compared by individually scoring a test that measured the success in the measurement evaluation class based on the CTT and IRT methods. The BILOG-MG 3 software was used for analysis. As a result, a positive and meaningful relationship was found between the acquired scores. Huang et al. (2009) developed and implemented an adaptive testing system. The result of the research shows that the system can estimate students' abilities reliably and validly and conduct an adaptive test efficiently. With his CAT system, Tseng (2016) was able to classify students' vocabulary with far fewer questions. Özbaşı and Demirtaşlı (2015) tested the applicability of a computer literacy test as a CAT. The data were gathered with the SimulCAT simulation program and with the CAT system that Kalender (2011) designed. The average reliability level acquired from the administering the CAT was found to be significantly higher than the value obtained from the PPT. Chen and Chung (2008) developed a mobile English vocabulary learning system based on IRT. The result of the experimental research shows that the system positively affected the students' learning performance and learning interest in English vocabulary learning. Kuo et al., (2015) developed multidimensional CAT for Indonesia junior high school Biology. The study was carried out in two phases (simulation study and real data). The results show that the bias and standard error of the Biology-MCAT system are acceptable. Özyurt (2013) evaluated the level-setting of the designed adaptable test system for the knowledge levels of the students. It was found that as a result of the conducted application, the developed test system was able to very reliably level-set the knowledge levels of the students. The findings of the study of Petscher, Foorman and Truckenmiller (2017) indicated that examinees in the experimental condition took fewer passages and had more reliable estimates of their reading comprehension ability. Zhang and VanLehn (2017) found that students using adaptive question selection had reliably larger learning gains than students who received questions in a maladaptive order. Wu et al. (2018) argue that the computerized dynamic adaptive test with individualized prompts outperformed the other two instruction methods (the individualized instruction without adaptive dynamic assessment, and the traditional classroom remedial instruction).

It is understood from the literature that the CAT system can calculate the knowledge levels of students much quicker and more reliably. In addition to this, it is seen from research results and the theoretic framework that CAT systems are quite advantageous. Although there has recently been an increase in the number of studies conducted in this field, they are quite limited. The reason for this could be that the design of CAT requires specialization both on the topics of programming and measurement evaluation. When it is as such, researchers prefer test statistics with simulation software like SimulCAT rather than real, experimental studies with CAT. On the other hand, the formation of a item pool with real experimental applications requires a period about one or two years. Additionally, there is no platform on which researchers and

individuals who want to conduct this type of application can easily make designs.

The CAT system designed on the “Concerto” platform and the Computer Based Assessment (CBA) designed on the My-Sql platform by the researcher were used as the test tool in this study. In this context, the examination of the applicability and usability of CAT in the measurement of the knowledge levels of students will provide significant contributions to the field.

This study examined the applicability in a CAT system developed based on the IRT of the achievement test of the “Office Programs” course, a basic, required course taught at universities. All students must answer the entirety of the questions in these tests, generally administered as multiple choice, regardless of the level of proficiency. In other words, students are forced to answer more questions than necessary that fall above or below their proficiencies. This situation weakens the reliability of tests and the motivation of students in exams. To eliminate these limitations, testing the applicability as a CAT of the achievement test administered as a PPT constitutes the fundamental problem of this research.

1.2. Purpose of the Research

The aim of this study is to examine student achievement, which is estimated based on IRT in the CAT system and calculated based on CTT, which is one of the two equivalent measurement tools aimed at measuring the academic success of office programs. The initial hypothesis was stated as follows:

1. The reliability coefficient of the "office programs" achievement test carried out with the CAT system is higher than that of the KTK.

2. There is a positive and highly significant relationship between the scores calculated based on the IRT and CTT.

3. The average number of questions that students have to answer in the CAT system is less than the number of questions they answer according to the KTK.

2. METHOD

In this section, the research pattern, study group and teaching materials used in the study are explained. Data collection tools and statistical analyses of collected data are described.

2.2. Study Group

The research was carried out in three phases. 1st phase was conducted on 745 students receiving the “Office Programs” course and who were attending the Faculty of Education and Faculty of Arts and Sciences at a state university during of the 2018-2019 academic year. 2nd phase was conducted on 128 students receiving the “Office Programs” course and who were attending the Faculty of Education and the Faculty of Arts and Sciences at a state university during of the 2019-2020 academic year. The final phase was also conducted with 128 students in the 2nd phase.

2.3. Data Collection Process and Experimental Operation

1st phase: In this phase, first of all, an online exam system with multimedia support and a user-friendly interface was developed by the researcher.

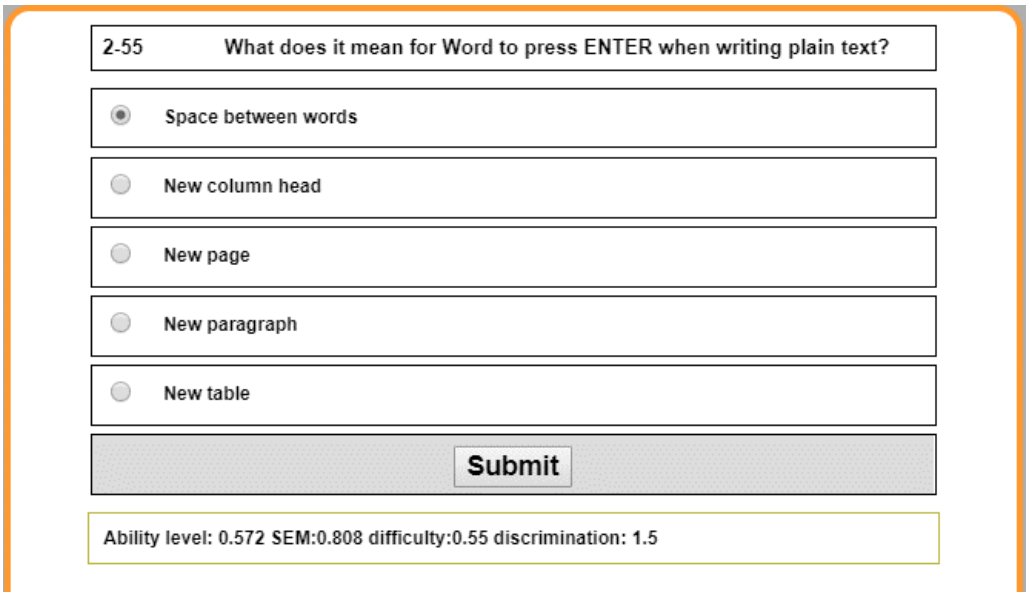
Then, the achievement test, consisting of 118 questions (a multiple choice test), was applied to a total of 745 students who took the "Office Programs" course at a state university. In the tests carried out throughout a 2-year process in 4 sessions, the item parameters were automatically calculated by the system based on the answers the students provided to the questions. Items whose difficulty and index of distinctiveness values were not suitable were again automatically removed from the question bank.

At the end of the conducted application, 43 items with index of distinctiveness index below 0.30 and difficulty index less than 0.25 greater than 0.9 were removed from the item pool. At the end of the first stage, an item pool of 75 questions calibrated with the 2-Parameter model was obtained. Because the 2PL model takes the item discrimination level of the item into account along with the difficulty index.

2nd phase: In this phase, first of all, the researcher designed an IRT-based CAT system. This system was designed on the open-sourced Concerto platform, developed by the University of Cambridge Psychometrics Centre. While the test codes were written with the "R" language on the Concerto platform, the tables, which are the cornerstones of the database, can be configured in a graphic interface just as in the My-Sql platform. Interface design can be done with HTML codes or graphic-based.

Rules of termination are generally chosen as fixed length and varying length in the body of literature. Standard error, most preferred in varying length conclusion rules, emerged as the conclusion rule. Additionally, it is recommended that the varying length conclusion rule be limited with a maximum number of items. This is why a standard error of 0.30 and a maximum of 40 items were specified in this study as the conclusion rule. The CAT module with the aforementioned traits was added to the online examination system designed in the first phase. Figure 1 is a screenshot from the CAT module.

Fig. 1. CAT screenshot



Then, CAT was administered with 128 students who were taking the Office Programs course in 6 different departments in the Faculty of Education and the Faculty of Arts and Sciences at a State University. In this administering, 75 questions that had been previously calibrated following the 2PL model were used. The ability estimation method has been specified as the "Maximum Likelihood", the question-selection method as the "Maximum Information", and the test termination rule as the "standard error falling below 0,30" or the number of administered questions reaching 40.

3rd phase: Forty questions that had homogeneous distribution were identified based on the difficulty (p) and item discrimination (r) levels of the 75 questions whose suitability is specified for the 2PL model. These 40 questions were administered again as a PPT 1 week after the CAT was administered to the student group in the 2nd phase.

3. FINDINGS

3.1 Findings for the First Sub-Purpose

Table 1 presents the knowledge level estimations, test scores, standard errors, and reliability coefficients of all students in the administering of the office programs test.

Table 1. *The knowledge level estimations, test scores, and standard error and reliability coefficient values for all students who took the test.*

Std.	N. of item	Theta	Std. error	Success grade (100)	Reliability coefficients	St.	N. of item	Theta	Std. error	Success grade (100)	Reliability coefficients

Std1	19	0.73	0.30	70	0.913	Std65	19	0.65	0.30	70	0.91
Std2	21	0.04	0.30	20	0.912	Std66	19	0.24	0.30	35	0.91
Std3	19	0.38	0.30	65	0.913	Std67	19	0.89	0.30	80	0.91
Std4	21	1.09	0.29	90	0.915	Std68	19	0.79	0.30	85	0.91
Std5	19	0.86	0.30	85	0.912	Std69	19	0.38	0.30	45	0.91
Std6	19	0.24	0.30	40	0.911	Std70	19	0.53	0.30	70	0.91
Std7	19	0.51	0.29	65	0.914	Std71	19	0.38	0.30	45	0.91
Std8	19	0.61	0.30	80	0.912	Std72	19	0.65	0.30	75	0.91
Std9	19	0.66	0.30	75	0.912	Std73	19	0.51	0.29	55	0.91
Std10	19	0.53	0.30	75	0.913	Std74	19	0.24	0.30	35	0.91
Std11	20	0.42	0.29	65	0.915	Std75	19	0.28	0.30	40	0.91
Std12	19	0.71	0.30	75	0.913	Std76	19	0.24	0.30	45	0.91
Std13	19	0.64	0.30	70	0.912	Std77	20	0.20	0.29	30	0.91
Std14	19	0.39	0.30	55	0.913	Std78	19	0.51	0.29	70	0.91
Std15	19	0.52	0.30	65	0.913	Std79	19	0.51	0.29	80	0.91
Std16	19	0.85	0.30	75	0.912	Std80	19	0.51	0.29	60	0.91
Std17	19	0.84	0.30	75	0.912	Std81	19	0.38	0.30	40	0.91
Std18	19	0.89	0.30	80	0.912	Std82	21	0.04	0.30	10	0.91
Std19	19	0.57	0.30	65	0.912	Std83	22	0.00	0.29	5	0.91
Std20	19	0.64	0.30	80	0.912	Std84	19	0.39	0.30	45	0.91
Std21	19	0.51	0.29	75	0.914	Std85	25	-0.21	0.30	5	0.91
Std22	19	0.71	0.30	85	0.912	Std86	19	0.24	0.30	30	0.91
Std23	19	0.59	0.30	75	0.912	Std87	25	-0.21	0.30	5	0.91
Std24	19	0.88	0.30	95	0.912	Std88	19	0.24	0.30	25	0.91
Std25	19	0.68	0.29	75	0.914	Std89	19	0.24	0.30	25	0.91
Std26	19	0.27	0.30	35	0.911	Std90	24	-0.05	0.29	5	0.92
Std27	19	0.65	0.30	70	0.912	Std91	19	0.38	0.30	45	0.91
Std28	20	0.46	0.29	60	0.915	Std92	19	0.68	0.30	65	0.91
Std29	19	0.64	0.29	70	0.914	Std93	21	0.16	0.29	60	0.92
Std30	19	0.63	0.30	75	0.912	Std94	19	0.38	0.30	55	0.91
Std31	21	0.19	0.29	25	0.915	Std95	19	0.76	0.30	50	0.91
Std32	19	0.25	0.30	30	0.911	Std96	19	0.24	0.30	25	0.91
Std33	19	0.51	0.29	50	0.914	Std97	19	0.40	0.30	70	0.91
Std34	19	0.51	0.29	65	0.914	Std98	21	0.04	0.30	10	0.91
Std35	20	0.55	0.29	70	0.915	Std99	19	0.51	0.29	75	0.91
Std36	19	0.82	0.30	90	0.912	Std100	21	0.04	0.30	10	0.91
Std37	20	0.77	0.29	85	0.915	Std101	19	0.24	0.30	25	0.91
Std38	19	0.58	0.30	60	0.912	Std102	19	0.38	0.30	60	0.91
Std39	19	0.65	0.29	65	0.914	Std103	23	-0.02	0.29	5	0.92
Std40	19	0.38	0.30	60	0.913	Std104	21	0.04	0.30	5	0.91
Std41	27	-0.25	0.29	15	0.914	Std105	19	0.38	0.30	60	0.91
Std42	19	0.39	0.30	45	0.913	Std106	20	0.25	0.30	50	0.91
Std43	20	0.20	0.29	30	0.914	Std107	21	0.06	0.30	10	0.91
Std44	19	0.51	0.29	55	0.914	Std108	30	-0.43	0.31	5	0.91
Std45	21	0.04	0.30	10	0.912	Std109	19	0.89	0.30	75	0.91
Std46	19	0.56	0.29	65	0.914	Std110	19	0.38	0.30	50	0.91
Std47	19	0.83	0.30	70	0.912	Std111	19	0.38	0.30	60	0.91
Std48	19	0.39	0.30	30	0.913	Std112	19	0.65	0.30	60	0.91

Std49	19	0.65	0.30	75	0.912	Std113	20	0.75	0.29	65	0.92
Std50	21	0.16	0.29	20	0.916	Std114	21	0.04	0.30	5	0.91
Std51	19	0.51	0.29	65	0.914	Std115	21	0.16	0.29	25	0.92
Std52	19	0.65	0.30	55	0.912	Std116	30	-0.30	0.29	15	0.92
Std53	20	0.45	0.29	75	0.915	Std117	19	0.51	0.29	80	0.91
Std54	19	0.86	0.30	85	0.912	Std118	25	-0.20	0.30	70	0.91
Std55	19	0.51	0.29	60	0.914	Std119	30	-0.43	0.31	60	0.91
Std56	19	0.50	0.30	65	0.912	Std120	23	-0.03	0.29	60	0.92
Std57	30	0.59	0.33	5	0.893	Std121	19	0.24	0.30	65	0.91
Std58	19	0.53	0.29	65	0.914	Std122	19	0.38	0.30	80	0.91
Std59	19	0.51	0.29	62	0.914	Std123	19	0.43	0.30	70	0.91
Std60	19	0.50	0.30	70	0.912	Std124	19	0.24	0.30	60	0.91
Std61	20	0.20	0.29	25	0.914	Std125	20	0.20	0.29	65	0.91
Std62	21	0.04	0.30	10	0.912	Std126	19	0.51	0.29	75	0.91
Std63	19	0.51	0.29	70	0.914	Std127	21	0.16	0.29	65	0.92
Std64	20	0.20	0.29	30	0.914	Std128	21	0.04	0.30	45	0.91

It is seen from Table 1 that the reliability coefficient of the achievement test received values between 0.893 and 0.917. The arithmetical average of the reliability coefficient of the test is 0.913. According to these values, it can be said that the developed CAT system measured the knowledge levels of the students to a highly reliable degree.

Table 2 presents the progress and knowledge level estimations in the CAT system of Std105, the parameters of each question, the given responses, the amount of standard error, and the reliability coefficient provisions of this standard error.

Table 2. *Details of the administering of the end of the unit exam for Std105.*

Number	Item number	p	True/False	Theta	Std. error	Reliability coefficients
1	59	0.25	0	-------	--------	
2	42	0.3	1	-0.41	0.83	0.31
3	33	0.35	0	0.13	0.69	0.53
4	58	0.35	1	-0.12	0.63	0.61
5	41	0.4	1	0.20	0.56	0.69
6	62	0.4	0	0.42	0.51	0.74
7	74	0.45	1	0.24	0.48	0.77
8	44	0.55	1	0.41	0.45	0.80
9	53	0.45	0	0.56	0.43	0.81
10	55	0.55	1	0.43	0.41	0.83
11	60	0.65	1	0.55	0.39	0.85
12	12	0.6	0	0.65	0.38	0.86
13	14	0.5	0	0.55	0.36	0.87
14	49	0.6	1	0.47	0.35	0.88
15	7	0.5	0	0.55	0.34	0.89
16	45	0.65	0	0.48	0.33	0.89
17	57	0.65	0	0.40	0.32	0.90
18	48	0.7	0	0.34	0.31	0.90
19	19	0.75	0	0.43	0.30	0.91
20	51	0.7	0	0.38	0.30	0.91

According to Table 2, one of the items with the lowest difficulty index was asked to the individual as

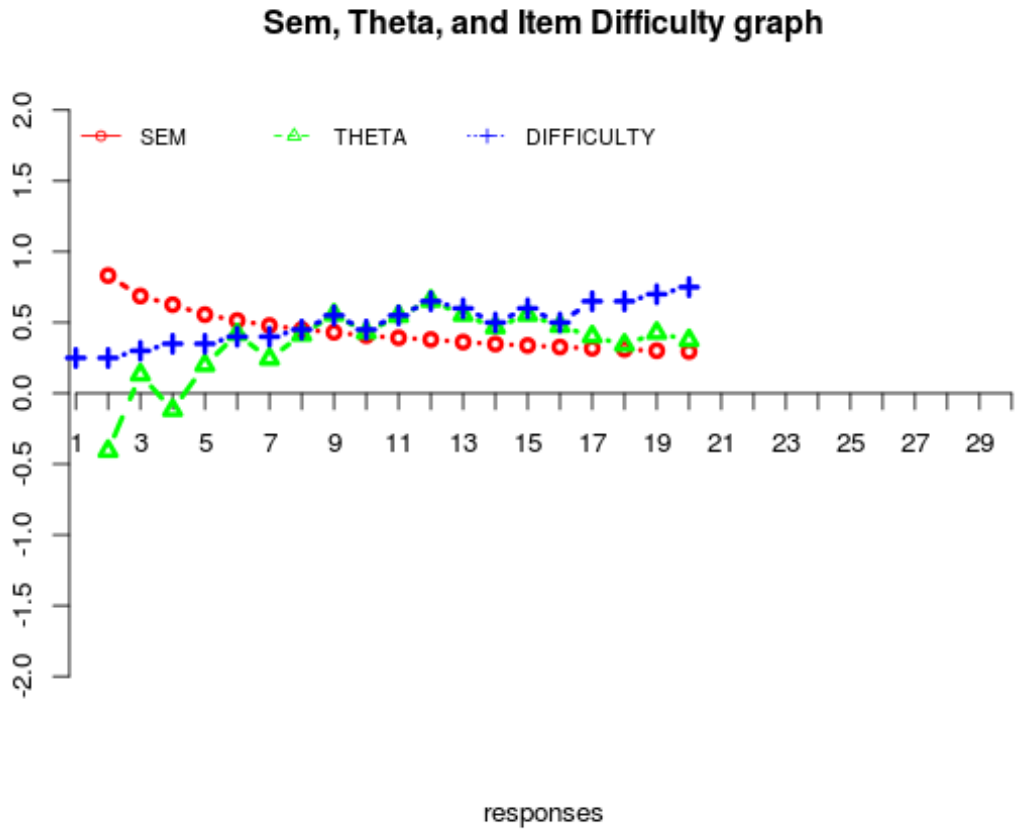
the first item (p = 0.25). Upon an individual incorrectly answering this item, the ability is attempted to be estimated by asking an item on the p=0.3 level and by providing a true/false condition, which is a condition for the maximum likelihood method (MLE). Upon the provision of a correct answer to the 2nd question by the individual, the first ability estimation was acquired as -0.407 (*SE*=0.832). The difficulty index of a subsequent item chosen based on the item information function was 0.35. The reason that the ability estimations of individuals and the difficulty indexes of the items do not completely overlap here is that in the phase of the selection of a subsequent item, not just difficulty index but also item discrimination are taken into consideration.

As can be seen in Table 2, 20 items were administered to the students in the test, and the test was concluded with the standard error dropping below 0.30 and the ability level of the individual being estimated as 0.375. It is seen that the difference between the knowledge level estimation values decreases towards the end of the test. Accordingly, after each step of the test, results even closer to the real knowledge level were obtained.

In addition, it is seen that the value of standard error decreased from the first step of the test towards the last and that the reliability coefficient value increased in connection with this. In the last step of the test, the standard error value decreased to 0.295, while the reliability coefficient increased to 0.913. As a result, it can be said that the test is very reliable and therefore the last estimated knowledge level value (0.375) is the closest value to the real knowledge level of Std105.

Figure 2 visually presents the ability, estimations of standard error, and change in difficulty index of the questions for the individuals whose test advancement report is provided in Table 2.

Figure 2. Standard error, ability and item difficulty index progress



According to Chart 1, the range of ability estimation narrows as the test progresses. While the difficulty level difference between the items in the first questions is larger, it gets smaller as the test progresses, and the individual's ability estimation becomes more and more precise.

3.2. Findings for the Second Sub-Purpose

The relationship between the T scores obtained from the CAT based on the IRT and the paper pencil test based on the CTK was examined with the Spearman Rank Differences Correlation Coefficient and the results are given in Table 3.

Table 3. *Spearman rank-order correlation coefficient between ability scores estimated according to the IRT and the achievement scores specified according to the CTT.*

CAT Ability scores (IRT)	AVE
	.799**
Paper pencil test (CTT)	.000
	128

**. $p<0.01$

Table 3 shows that there is a high, positive, significant relationship between students' levels of knowledge that are estimated in CAT systems and the score of an achievement test they received from a PPT (r=,799, p<.01). The fact that the test was developed either according to CAT or the CTT did not lead to a meaningful change in student achievement scores.

3.3. Findings for the Third Sub-Purpose

As previously specified, 40 questions were asked to each of the students in a fixed length based on the CTT. In the CAT administered based on the IRT, a maximum of 40 questions and a standard error of 0,30 was taken as basis as a rule of conclusion. It is seen from Table 1 that the students answered at least 19 and at most 30 questions. Table 4 presents the average number of questions students had to answer in the CAT and CTT, the standard deviation of the test, and the average reliability coefficients.

Table 4. *The average number of questions asked in the administering of the CAT and the fixed number of questions asked based on the CTT*

	Item mean	Std. deviation	Reliability coefficients
CAT (IRT)	20.02	0.295	0.913
Paper-pencil test (CTT)	40	0.427	0.720

When Table 4 is examined, it is seen that the average number of questions students had to answer in the CAT was 20.02. Based on this, students answered approximately half of the number of questions they had to answer based on the CTT, and moreover, a knowledge level estimation was reached "at "high reliability".

4. RESULTS and DISCUSSION

In this study, a CAT system that provided for multiple-choice achievement tests to be given based on the IRT was designed. After that, the "office programs" course achievement test was conducted in the designed CAT system. According to the findings acquired in the study, the knowledge levels of students were estimated with high reliability by the achievement test performed in the CAT system. This finding shows that the feature of "measurement with high sensitivity and therefore high reliability with the adaptive test" (Kalender, 2011; Weiss, 1982; Wise and Kingsbury, 2000) specified in the literature is provided and it is similar to the literature (Cisar et al., 2016; Kuo et al., 2015; Özbaşı and Demirtaşlı, 2015; Petscher et al., 2017; Zhang and VanLehn, 2017).

In addition, a high level, positive and significant relationship was found between the students' knowledge levels estimated in the CAT system and the scores they got from the PPT. This finding shows that the scores and ability measurements calculated based on the two separate theories can rank individuals similarly and that there is no statistically significant difference in the results if one is used instead of the other. This result is very similar to the results of the research (Chao et al., 2015; Çelen and Aybek, 2013) examining the relationship between the 2 tests. Zhang and VanLehn (2017) found that CAT contributed

positively to students' learning outcomes. Liu and Zhao (2017) designed an English vocabulary learning system based on IRT and at the end of his experimental study, they found that the CAT was more successful by working with fewer words.

CAT systems provide high-precision measurements by asking questions appropriate to their level instead of questions that are well above or below their own knowledge level (Weiss, 1982; Wise & Kingsbury, 2000). When the parameters of the questions answered by the students and the estimated knowledge levels of the students are examined, this situation is clearly seen. As a matter of fact, it was seen that the predicted knowledge levels of the students and the difficulty levels of the questions were quite close to each other.

In the designed CAT system, the average number of questions that students had to answer was 20. The number of questions for the Paper Pencil test is 40. Similarly, Chalmers (2016) found that the CAT system he designed made more precise measurements with fewer questions. Petscher et al. (2017) conducted an experimental study aimed at increasing the reading-comprehension capabilities of students. As a result, he found that the students who took the CAT were given a smaller passage and had better reading comprehension ability compared to the students in the control group. Kaptan (1993) reduced the adaptive form of the paper-pencil form of the math test, which consisted of 50 questions, to 14 questions. As a result, it was found that the adaptive test system reduced the number of items used in estimating the level of knowledge by 70% compared to the paper-pencil test. Similarly, Gardner et al. (2004) similarly used 21 questions in the PPT form of the Beck depression scale, as opposed to an average of 6 questions in the adaptable version of the scale in a study they conducted. As a result, it can be said that the tests based on IRT measure all knowledge levels from low to high with high precision and significantly reduce the number of questions.

4.1. Suggestions

The CAT system can provide more reliable and effective results in courses that require problem-solving skills such as Programming Languages. Because students have the most difficulty in subjects that require problem solving skills. This may be due to the inability to develop an application suitable for each student's abilities. CAT tests can be applied frequently in the teaching process of subjects such as Science, Mathematics, Programming and Language learning. Feedback can be made for each student on necessary topics based on the results obtained from the CAT. It is obvious from this study and the literature that CAT systems are very advantageous. However, because the designing of CAT systems requires specialized knowledge, the number of studies conducted is quite low. This is why a graphic interface CAT platform can be designed that individuals who are not specialized in the topics of computer programming, measurement, and evaluation can easily use.

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Examination of the Relationship Between Academicians' Life Long Learning Tendencies and Thinking Styles [1]

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ABSTRACT

The purpose of this research is to examine the relationship between academicians' lifelong learning tendencies and their thinking styles. Relational survey model was used in the research. All academicians working in higher education institutions in the 2022-2023 academic year were determined as the population of the research. After obtaining the necessary permissions, the scale was applied to a sample group of 1554 people by reaching all universities via official letters and e-mails to the institutional e-mail addresses of the individuals. Personal Information Form, "Lifelong Learning Tendency Scale" and "Rational-Experiential Thinking Styles Scale" were used as data collection tools. The obtained data were transferred to the statistical package program. In the light of the sub-problems, it was examined whether the scale scores differed in terms of various variables (education level, academic title, field of science). The results were classified according to sociodemographic variables and presented in frequency tables. In accordance with the results obtained from the variables, Kruskal Wallis H test and Spearman-Brown Correlation Analysis were performed, and Mann Whitney U test was applied to determine the direction of the differences. Based on the findings, it was concluded that academicians have a high level of lifelong learning tendencies. While the lifelong learning tendencies of academicians differ according to the variables of educational status and field of science; they did not differ according to academic title variables. It was concluded that the academicians' thinking style levels were at a moderate level. The thinking styles of the academicians differed in terms of educational status, academic title and field of science variables. It has been concluded that the relationship between academicians' lifelong learning tendencies and thinking styles is at a significant level in terms of total and sub-dimension scores, which are generally below the medium level and in a positive direction.

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INTRODUCTION

Humanity has changed economically, socially, culturally, scientifically and artistically throughout history. Change is always moving with an increasing momentum. This rapid rise in change greatly affects the way of life in the world. Increasing world population, the aim of globalization of societies, developments in industry and technology make people constantly strive to renew and develop themselves in the 21st century. Social life, professional needs, the widespread use of technological tools and equipment and their settlement in almost every stage of life create the need for people to constantly renew and develop their existing knowledge and skills. This need is tried to be met by learning up-to-date knowledge and skills.

Lifelong Learning

Lifelong learning covers the process that starts from the moment an individual is born and continues until his or her last breath. This means that the individual's entire life is spent by learning. Even though the things individuals learn throughout their lives are different, it is a common point for each individual to learn throughout their lives. Lifelong learning has been going on from ancient times to the age of artificial intelligence. In the age of artificial intelligence, learning has evolved into a different process with the opportunities provided by technology and the capacity of human beings (Poquet, & De Laat, 2021). It is predicted that differences in learning processes will be inevitable in the future depending on the conditions brought by technology (Benavot et al., 2022).

Formal education is constantly updating itself to raise individuals who keep up with the developments in the changing world. In addition to the continuous updating of formal education, the increase in non-formal education practices and the continuous expansion of individual learning have become an inevitable situation. From the moment he is born until his death, every individual constantly encounters new stimuli and each stimulus creates a new learning (Tudor, 2013). In order to solve the problems they encounter in their daily lives, people both need to learn new information and benefit from the experiences they have gained through their lives. This is permanent due to the fact that life has a dynamic structure. The concept of lifelong learning includes the knowledge, skills and behaviors that are learned not only in the school environment but throughout life (Samancı & Ocakçı, 2017). Candy, Crebert, and O'leary (1994) state that all formal and non-formal learning environments are important in lifelong learning. In the study conducted by Ilgaz and Eskici (2019), it is stated that the basis of the concept of lifelong learning is a sustainable process since learning never stops for individuals. This dynamic and sustainable structure ensures that lifelong learning starts from early ages and continues until adulthood; it shows that it is a comprehensive concept extending to in-service training, adult education and public education (Schuetze & Casey, 2006). In addition, Ohidy (2008) stated that the formation of individuals who are lifelong learners has an important role in the development of society.

The concept of lifelong learning has been tried to be defined by many researchers and institutions since the day it started to take place in the literature due to its importance. Sarıgöz (2020) defines lifelong learning as a concept that aims at the development of individuals both in their socio-cultural and professional lives, and with the principle of continuity. Likewise, the European Commission (2002) defines lifelong learning as the activities that will occur in the process of the development of individuals' knowledge and skills from birth to death. Miser (2020) stated that lifelong learning does not only remain at school age but continues at all stages of life and it is a process. Gouthro (2017) states that lifelong learning provides information about how to live a more meaningful and rich life; she also states that lifelong learners will develop their abilities and gain insight. In a way, the concept of lifelong learning is a very broad structure in terms of acquiring the ability of individuals to take on their learning responsibilities, self-assessment, making plans and programs, and choosing the ways to reach information (Boztepe & Demirtaş, 2018). Similarly, Lamb and Brady (2005) emphasizes that the decisions individuals make in situations, their professional lives, and the skills they acquire affect their

lifelong learning tendencies. At the same time, it is very important for lifelong learners to be able to engage in social interaction as well as managing their learning processes themselves.

In the first quarter of the 21st century, it is seen that the European Union is trying to be placed on the basis of the education policies created due to the international norms of lifelong learning. It is seen that the process that started with adult education in the 1920s turned into an idea that the individual should experience learning throughout his life in the 1980s (Volles, 2016). The fact that formal or informal learning, in which individuals will learn from the cradle to the grave, is one of the dynamics of the developing society constitutes an important dimension in the education strategies of the EU. Policies that form the basis of lifelong learning in the EU as well as in global organizations such as OECD and UNESCO are reflected in the international exchanges made after the 1960s (Lee, Thayer & Madyun, 2008). Lifelong learning (Urhan, 2020), which was mentioned at the UNESCO meeting in 1960, took its place in the European Council "Permanent Education" and OECD "Continuing Education: A Strategy for Lifelong Learning" reports in the early 1970s (Demirkıran & Yılmaz, 2022). While the European Union started to devote more space to lifelong learning in its education policies in the 1990s, it published a study called "Towards a Learning Society" in 1995 and then declared 1996 as the "European Year of Lifelong Learning" (Akbaş & Özdemir, 2002). With the "Lifelong Learning Memorandum" published by the European Commission in 2000, it was emphasized that the concept of lifelong learning is the umbrella of all education and training activities (Samancı & Ocakçı, 2017).

It is known that there have been movements of innovation and change in many areas in the State of Turkey, which was established after the tough years of war with the proclamation of the republic on October 29, 1923. Education policies have also formed an important phase of these areas that require innovation. It is seen that many educational programs, laws, regulations and council decisions were taken in the process that started with the Law of Unification of Education enacted in 1924 (Hesapçıoğlu, 2013). In the Basic Law of National Education, which is still in force and came into force in 1973, the Turkish national education system consists of two parts as formal and non-formal education (MEB, 1973). While it is seen that international organizations such as the European Union, OECD and UNESCO discovered lifelong learning and started to place it at the center of their education policies in the 1990s; it is seen that it was first included in the Basic Law of National Education in Turkey (Ersoy & Yılmaz, 2009). When we look at the historical process, despite not being used as a concept, people's classrooms, public houses and village institutes seen in the republic period appear as institutions that work in the light of lifelong learning (Kavtelek, 2014).

Thinking Styles

Scientists have struggled to understand and explain human beings for centuries. Philosophers and psychologists based on social sciences have focused on the concept of thinking that distinguishes human beings from other living things and tried to define it (Karagülle, 2021). Güven and Kürüm (2006) state that knowing how human thoughts are formed and what the affecting factors are will contribute to the formation of an effective thinking and learning process. It can be said that this definition request is based on the idea that getting to know people starts with understanding their intellectual processes. Kurzweil (2021) sees intelligence, which affects human thinking, as the most important concept and talks about the difficulty of estimating its limits. Therefore, the understanding of human becomes more complicated.

While the dictionary of the Turkish Language Association defines thinking, it emphasizes that perceptions are the individual's own interpretation action (TDK, 2022). Başerer (2021) defines thinking as the ability of the human mind to comprehend, distinguish and compare information independently of everything else. It can be said that the ability to think, which the mind can do independently of other factors, also includes many skills.

While thinking is an important mental process that helps people to fulfill their daily life activities;

it also reflects the components that make up the personality structure (Algani & Haj, 2020). Individuals' thinking styles form their lifestyles (Ciarrochi, Heaven & Davies, 2007). It can be concluded that the thinking ability that individuals use to solve the problems they encounter is related to their lifestyle. While expressing thinking as a skill, Çubukçu (2004) emphasizes that it is unique to the individual. Güneş (2012) states that thinking is a natural process of the human mind, and underlines that it is a fundamental part of understanding and learning. From this point of view, it can be said that thinking is an action that affects and even manages personal and cognitive processes. Vance et al. (2007) say that the way of thinking can increase people's consciousness and awareness; he emphasizes that it contributes to the positive development of behaviors.

People engage in the act of thinking about how to find a way to solve the problems they encounter before they move on to a behavioral activity. Each individual thinks differently and applies different solutions. This shows that everyone has individual differences in the information processing process (Çatalbaş, 2006). Sünbül (2004) states that individuals can develop different styles for different situations and problems, not sticking to the same style in every situation. Differentiation can be seen in the thinking styles that individuals form against the same events and phenomena at different times. This is an indication that thinking styles are not static and they are open to change. The concept of thinking styles first found its place in the late 1900s (Berkant & Tüzer, 2018). Thinking styles, which form the basis of Sternberg's Theory of Mental Self-Management, is a concept based on how people prefer to think about the subject during or after learning (Fer, 2005).

Mental self-management theory, while trying to explain what people's thinking styles are, expresses the preferred way while exhibiting a new behavior or learning something. The main idea of this theory is that people have many ways to manage their daily lives (Zhang & Sternberg, 2002). At the core of the theory is the idea of how people's minds appear from outside, which helps the formation of thinking activities (Tüzer, 2016). In his mental self-management theory, Sternberg emphasizes that people manage themselves and organize their lives by making an analogy with how societies govern themselves (Buluş, 2005). Fer (2005) states that Sternberg, who put forward that thinking styles and management styles of states overlap with each other, states that people need to manage their mental activities. The fact that the reactions of individuals to the problems are different means that everyone organizes their own mental management style in a way that they feel comfortable and free.

Thinking styles are very important concepts in terms of lifelong learning. As stated in the study conducted by Sarıtepeci and Orak (2019), individuals' ability to achieve success in the learning process is related to their thinking styles and knowing how to think about problems. It is seen that academicians have an influence on students studying at universities in knowing how to think, which will affect the learning processes they will experience both in school life and when they enter business life; in other words, their lifelong learning. First of all, academics who have developed their own thinking skills contribute to the development of students' thinking styles by providing a learning environment suitable for life conditions, which are becoming an increasingly complex and difficult process (Baysal, Çarıkçı, & Yaşar, 2018). In this way, lifelong learning skills will be gained and these skills will be used in the right direction.

Continuous research and learning are part of the lives of academicians, who have an important role in the development of society, in order to improve themselves. For this reason, it can be thought that one of the professional groups that most embrace lifelong learning should be academics. Considering that the tendency for lifelong learning affects many characteristics of individuals, it will also be directly and indirectly reflected in cognitive skills. One of the cognitive skills is the ability to think. Thinking skills can be developed like other skills. In this development process, individuals' lives are at the forefront. Changes in behavior as a result of experiences and learning keep thinking processes alive. In this dynamic interaction, learning and thinking affect each other and develop the individual. Therefore, there is a close relationship between continuous learning and thinking styles. Revealing the

relationship between the concepts of lifelong learning and thinking styles is important in terms of shedding light on the nature of learning and thinking.

For researchers, the way cognitive processes such as learning and thinking take place is always an intriguing subject. It is a known fact that human beings continue to learn from birth to death. Considering that cognitive processes in learning also trigger thinking. It can be said that individuals think throughout their lives and direct their thinking processes consciously or unconsciously. Directing individuals' thinking creates their thinking styles. The fact that learning and thinking continue throughout life by influencing each other reveals the importance of studies investigating the interaction of these two concepts.

Determining the relationship between academicians' lifelong learning tendencies and thinking styles enables the cognitive and behavioral characteristics of individuals who produce science to be revealed. Social, technological and cultural developments occur with the presentation of scientific works and products. It is thought that the cognitive structures of academicians who are the architects of these developments, especially the concepts such as lifelong learning and thinking styles, which are closely related to each other and have a great impact on the production of science, should be examined together. Scientific research will contribute to the literature.

The aim of this study was to examine the relationship between academicians' lifelong learning tendencies and their levels of thinking styles. For this purpose, answers were sought for the following sub-problems:

1. What are the academics' lifelong learning tendencies and thinking styles?
2. Do the academicians' lifelong learning tendencies and thinking styles differ significantly according to their educational background?
3. Do academics' lifelong learning tendencies and thinking styles differ significantly according to their academic titles?
4. Do academics' lifelong learning tendencies and thinking styles differ significantly according to their fields of science?
5. Is there a statistically significant relationship between academicians' lifelong learning tendencies and their thinking styles?

METHOD

Research Design

The research was prepared with quantitative research methods and techniques. Relational survey model was used to determine the relationship between academicians' lifelong learning tendencies and thinking styles. The screening model is the ability to quantitatively describe the dimensions of attitude and tendency for the whole population as a result of the study with the sample group (Creswell, 2017). A cause-effect relationship was not sought within the scope of the study. The relationship between the two concepts has been examined. The relational screening model is a model that aims to describe the state of change that exists between two or more variables (Karasar, 2020).

Research Sample

The population of the research consists of 183560 academicians who are actively working in Higher Education Institutions in the 2022-2023 academic year (obtained from CHE (Council of Higher Education) as of 18 January 2023). A sample group was not determined within the scope of this study. It is aimed to reach the whole population. In line with this goal, academics working in all universities in Turkey were reached with the distributed article written by Kırklareli University. In addition, a link containing the measurement tools of the research was sent to the institutional e-mails of the faculty

members by the researcher. In this direction, the feedbacks from the instructors who voluntarily filled the data collection tools were evaluated as data. When the data were examined, all the data were used as no inaccuracies were detected. The demographic characteristics of the participants are given in Table 1.

Table 1: *Demographic characteristics of academics*

Variable	Groups	f	%
Educational Status	1.Licence	32	2.1
	2.Master	366	23.5
	3.PhD	1157	74.4
Total		**1554**	**100**
Academic Title	1.Instructor	441	28.4
	2.Assistant	307	19.7
	3.Assistant Professor	381	24.5
	4.Associate Professor	225	14.5
	5.Professor	201	12.9
Total		**1554**	**100**
Science Area	1.Educational Sciences	227	14.4
	2.Philology	56	3.6
	3.Law	42	2.7
	4.Architecture, Planning and Design	53	3.4
	5.Health Sciences	224	14.2
	6.Agriculture, Forestry and Aquaculture	72	4.6
	7.Science and Mathematics	103	6.5
	8.Fine Arts	71	4.5
	9.Theology	78	5
	10.Engineering	184	11.7
	11.Social, Humanities and Administrative Sciences	413	26.2
	12.Sports Sciences	51	3.2
Total		**1554**	**100**

When the education levels of the academicians in Table 1 are examined, it is seen that 32 (2.1%) completed their undergraduate education, 366 (23.5%) master's education, 1157 (74.4%) doctoral education. It is seen that the majority of the academicians participating in the research (74.4%) have completed their doctorate education. It is seen that those who participated at least have a bachelor's degree (2.1%).

Considering that the participants work at universities, when the data in Table 4 is examined in terms of their academic titles, 441 (28.4%) are lecturers, 307 (19.7%) are research assistants, 381 (24%, 5) are doctoral faculty members, 225 (14.5%) are associate professors and 201 (12.9%) are professors. When we look at the academicians participating in the research in terms of academic title, it is seen that the participation is mostly in the title of lecturer (28.4%). The least participation is the title of professor (12.9%).

Based on the fact that the participants were scientists, 227 (14.4%) of them were Educational Sciences, 56 (3.6%) were Philology, 42 (2.7%) were Law, 53 were It is seen that (3.4%) they work on Architecture, Planning and Design. 224 (14.2%) Health Sciences, 72 (4.6%) Agriculture, Forestry and Fisheries, 103 (6.5%) Science and Mathematics, 71 (4.5%) Fine Arts, 78 (5%) Theology, 184 (11.7%) Engineering, 413 (26.2%) Social Humanities and Administrative Sciences and 51 (3.2%) Sports. It is seen that they do scientific studies in their fields of science. Among the academic research fields determined by the Interuniversity Institution, it is seen that Social, Humanities and Administrative Sciences (26.2%) participated in the study the most, and Law (2.7%) was the least participated.

Research Instruments and Processes

In this study, which aimed to examine the relationship between academicians' lifelong learning

tendencies and thinking styles, three different scales were used. These scales were used as “Personal Information Form” developed by the researcher, “Lifelong Learning Tendency Scale” developed by Gür Erdoğan and Arsal (2016), and “Rational-Experiential Thinking Styles Scale” adapted into Turkish by invention (2003). Necessary permissions were obtained for the use of both scales. The online form prepared by the researcher included the personal information form in the first, the lifelong learning tendencies scale in the second, and the thinking styles scale in the last section. Information about the scales is discussed in detail in this section.

In order to collect the research data, firstly, the necessary permission was obtained from Kırklareli University Institute of Social Sciences and the approval of the Scientific Research and Publication Ethics Board was obtained for the application of the scale. The data collection tools were designed as an online form due to the impossibility of reaching all academicians personally considering the size of the population. Kırklareli University notified all state and foundation universities affiliated to the Higher Education Institution of the link address of the form created for data collection tools. The data collection process started as of December 2022. In addition, all academics who could be reached by the researcher were sent a link to the scales via e-mail. The prepared scale form was delivered to all universities and 1554 academics responded and gave feedback. All 1554 scales answered by academics were used in the data analysis. The researcher included information about the purpose and importance of the research on the online form containing the scales.

Personal Information Form

In the personal information form prepared by the researcher, there were questions for the personal information of the academicians participating in the research to be used in the analysis of the data. These questions are about gender, age, education level, academic title, place of residence and academic research area. It is aimed to examine the answers given to these questions by associating the sub-dimensions of the scales.

Lifelong Learning Tendency Scale

“Lifelong Learning Tendency Scale” developed by Gür Erdoğan and Arsal (2016) was used. The scale consists of two five-point Likert-type (1- Strongly Agree, 2- Agree, 3- Undecided, 4- Disagree, 5- Strongly Disagree) sub-dimensions and 17 items. The scale does not contain any negative items. The first eleven questions in the scale seek answers to the dimensions of "Willingness to Learn", and the following six questions to the dimensions of "Openness to Development". Gür Erdoğan and Arsal (2016) calculated the criterion validity of the scale they developed as .71. The Cronbach Alpha internal consistency coefficient of the scale was .86, the Mayer-Olkin value was .89, and the test-retest reliability coefficient was .76. Cronbach Alpha coefficients were determined as .87 for Willingness to Learn factor, .79 for Openness to Development factor and .87 for the whole scale.

The Cronbach Alpha internal consistency coefficient for the willingness to learn sub-dimension of the Lifelong Learning Tendency Scale applied to the participants within the scope of the research was determined as .89, and the Cronbach Alpha internal consistency coefficient for the openness to development sub-dimension was determined as .84.

Rational-Experiential Thinking Styles Scale

Another scale used in the study was Epstein et al. (1996) to measure the differences between intuitive-experiential and analytical-rational styles in individuals, and it was adapted into Turkish by Invention (2003), the "Rational-Experiential Thinking Styles Scale". The scale consists of two subscales named “Need for Cognition” and “Faith in Intuition” and 29 items. In order to measure rational thinking, 19 items of 45 items developed by Cacioppa and Petty (1982) were combined with the Cognition Needs scale and the 12-item Intuitive Belief scale, which measures individuals' confidence in their emotions, and a 31-item version was formed. With subsequent studies, the 29-item scale became

ready for use. The scale was prepared using a five-point scale from Completely False to Completely True. When the criterion reliability of the scale was calculated, the Cronbach Alpha coefficient of the "Need for Cognition" subscale was .87; The Cronbach Alpha coefficient for the “Intuitive Belief” subscale was .82 and .85 for the whole scale.

The Cronbach Alpha internal consistency coefficient for the cognitive need sub-dimension of the Rational-Experiential Thinking Styles Scale applied to the participants within the scope of the research was determined as .64, and the Cronbach Alpha internal consistency coefficient for the intuitive belief sub-dimension was determined as .86.

Data Analysis

The data obtained in the research were analyzed using a statistical program. In order to determine the statistical methods to be used to examine the lifelong learning tendencies and thinking styles scores of academicians, first of all, the normality test values of the scales were examined in order to understand how the distribution was. Normality test results are shown in Table 2.

Table 2: *Normality test results of lifelong learning tendency and rational-experiential thinking styles scales*

Scale	Lower dimension	Kolmogorov-Smirnov			Shapiro-Wilk		
		Statistics	df	p	Statistics	df	p
Lifelong Learning Tendency	Willingness to Learn	.119	1554	.000	.119	1554	.000
	Openness to Development	.135	1554	.000	.135	1554	.000
	Total	.115	1554	.000	.115	1554	.000
Rational-Experiential Thinking Styles	Cognition Requirement	.061	1554	.000	.061	1554	.000
	Intuitive Faith	.051	1554	.000	.051	1554	.000
	Total	.031	1554	.001	.031	1554	.001

Büyüköztürk (2007) states that if the participation in the research is more than 50, the Kolmogorov-Smirnov test p values should be checked. When the values in Table 2 were examined, it was understood that the p values did not show a normal distribution in terms of $p=.000$ ($p<.05$) sub-dimensions and the sum of the scales. Non-parametric analyzes (Kruskal Wallis H, Mann Whitney U) were applied on the data in which the distribution did not show normality (Kul, 2014). Spearman-Brown Correlation Analysis was applied to determine the relationship between academicians' lifelong learning tendencies and thinking styles.

Ethics

This study has ethical approval from Kirklareli University under the protocol number E-35523585-199-65892 on 31/10/2022.

FINDINGS

Lifelong Learning Tendency and Thinking Style Levels of Academicians

In the first sub-problem of the study, the arithmetic mean and standard deviation analyzes of the Lifelong Learning Tendency Scale applied to determine the level of academicians' lifelong learning tendencies and the Rational-Experiential Thinking Styles Scale was applied to determine their thinking style levels shown in Table 3.

Table 3: *Arithmetic mean and standard deviation values*

Scale	Number of Items	min	max	$\bar{x}$	SS	Item Averages ($\bar{x}$/ number of items)
Lifelong Learning Tendency Scale	17	1	5	72.81	8.89	4.28

Rational-Experiential Thinking Styles Scale	29	2.17	4.72	103.77	10.51	3.57

When Table 3 is examined, it has been determined that the lifelong learning tendencies of academicians are at a high level ($\bar{x}$: 4.28). However, it was observed that the thinking styles of the academicians were at a moderate ($\bar{x}$: 3.57) level.

When the level of lifelong learning tendencies of academicians was examined in the light of the data in Table 3, and the arithmetic averages of the scale items applied to the participants were examined, it was seen that the values were ($\bar{x}$: 4.28). Based on this, it can be concluded that academicians have a high tendency towards lifelong learning, are open and willing to learning new things, and activities necessary for personal and professional development.

In the light of the data in Table 3, when the level of thinking styles of academicians was examined, and the arithmetic averages of the scale items applied to the participants were examined, it was seen that the values were ($\bar{x}$: 3.57). Based on this, it can be concluded that academicians' thinking styles levels are at a medium level and they are indecisive in acting according to both their cognitive levels and intuitive beliefs.

Lifelong Learning Tendency and Thinking Style Levels of Academicians by Educational Status

In the second sub-problem of the study, an answer has been sought for the following question. "Do academics' lifelong learning tendencies and thinking styles differ significantly with their educational status?" The findings obtained by performing the Kruskal Wallis H and Mann Whitney U tests for the Lifelong Learning Tendency Scale and the Rational-Experiential Thinking Styles Scale are presented in Table 4.

Table 4: *Kruskal Wallis H test values in terms of educational status variable*

Scale	Educational Status	N	Rank Average	x^2	Df	p	Difference
Lifelong Learning Tendency Scale	1.Licence	32	740.11	16.25	2	.000	3>2
	2.Master	366	696.53				
	3.PhD	1156	804.17				
Rational-Experiential Thinking Styles Scale	1.Licence	32	657.03	12.48	2	.002	3>2
	2.Master	366	715.02				
	3.PhD	1156	800.62				

According to Table 4, a significant difference was found when the levels of lifelong learning tendencies and thinking styles of academicians were examined in terms of educational status ($p<.05$).

According to the Mann Whitney U test results, when the total scores of the Lifelong Learning Tendency Scale and the Rational-Experiential Thinking Styles Scale were examined, the scores of academics who completed their doctoral education were found to be significantly higher than the scores of those who completed their master's degree. In line with the results, it can be said that academics with a doctorate degree are more willing to learn, have a higher tendency towards lifelong learning, and can use their thinking styles more effectively than others.

Lifelong Learning Tendency and Thinking Style Levels of Academicians by Academic Titles

In the third sub-problem of the study, an answer has been sought for the following question. "Do academics' lifelong learning tendencies and thinking styles differ significantly with their academic titles?" The findings obtained by performing the Kruskal Wallis H and Mann Whitney U tests for the Lifelong Learning Tendency Scale and the Rational-Experiential Thinking Styles Scale are presented in Table 5.

Table 5: *Kruskal Wallis H test values in terms of academic title variable*

Scale	Academic Title	N	Rank Average	x²	df	p	Difference
Lifelong Learning Tendency Scale	1.Instructor	307	724.84	6.87	4	.142	
	2.Assistant	440	801.42				
	3.Assistant Professor	381	768.03				
	4.Associate Professor	225	808.81				
	5.Professor	201	788.46				
Rational-Experiential Thinking Styles Scale	1.Instructor	307	735.09	11.7	4	.020	4>1,3
	2.Assistant	440	795.03				
	3.Assistant Professor	381	744.66				
	4.Associate Professor	225	852.10				
	5.Professor	201	782.66				

According to Table 5, when the lifelong learning tendencies of academicians are examined in terms of their academic titles, no significant difference was found (p>.05). However, the levels of thinking styles of academicians differ significantly in terms of their academic titles (p<.05).

When the average scores are examined in the light of the data in Table 5, it can be said that the increase in the education level ensures that academicians have a high level of lifelong learning tendencies.

According to the Mann Whitney U test results, the academician scores of associate professors were found to be significantly higher than the academician scores of research assistants and doctor faculty members. It has been observed that academicians with the title of associate professor can use their thinking styles more actively than other academicians as a result of their career progress and experience.

Lifelong Learning Tendency and Thinking Style Levels of Academicians by Field of Science

In the fourth sub-problem of the study, an answer has been sought for the following question. "Do academics' lifelong learning tendencies and thinking styles differ significantly with their fields of science?" The findings obtained by performing the Kruskal Wallis H and Mann Whitney U tests for the Lifelong Learning Tendency Scale and the Rational-Experiential Thinking Styles Scale are presented in Table 6.

Table 6: *Kruskal Wallis H test values in terms of science fields variable*

Scale	Science Area	N	Rank Average	x²	df	p	Difference
Lifelong Learning Tendency Scale	1.Educational Sciences	180	674.72	49.15	11	.000	4 >1 3>2 2,6>4 6,8,9,11>3 2,6,8,9,11>1,7,10 1,6,9,11>12
	2.Philology	224	857.71				
	3.Law	71	692.04				
	4.Architecture, Planning and Design	404	748.17				
	5.Health Sciences	42	775.62				
	6.Agriculture, Forestry and Aquaculture	227	857.02				
	7.Science and Mathematics	102	704.17				
	8.Fine Arts	68	843.99				
	9.Theology	56	882.47				
	10.Engineering	77	682.81				
	11.Social, Humanities and Administrative Sciences	50	962.54				
	12.Sports Sciences	53	694.47				
Rational-Experiential Thinking Styles	1.Educational Sciences	180	708.33	26.7	11	.006	9>1 8>5 8,11>1,2,3,4, 6,7,10,12
	2.Philology	224	782.19				

Scale	3.Law	71	697.11
	4.Architecture, Planning and Design	404	771.04
	5.Health Sciences	42	750.23
	6.Agriculture, Forestry and Aquaculture	227	781.14
	7.Science and Mathematics	102	751.76
	8.Fine Arts	68	961.82
	9.Theology	56	846.92
	10.Engineering	77	759.08
	11.Social, Humanities and Administrative Sciences	50	932.12
	12.Sports Sciences	53	776.15

According to Table 6, when the lifelong learning tendencies and thinking styles of academicians are examined in terms of science fields, significant differences were found ($p<.05$).

According to the Mann Whitney U test results, the scores of academics working in the field of Social, Human and Administrative Sciences in the Lifelong Learning Tendencies Scale were found to be significantly higher than the scores of academics working in the field of Engineering. The scores of academicians working in the field of Agriculture, Forestry and Fisheries were found to be significantly higher than the scores of academicians working in the field of Health Sciences. The scores of those working in the fields of Health Sciences and Educational Sciences were found to be significantly higher than the scores of academics working in the fields of Social, Human and Administrative Sciences. It was observed that the scores of academicians working in the fields of Educational Sciences, Fine Arts, Philology and Sports Sciences were significantly higher than the scores of academicians working in the fields of Agriculture, Forestry and Fisheries. In addition, it was observed that the scores of academicians working in the fields of Health Sciences and Educational Sciences, Fine Arts, Philology and Sports Sciences were significantly higher than the scores of academicians working in the fields of Engineering, Science and Mathematics and Theology. Finally, the scores of academics working in the fields of Engineering, Educational Sciences, Philology and Sports Sciences showed a significant difference compared to the scores of academics working in the fields of Architecture, Planning and Design.

According to the Mann Whitney U test results, the scores of academics working in the field of philology and engineering on the Rational-Experiential Thinking Styles Scale and the scores of academics working in the field of fine arts and science were found to be significantly higher than the scores of academics working in the field of law. In addition, the scores of academicians working in the fields of fine arts and sports sciences are significantly higher than the scores of academicians working in the fields of engineering, health, agriculture, forestry and aquaculture, social, human and administrative sciences, education, science and mathematics, theology and architecture, planning and design sciences.

The Relationship Between Lifelong Learning Tendencies and Thinking Styles of Academicians

The fifth sub-problem of the research is "Is there a statistically significant relationship between academicians' lifelong learning tendencies and their thinking styles?" Spearman-Brown Correlation Analysis was performed with the data obtained in order to search for an answer to the problem. The results are listed in Table 7.

Table 7: *Spearman-Brown Test values of the relationship between lifelong learning dispositions and thinking styles*

	Willingness to	**Openness to**	**Lifelong Learning**

		Learn	Development	Trends (Total)
Cognition Requirement	r	.260**	.181**	.245**
	p	.000	.000	.000
	n	1554	1554	1554
Intuitive Faith	r	.131**	.128**	.138**
	p	.000	.000	.000
	n	1554	1554	1554
Rational-Experiential Thinking Styles (Total)	r	.268**	.212**	.262**
	p	.000	.000	.000
	n	1554	1554	1554

When Table 7 is examined, it is concluded that there is a significant relationship between academicians' lifelong learning tendencies and thinking styles in terms of total scores and sub-dimension scores, generally below the medium level and in a positive direction ($p<.05$). However, the relationship between willingness to learn-intuitive belief, openness to development-cognition need, openness to development-intuitive belief, lifelong learning tendencies total score and intuitive belief is at a low level.

DISCUSSION AND CONCLUSION

In this section, the results of the research conducted to examine the relationship between academicians' lifelong learning tendencies and thinking styles are given. In addition, suggestions were made to contribute to the literature and researchers related to future studies.

Lifelong Learning Tendency and Thinking Style Levels of Academicians

While high arithmetic averages were encountered in the analyzes made as a result of the application made to measure the lifelong learning tendencies of academicians, it is revealed that the thinking styles of academicians are at a moderate level. In the light of this result, it can be concluded that academicians have high lifelong learning tendencies, are willing to learn new things, and are open to learning activities necessary for personal and professional development.

When the literature is analysed, it is seen that similar results are obtained in studies on lifelong learning. The fact that the students of the Faculty of Education continue their education in order to prepare for the teaching profession, that they live in similar conditions with academicians in terms of being located on the university campus, and that they are in the same age group as the students are the results of studies conducted with research assistants and university students who are prospective teachers within the scope of the research. can be considered to be similar to the findings. Oral and Yazar (2015) determined that pre-service teachers' perceptions of lifelong learning were high as a result of their research with students studying at the faculty of education. In Akçaalan's (2016) study examining the relationship between lifelong learning and social emotional learning of university students, it was determined that students' lifelong learning levels were generally high, including gender, academic achievement and class variables. Similarly, the results obtained in the research conducted by Law, Lee, and Yen (2009), Demiröz (2022) and Settaşı (2022) with teachers; Gültepe (2022) and Topal Kaya (2021) with prospective teacher university students are similar to the results of this study. However, there are also studies in the literature that conclude that lifelong learning tendencies are not at a high level. Tunca, Şahin, and Aydın (2015) "Lifelong Learning Dispositions of Prospective Teachers"

It can be concluded that the academicians have a moderate level of thinking styles, and they prefer to behave according to their cognitive levels and intuitive beliefs against the problems encountered. It arouses curiosity in what kind of context academicians are in terms of both lifelong learning tendencies and thinking styles, and what is the the relationship between them. In this context, studies with academicians that measure the relationship between the two concepts have not been found. However, studies that are similar to the results of the study and that are close to academics in terms of the study group have been examined within the scope of the discussion. Coşkuner, Gacar, and Yanlıç

(2012), in their study titled "Evaluation of the Thinking Styles of Physical Education and Sports Teacher Candidates", concluded that the thinking styles of the prospective teachers participating in the research were at a moderate level. This result contains similarity within the scope of the study.

Based on these results, it can be said that academicians are generally open and willing to learn and improve their deficiencies. In addition, it can be interpreted that lifelong learning tendencies are high. It is an important point that academicians have a high level of awareness about the practices they will do in order for students who have reached a certain level of cognitive level to become lifelong learners. It can be expected that academics (Toygar, Kıroğlu, & Kara, 2020), who are intellectual pioneers in the development of the scientific and cultural level of the society, are open and inclined towards lifelong learning, and that they can keep up with and adapt to the changing and developing living conditions of the society in every aspect. In this case, it can be thought that the effect of academics having a role model structure under the cultural and scientific leadership of the individual and society is great. In the 21st century, when existing knowledge is constantly changing, it is expected that academics will have a tendency to lifelong learning, and it will be very important in terms of ensuring that every individual forming the society becomes a lifelong learner and thus this culture is formed in the society in general.

As a result of the research, it was concluded that the level of preference and use of the thinking styles of the academicians remained at moderate levels. It is thought that the reactions of the academicians to the events they encounter may differ according to the shape and characteristics of the situation, both rationally and intuitively. This result may reveal that academics can approach events more emotionally and self-centered than the effect of the current emotional period, or on the contrary, they can display realistic and logical behavior. It can be predicted that this choice of academics will be determined by their approach to the events in their lives. It can be interpreted that academicians do not clearly define emotional or rational personality but prefer a style according to their living conditions.

Lifelong Learning Tendency and Thinking Style Levels of Academicians by Educational Status

When the levels of lifelong learning tendencies and thinking styles of academicians were examined in terms of educational status variable, a significant difference emerged. It was concluded that the level of lifelong learning tendencies and thinking styles of doctoral graduate academicians is significantly higher than that of graduate academicians. It can be said that academicians with doctorate degrees are more willing to learn than others and have a higher life-long learning tendency. It can be said that there is a significant and positive relationship between the progress achieved at the education level and the behavior preferences shown against the events.

No study has been found in the literature on whether lifelong learning tendencies differ in terms of the variable of educational status. There are studies mostly on teachers. It is important for teachers to have similar educational backgrounds with academicians in terms of similarity with the research results of the studies in the literature. In the study they conducted with the teachers working in Anatolian High Schools in Diyarbakir, Yaman and Yazar (2015) concluded that the educational status of the graduate showed a significant difference on lifelong learning tendencies. The result of a significant increase in lifelong learning tendencies with the increase in education level is similar to the research findings. As a result of the study conducted by Sevinç and Çelebi (2020) with teachers, a significantly high difference was found between educational status and lifelong learning tendencies. The result of the increase in the level of education shows an increase in the tendencies of lifelong learning, which is similar to the results of the research. Yılmaz and Beşkaya (2018), in their study titled “Examination of Education Administrators' Lifelong Learning Tendencies and Individual Innovation Levels”, concluded that the increase in education level also leads to an increase in the level of lifelong learning. Studies with teachers by Ekici (2022), Yüksel (2020), Şen (2021) are similar to the research findings. However, there

are also studies in the literature that do not coincide with the results of the research. Gökbulut (2021), Yıldız Durak and Tekin (2020), Bilen (2022) did not find a significant difference between teachers' educational status and lifelong learning tendencies in their studies with teachers.

In the literature, no study has been found about the thinking styles of academicians. The similarities of teachers to academicians in terms of certain variables were discussed in relation to the research results. Uğurlu (2012), in his study examining the thinking styles of teachers working in secondary education institutions, stated that the educational status of the teachers caused a difference in their thinking styles. He concluded that teachers who have master's and doctorate degrees have a judgmental thinking style, and stated that they use the features of evaluation, judgment and criticism more. This result is similar to the results of research conducted with academics who have higher levels of analytical and logical thinking. Bilgiç (2010) in his study with primary school administrators and classroom teachers concluded that educational status affects thinking style preferences and as the level of education increases, style choices become more creative, critical, judgmental and rational. However, as stated in the results of the research, there were also studies that concluded that the educational status did not cause the thinking style to differ. Adak (2006), in his study examining the thinking styles of preschool teachers, divided the education levels of teachers as associate, undergraduate and graduate, but could not detect any difference with their thinking styles.

Within the scope of the study, it was concluded that the lifelong learning tendencies of academicians increased according to their educational status. Considering that people with higher graduations have a longer educational life, we can say that these people spend more time in learning environments. It is an expected result that this time will support individuals to have the ability to learn. It causes academicians who have the academic titles of doctoral lecturer, associate professor and professor to pass these learning processes successfully and to have more lifelong learning tendencies. In addition, academicians' scientific studies ensure that they are in continuous learning and research environments. In addition, it can be said that the degree of graduation obtained at the end of the successfully completed education process is also very important in terms of emotional satisfaction and motivation. For all these reasons, the lifelong learning tendencies of academics who have just started their profession and have low educational status are lower than those with higher education levels. It can be concluded that academicians with doctoral degrees do not adopt lifelong learning in all areas of their lives.

According to the results of the research, the level of using thinking styles of doctoral graduate academicians was higher than that of undergraduate and graduate academicians. In this case, it can be said that the increase in education level brings a higher level of style preference in terms of cognition needs. In other words, the progress of the educational situation may affect the style choices to be used in the behaviors to be shown against the events. According to the results of the research, it was determined that the doctoral graduates approached the events from a more logical and rational perspective as a result of the research. The reason for this situation may be the similar behaviours of doctoral graduates in the educational processes and their academic studies on the results based on the findings and their use of analysis and decision-making skills in the light of rational data.It can be said that the critical perspectives of academicians with a doctorate degree will be more developed than academics with a master's or bachelor's degree.

Lifelong Learning Tendency and Thinking Style Levels of Academicians by Academic Titles

When the lifelong learning tendencies of academicians were examined in terms of academic title variable, it was seen that there was no significant difference. When the average scores were examined, it was concluded that the lifelong learning levels of the academicians with the academic title of lecturer, doctoral faculty member, associate professor and professor were significantly higher than the academicians with the academic title of research assistant. When we look at the scale in general, it has

been seen that the lifelong learning tendencies of associate professors are higher than other titles. When the thinking styles of the academicians were examined in terms of the academic title variable, it was seen that there was a significant difference. It has been concluded that the thinking styles of the academicians with the academic title of associate professor are significantly higher than those of the academicians with the academic title of research assistant and doctoral faculty member.

When the literature was examined, studies similar to the results of the research were found. Kör, Aksoy and Erbay (2017) found a significant relationship between the titles of academicians and their lifelong learning attitudes in their study titled "Examination of University Academic Staff's Attitudes to Lifelong Learning". They found a high level of lifelong learning attitudes of professors and associate professors similar to the research data. Haseski and Odabaşı (2016), in their study to determine the factors affecting lifelong learning according to faculty members, determined that the academic titles of the academicians participating in the research increased in the scores obtained from the lifelong learning questionnaire as they progressed. It has also been found that there are studies in the literature that do not differ by researchers. Yavuz Konokman and Yanpar Yelken (2014) examined the perceptions of instructors on lifelong learning competencies; Ayçiçek and Yanpar Yelken (2016), on the other hand, did not find a significant difference between the academic titles of academicians and their lifelong learning levels in their study in which they examined the lifelong learning competencies and lifelong learning habits of the instructors.

As a result of the research, it was concluded that as the academic titles of academicians increased, their lifelong learning tendencies increased. It can be said that the main reason for this situation is that the progress in terms of title in academics can be achieved with the studies and the time spent in learning environments. Günüç, Odabaşı and Kuzu (2012) similarly emphasize the importance of one's experience, which is similar to the research data. In addition, it can be said that professorship and associate professorship in universities, contracted employment of research assistants, lecturers and doctoral faculty members in universities affect the lifelong learning levels of academics in sub-headings due to job security concerns. The fact that associate professors have higher lifelong learning tendencies than professors can be expressed by the belief that professors are now at the top of the profession, and the conditions for obtaining the title of associate professor are considerably aggravated.

Studies on thinking styles about academics have not been found in the literature review. In the existing studies, demographic information about the academic titles of the academicians was not reached. In the results obtained, it was found that the academicians with the title of associate professor and lecturer showed a significant difference in the intuitive belief sub-dimension compared to the academicians with other titles. In the total of the scale, it was seen that the thinking style levels of the academicians with the title of associate professor were higher than those of the academicians with the title of research assistant and doctoral faculty member. It is clear that research assistants and doctoral faculty members need more cognitive and rational knowledge in their studies to progress in their educational status and to complete the necessary criteria for obtaining the title of associate professor. The academicians who have completed the necessary studies and have the title of associate professor have revealed that they prefer emotional and intuitive styles as well as rational knowledge preferences compared to other academicians as a result of their career progress and experience. It was concluded that this situation affected the research results.

Lifelong Learning Tendency and Thinking Style Levels of Academicians by Field of Science

When the lifelong learning tendencies of the academicians were examined in terms of the variable of the fields of science they worked on, a significant difference was found. It has been observed that academicians working in the fields of Health Sciences, Educational Sciences, Fine Arts and Philology have a higher level of lifelong learning tendencies than others. It has been observed that academicians working in the fields of Engineering, Agriculture, Forestry and Fisheries, Science and Mathematics,

Theology and Architecture, Planning and Design have low lifelong learning tendencies both in the sub-dimensions and in the overall scale.

When the thinking styles of the academicians were examined in terms of the field of science they worked on, a significant difference was found. It has been observed that the thinking styles of the academicians working in the fields of Fine Arts and Sports Sciences are at a higher level than the others.

It is foreseen that the establishment of different units within the university due to their autonomous structure and the different naming of the units created for the same purpose will create difficulties in terms of determining the working areas of academics. The Science Field section in the Personal Information Form applied to the participants within the scope of the research was arranged as stated in the 2022 March Term Associate Professorship Application Conditions of the Interuniversity Board Presidency (ÜAK). Thus, it is aimed that the differentiation between the fields in which the academicians do scientific studies and specialize and the units they currently work in their universities do not have a negative impact on the research findings.

In the literature review, it has been found that there are few studies on lifelong learning about academics and that there is no demographic information about the fields of science in which academics work. Similar to the results of the research, Ayçiçek and Yanpar Yelken (2016) found that the lifelong learning competencies of academics working in the field of educational sciences were found to be at a high level within the scope of the study conducted to examine the lifelong learning competencies of academicians working in the faculty of education. The reason why academicians working in the fields of health sciences, educational sciences, fine arts and philology have higher lifelong learning tendencies than academics working in the fields of engineering, agriculture, forestry and fisheries, science and mathematics, theology and architecture, planning and design. It can be said that having social areas and interacting with people are effective. Demirel (2012) emphasises that lifelong learning supports individuals' socialisation and active citizenship in addition to its effect on personal development. The fact that academics who mostly work on mathematical calculations and technological tools, planning, project design and experimental studies in laboratory environment have less social interaction and communication may have caused their lifelong learning tendencies to remain at a low level. On the contrary, academicians working in the fields of Educational Sciences where interaction at the highest level will be most necessary. There are academicians working in the fields of Educational Sciences where interaction will be at a high level, Philology where speaking and sharing will be used the most, Fine Arts and Health Sciences where creativity and cultural interaction will be used the most. It can be interpreted that social dialogues in terms of diagnosis and treatment methods will be one of the effects of high lifelong learning levels.

No studies have been found in the literature investigating the thinking styles of academics. It was understood that the results of the study conducted with teachers and prospective teachers were similar to the research findings. These results can be used in terms of discussion data, since the differences in the education and specialization fields of the teacher or teacher candidate university students are similar to the academicians. Duru (2002) examined the thinking styles of pre-service teachers and concluded that the students studying in the department of fine arts preferred intuitive thinking styles more than the students studying in the departments of social sciences, science, foreign languages and educational sciences. Uğurlu (2012) concluded that physical education, visual arts and music teachers differ in style preferences compared to other branches and they prefer conservative style in the study conducted with teachers working in secondary education institutions, similar to the research findings. Çınar (2016) in her study titled "The Relationship Between Pre-service Teachers' Thinking Styles and Reflective Thinking Tendencies" concluded that there are significant differences in executive, polyarchic, anarchic, granular, introverted and innovative styles in favor of students studying in the painting department. It is seen that similar results have been obtained in studies conducted abroad. In the study

conducted by Zhang and Sachs (1997) with high school graduate students, it was concluded that students who graduated from social sciences and humanities use the global style more. These results are similar to the research data.

It has been observed that academicians specializing in Fine Arts and Sports Sciences are more effective in using intuitive styles than academics working in other fields of science. The main reason for this situation is thought to be that art and sports activities contain a lot of emotion. These fields of science, which include activities such as music, painting, dance, etc., may require the use of emotional and intuitive styles rather than conceptual and cognitive knowledge. For this reason, the intuitive thinking styles of academicians specializing in Fine Arts and Sports Sciences may have been higher than other academicians.

The Relationship Between Lifelong Learning Tendencies and Thinking Styles of Academicians

In order to measure the relationship between academicians' lifelong learning tendencies and thinking styles, the Lifelong Learning Tendency Scale and Rational-Experiential Thinking Styles scale were applied within the scope of the study. As a result of the analyzes made, it was found that there was a positive relationship below the medium level in both the sub-dimensions and the overall total of the scale.

Thinking style refers to the ways and methods that individuals use voluntarily or involuntarily in order to progress in the process of solving the problems they encounter throughout their lives or in line with their goals. These preferences represent the emotional or rational behavior of people. While rational-analytical styles are more realistic, logical and evidence-based based on cognition, experiential-intuitive styles, on the other hand, include behaviors that are emotional, self-centered and based on past experiences. Teglasi and Epstein (1998) state that behavior is the common product of rational and experiential styles, which are very different from each other. Knowing which individuals are preferred more in style preferences and making the unused ones more active over time is very important for individuals to exhibit efficient and harmonious decision-making behavior in the following processes (Palut, 2003). In addition, whether the preferred styles will be liked by individuals will be in the light of individual differences.

The basis of lifelong learning is the idea that individuals can be in learning from their birth to the end of their lives. Walking, talking, riding a bicycle, learning to read and write, etc. are all behaviours that take place in learning.However, it is impossible to express learning in a separate way without thinking. It is an undeniable fact that thinking will form the basis of learning. For this reason, the conclusion that the thinking style will affect the learning of individuals is revealed by the research findings.

In the literature review, no studies were found examining the relationship between lifelong learning and thinking styles. However, there are some studies in the literature based on the conclusion that learning and thinking are parallel in human life. In their study, Cano and Hewitt Hughes (2000) examined the relationship between university students' learning styles and thinking styles and found that their students' academic success was related to their thinking styles. In his research, Sharma (2011) examined the relationship between secondary school students' thinking styles and academic success. As a result of the study, it was found that there was a positive and significant relationship between the academic achievements of secondary school students and their thinking styles. Huincahue et al. (2021) examined the relationship between mathematical thinking styles and mathematical performance in their study. It was concluded that there is a positive correlation between mathematical performance and analytical thinking style. Özbaş and Uluçınar Sağır (2014) in their study examining the relationship between classroom teachers' thinking styles and the measurement-assessment methods they use and Yaşar and Erol (2015) in their study examining the relationship between preschool teachers' thinking

styles and empathic tendency levels concluded that differences in individuals' thinking may cause differences in their learning. These results are similar to the research findings.

In order to determine the relationship between academicians' lifelong learning tendencies and thinking styles, as a result of the comparison of the scores of the academicians from the "Lifelong Learning Dispositions Scale" and the "Rational-Experiential Thinking Styles Scale", the relationship between academicians' lifelong learning tendencies and thinking styles was below the medium level and in a positive direction relationship has been found. According to this result, lifelong learning tendencies and thinking styles of academicians are concepts that affect each other positively but below the medium level. It was concluded that the preferences in thinking styles affected the lifelong learning tendencies to a small extent.

RECOMMENDATIONS

Recommendations for Practitioners

Based on the decrease in the tendency of lifelong learning with the advancement of the age of the academicians, it can be ensured that young academics and academics in the older age group can be in social interaction at universities. In addition, it may be recommended to organize activities that support and encourage lifelong learning.

Based on the effect of gender difference on lifelong learning tendencies of academicians, male academicians should be more involved in lifelong learning activities.

Based on the finding that the lifelong learning levels of academicians increase as they progress in their educational status, it can be ensured that the processes of promotion in career ladders are supported by the administrators, and especially academicians other than associate professors and professors can be supported by university administrations in order to ensure their career development.

Based on the results of the academics' fields of specialization, academicians working in the fields of engineering, agriculture, forestry and fisheries, science and mathematics, and architecture, planning and design, who spend most of their time doing scientific studies in laboratory environments, have social activities within or outside the university or arrangements that will enable them to be in the projects can be suggested.

Based on the conclusion that academics' thinking styles are at a moderate level, it can be suggested to re-plan the education-training processes with this awareness by organizing activities that will enable them to realize the thinking styles they have or prefer in the face of events.

Suggestions for Researchers

Since there are very few studies on lifelong learning or thinking styles in the literature on academics, more studies can be conducted on these concepts.

Since the research is limited to academicians, students, teachers, educational administrators, etc., it may be recommended that such studies be conducted for all employees in the field of education.

This research is a study conducted in the light of quantitative data. It may be recommended to conduct qualitative or mixed studies that will examine the results of this research.

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History Teachers' Opinion about the 11th Grade History Textbook

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ABSTRACT

Textbooks are one of the most widely used teaching materials in history lessons. History textbooks are important resources that facilitate the achievement of learning outcomes and ensure the realization of the curriculum. The newly prepared 11th Grade History Textbook and Program were implemented in the 2017-2018 academic year. This study aims to determine the evaluation of history teachers regarding the physical design, educational design, use of visual materials, and assessment and evaluation of the new 11th-grade history textbook. The textbook was developed in accordance with the curriculum change implemented by the Ministry of National Education in 2018. The universe of the study is history teachers who utilize the 11th-grade history textbook published by the Ministry of National Education in Türkiye. The study sample consists of history teachers working in Kırklareli province during the 2019–2020 academic year. While choosing the sample, the "cluster sampling" technique was preferred. The IBM SPSS Statistics 20 program was used to analyze the collected data. The descriptive statistics of the collected data are given in detail. At the end of the independent sample t-test and variance analysis, it was investigated whether teachers' attitude levels toward the subject of "Evaluating High School History Textbooks" showed a statistically significant difference according to the variables "age," "years of experience, "and "the department of graduation.". It was determined that teachers' attitude levels toward the "Evaluation of High School History Textbooks" showed a statistically significant difference based on "Age" and "the Department of Graduation" variables ($p<0.05$).

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INTRODUCTION

The reflection of technological developments in the world in every field of education and providing instant audio and video access to information via electronic devices such as computers, telephones, etc. have not kept textbooks from prevailing as the most basic teaching material worldwide and in Türkiye. Textbooks are still one of the most significant teaching materials for teachers and students. Many teachers carry out the lessons by adhering to the textbook alone. In this context, textbooks must be qualified. Textbooks are teaching materials that provide ease of use, are accessible to every student, provide information systematically, can be referred to at any time, and can fill the gaps in verbal teaching (Karabağ, 2012, p. 40). Textbooks are texts written by and for the political authority, publisher, teacher, and student, who are directly involved or influenced, to be used in schools to support a course subject or a curriculum. Textbooks are sources obtained from information sources and investigations at and outside of school, other than teachers, that affect a young person's knowledge of understanding his past and environment (Özbaran, 2005, pp. 134–135). In addition to being indispensable tools of educational services, textbooks play an important role in improving the quality of human resources as much as teachers, physical facilities, and curricula do (Ceyhan & Yiğit, 2005, p. 26).

Well-structured textbooks facilitate purposeful, organized, and fast teaching with the order of the subjects, warm-up and evaluation questions, and ready-made activities. In practice, teaching methods and environments are frequently structured around textbooks. This situation further increases the importance of textbooks (Kılıç & Seven, 2002, p. 19).

There are certain benefits that textbooks offer the teacher. These benefits are:

• Using a textbook by the teacher facilitates effective communication and interaction with the students.

• The textbook is a pedagogical tool that guides the teacher throughout the lesson's instructional process.

• The inclusion of questions, tests, figures, and other elements in the textbook fosters an effective learning environment for the course.

• Textbooks make important contributions to the teacher's guidance of students to do homework.

• The assessment and evaluation sections of the textbook allow teachers to evaluate their students more objectively.

• The textbook guarantees the efficient utilization of the course (Cemaloğlu, 2003, p. 5).

Textbooks have been one of the essential elements of the education process since the first half of the 19th century when compulsory education began to emerge in Western Europe. These materials, which serve as guides for teachers and students, vary in their characteristics across different fields of science. History textbooks have evolved in developed countries to address current issues, and new approaches have emerged in history textbook writing. These approaches can be listed as follows:

• The impact of developments in the understanding of the presentation of facts in history lessons on the writing of history textbooks,

• The impact of developments in the field of history and its teaching on the composition of history textbooks,

• The impact of developments in content preparation on the composition of history textbooks,

• The impact of the increasing importance of gender factor on the composition of history textbooks,

• The impact of developments in the understanding of democracy and human rights on the

composition of history textbooks,

• The impact of developments in historical thinking skills on the composition of history textbooks (Demircioğlu, 2013, pp. 120–124).

The change in history textbooks worldwide is about teaching how to utilize historical knowledge rather than simply acquiring it. The aim here is not to list historical information chronologically but to present the information that needs to be known concerning the history of a country and the world from various perspectives and to train students' skills in this sense. From this perspective, western textbooks are not indispensable for the student but rather their assistant and guide in learning (Karabağ, 2014, p. 191). There is a trend towards workbooks that offer students a range of resources and materials (maps, photographs, statistical data, document summaries, and eyewitness accounts) for analysis and interpretation, as opposed to traditional books (Stradling, 2001, p. 13). Images in history textbooks should comply with visual design principles, be suitable for student development levels and subjects, be aesthetic, comply with design principles, be sufficient in size, and be presented clearly and easily readable (Karabağ, 2012, pp. 45–46).

Constructivist education, implemented since the 2005–2006 academic year, has also led to a positive change in the design of history textbooks. In this context, textbooks have also included written and visual evidence that would allow students to build knowledge themselves and activities where students could improve their skills. In the later period, some practices introduced within the framework of the constructivist approach have been softened, and this situation has also spread to the textbooks. As it is known, history textbooks in schools are crucial because some members of various nations do not study history after school (Ortaylı, 1998, p. 52). Although numerous course materials can be used in history courses, research indicates that the textbook is still the primary source in history courses today. In this sense, history textbooks must be well prepared to convey the topics of this course to students. Teachers' evaluation of history textbooks is also important in preparing more qualified textbooks.

Countries periodically revise their curricula to cultivate more competent individuals. In our country, the Ministry of National Education tried to update the curricula of several courses in line with the demands of the time during the 2017–2018 academic year. One of these renewed curricula is the history course curriculum. Textbooks were also rewritten within the framework of the renewed curricula.

Literature Review

In the literature, previous and new social studies, Turkish Republic Revolution History and Kemalism, geography, and science courses' textbooks have been discussed in many studies in terms of various aspects (Akcan & Türkmenoğlu, 2022; Depeci & Çifçi, 2023; Dere & Uçar, 2020; Dere & Aktaşlı, 2019; Ersoy, 2023; Gökçınar, 2022; Karakuş & Çoksever, 2019; Osmanoğlu & Cantemur, 2020; Safran et al., 2016). Concerning the studies on the textbooks of history courses, Kaya and Perihan (2017) conducted a study to determine the opinions of history teachers and 9th-grade students about the 9th-grade history curriculum and the 9th-grade history textbook. This study concluded that neither the curriculum nor the 9th-grade textbook was at a level to meet the expectations fully. In their study to determine the opinions of history teachers about the curriculum of the 9th-grade history course and history textbook, Köse and Türkan (2018) found that the 9th-grade history curriculum and textbook contained several problems and that some teachers are not familiar with the philosophy and approach of the new history programs. In the study conducted by Şimşek and Çakmakçı (2019), the subject of "National Struggle" was covered in the history and social studies textbooks taught in primary schools since the proclamation of the Republic. At the end of the research, it appeared that the subject of the National Struggle had decreased in content in textbooks as of the 1930s. Dere and Ülker (2022), who discussed historical figures in history textbooks, evaluated how historical figures took part in high school history textbooks.

At the end of the analysis, it was determined that statesmen (leaders) were included the most in all textbooks, and foreign and female historical figures were included the least. In the study conducted by Özgür and Öztaş (2023), the 10th-grade history textbook was examined according to the opinions of history teachers. At the end of the research, it was determined that history teachers had a positive attitude toward the 10th-grade history textbook. In the most recent study that overlaps with this study, Candan (2023) received teachers' opinions about history textbooks (in educational, visual, physical, and language-wording contexts). Research results showed that teachers found the textbooks inadequate in terms of suitability for cognitive development levels, design, and content, although they found the textbooks sufficient in some aspects. This research aimed to determine how the 11th-grade history textbook, prepared in 2018, was evaluated by history teachers in terms of physical design, educational design, use of visual materials, and assessment and evaluation.

METHOD

Research Design

This research utilized the survey method to evaluate the 11th-grade high school history textbook published by the Ministry of National Education Publications (Yüksel et al., 2019) based on teachers' opinions. Survey models are research approaches that aim to describe a past or present situation as it exists (Karasar, 2012).

Data Collection Process

The questionnaire, which was used as a data collection tool in the research, was created by the researcher by going over the relevant literature. The first part of the questionnaire consists of questions about the teachers, such as "age," "work experience in years," "the university of graduation," "the faculty of graduation," and "the department of graduation.". The second part of the questionnaire includes the "High School History Textbooks Evaluation Form (it will be abbreviated as HSHTEF henceforth)", the validity and reliability of which were provided by Akbaba (2013). This "High School History Textbook Evaluation Form" consists of 51 questions, each of which can be answered as "1 = strongly disagree" "2 = disagree" "3 = neutral" "4 = agree" and "5 = strongly agree." The minimum score that can be obtained from a question is 1, and the maximum score is 5. The mean of all questions was taken as the score to be obtained from the entire HSHTEF (also valid for each sub-dimension). In this case, the minimum HSHTEF score that can be obtained is 1, and the maximum HSHTEF score is 5. High scores from HSHTEF indicate a positive attitude, while low scores indicate a negative attitude.

The reliability of the HSHTEF instrument, including each dimension, was determined to be high ($\alpha > 0.70$). The mean score of HSHTEF was 3.30 ± 0.75 (Table 1).

Table 1. *Reliability and mean values of the "high school history textbooks evaluation form (HSHTEF)" dimensions*

Sub-dimension	Number of Items	Mean	Cronbach Alpha (α)
D1: Physical Design	5 Items	3,24 ± 0,87	0,856
D2: Educational Design	27 Items	3,16 ± 0,84	0,972
D3: Use of Visual Material	8 Items	3,40 ± 0,89	0,933
D4: Language, Wording and Spelling	5 Items	3,63 ± 0,77	0,838
D5: Assessment and Evaluation	6 Items	3,59 ± 0,79	0,884
High School History Textbooks Evaluation Form (HSHTEF)	**51 Item**	**3,30 ± 0,75**	**0,979**

The mean values of the sub-dimension of the HSHTEF were found as follows:

- The mean of the "Physical Design" sub-dimension was calculated as 3.24 ± 0.87.
- The "Educational Design" sub-dimension's mean was 3.16 ± 0.84.
- The "Use of Visual Material" sub-dimension's mean was 3.40 ± 0.89.
- The "Language, Wording, and Spelling" sub-dimension's mean was 3.63 ± 0.77.
- The "assessment and evaluation" sub-dimension's mean was 3.59 ± 0.79.

Upon analyzing the HSHTEF scores, it was found that the teachers generally held a positive attitude ($\bar{X}$=3,30, s=0,75) regarding the 11th-grade high school history textbooks. At the same time, when the scores of each sub-dimension of HSHTEF were examined, it was observed that this positive attitude was consistent. In addition, it was observed that the teachers showed the highest positive attitude towards the 11th-grade high school history textbooks in the "Language, Wording, and Spelling" sub-dimension ($\bar{X}$= 3,63, s = 0,77). Accordingly, it was observed that the dimension in which teachers had a lower level of positive attitude towards 11th-grade high school history textbooks was the "Educational Design" sub-dimension ($\bar{X}$= 3,16, s = 0,84).

Sample of the Research

The research sample consists of all history teachers employed in the Kırklareli province during the 2019-2020 academic year. A cluster sampling technique was used to create the research sample (Bayram, 2017). The table below (Table 2) presents the distribution of participating teachers based on their universities, faculties, departments, ages, and years of experience.

Table 2. *Demographic information of the participants*

Variables	Categories	*f*	%
University	İstanbul University	9	19,6
	Marmara University	5	10,9
	Ankara University	3	6,5
	Mimar Sinan University	3	6,5
	Anadolu University	2	4,3
	Celal Bayar University	2	4,3
	Dokuz Eylül University	2	4,3
	Dumlupınar University	2	4,3
	Fırat University	2	4,3
	Ondokuz Mayıs University	2	4,3
	Trakya University	2	4,3
	Other	12	26,4
	Total	46	100
Faculty	Faculty of Arts and Sciences	33	71,7
	Faculty of Education	9	19,6
	Faculty of Language, History and Geography	3	6,5
	Faculty of Open Education	1	2,2
	Total	46	100
Department (Dept)	History	37	80,4
	History Teaching	9	19,6
	Total	46	100,0
Age	40 and below	14	30,4
	41-50	25	54,3
	51 and over	7	15,2

	Total	46	100
Year of Experience	1-10 years	8	17,4
	11-20 years	15	32,6
	21-30 years	19	41,3
	31 or more	4	8,7
	Total	46	100

Forty-six graduates from 23 different universities participated in the questionnaire. Thirty-three of them are graduates of the Faculty of Arts and Sciences. Most participants (25) fall within the age range of 41-50. Additionally, most of the teachers have work experience of 11 years or more.

Data Analysis

IBM SPSS Statistics 20 was used to analyze the collected data. In the research findings section, firstly, the distributions of the data regarding the teachers' "age," "year of experience," "the university of graduation," "the faculty of graduation," and "the department of graduation" were given as frequency analyses. A reliability analysis of the HSHTEF tool was conducted for the HSHTEF scores to be used in hypothesis tests. In the study, the Cronbach Alpha reliability coefficient of HSHTEF was $\alpha = 0.979$. In addition, the reliability coefficient values of all five dimensions that make up the HSHTEF are also reported in the findings section. Descriptive statistics for each item of the HSHTEF are given in a table. With hypothesis tests, it was explored whether the HSHTEF scores of the teachers showed a statistically significant difference according to the variables "age," "years of experience," and "the department (faculty) of graduation." For this purpose, an independent sample t-test was used to determine the differences in the mean scores of the two groups. ANOVA was used to determine the differences in the mean scores of groups with more than two members. In cases where the assumptions required by these parametric tests were not met, non-parametric equivalents of these tests were used. The interpretation of the results of all hypothesis tests was made at a 95% confidence level.

FINDINGS / RESULTS

Descriptive Statistics

The findings regarding the descriptive statistics, which were created based on the responses of the research participants, are presented in Table 3 below.

Table 3. *Descriptive statistics for the items on the "High school history textbook evaluation form"*

Item	$\bar{X}$	(s)
1. The history textbook is useful and solid.	3,43	1,167
2. The book's design (page layout, colours, images, print quality) is attractive.	3,04	1,074
3: The general appearance of the book arouses the desire to read and examine it.	2,87	1,166
4: Font type, size, number of lines per page, and placement of images on the page are appropriate.	3,41	1,002
5: The organization chart guides the student in the use of the book.	3,43	1,025
6: The dictionary section is accurate and sufficient.	3,02	1,064
7: Footnotes of the written and visual materials used in the book (explanation of the source from which the relevant information was taken) are given.	3,37	1,019
8: Written and visual sources used in the book's writing are shown in the bibliography.	3,91	0,694
9: The textbook allows the application of different methods, techniques, and activities.	3,30	1,093
10: The number and quality of the resources used in the textbook are sufficient.	3,02	1,022
11: The textbook includes research, analysis, and observations appropriate to the student's level.	3,00	1,135
12: The topics are discussed holistically, where political, social, cultural, and economic events are presented together.	3,26	1,084

13: The textbook reflects the new information, research results, and perspectives of different scientists revealed by the social sciences.	3,22	1,031
14: The textbook provides national identity and citizenship consciousness.	3,20	1,025
15: Activities for structuring knowledge by the student are included.	3,09	0,962
16: To build knowledge, applications for analyzing different materials (cartoons, paintings, literary works, etc.) are included.	3,30	0,963
17: Texts and visual materials are compatible.	3,48	1,130
18: At the beginning of each unit and chapter, elements that motivate the student and encourage him or her to think and research are included.	3,20	1,108
19: The concepts used are suitable for the cognitive and affective characteristics of the students.	3,07	1,020
20. The preparation and presentation of the content appeal to different learning styles (visual, auditory, kinesthetic, etc.).	3,02	1,125
21. The content has been enriched by using literary products.	3,50	1,049
22. The textbook improves students' historical skills by providing activities in which they will use first-hand and second-hand sources.	2,87	1,204
23. It considers students' developmental stages when teaching subjects.	2,96	1,228
24. The textbook contributes to developing higher-order thinking skills (problem-solving, critical thinking, etc.).	2,89	1,178
25. The textbook provides global awareness.	2,98	1,183
26. Textbooks reflect the relations of history with other branches of science.	3,35	1,079
27. The textbook helps students form their understanding of history.	3,20	1,128
28. Presenting the content in the textbook chronologically contributes to an easier understanding of the subjects.	3,07	1,421
29. It presents historical events through the narrations of people who experienced those events.	3,09	1,208
30. The textbook provides students with a comparative perspective.	2,98	1,164
31. The textbook contributes to the perception of time, chronology, continuity, and change.	3,04	1,282
32. The textbook arouses the student's interest in the past.	3,07	1,143
33. Visual elements are presented accurately, up-to-date, and in a useful manner for teaching.	3,30	1,093
34. Visual elements are appropriate to students' cognitive characteristics.	3,46	1,069
35. Visual elements contribute to message transfer.	3,46	1,026
36. The dimensions of the visual elements are sufficient to serve the purpose.	3,50	1,006
37. Visual materials are separated and numbered according to their types.	3,54	1,069
38. Visual materials have titles and subtitles consistent with the visual.	3,63	1,019
39. Concept maps, cartoons, and networks were used to show the relationships between concepts.	3,17	1,217
40. Visual materials were used to provide access to information without requiring written documents.	3,15	1,115
41. Language and sentence structure appropriate to the age and personal characteristics of the students were used.	3,15	1,074
42. The textbook complies with spelling and grammar rules.	3,78	0,941
43: Foreign words are given with their Turkish pronunciations.	3,78	1,009
44. The sentence structure of the texts in the textbook is decent and understandable.	3,65	1,016
45. The textbook contributes to students' vocabulary.	3,76	0,899
46. The questions in the textbook are understandable.	3,83	0,926
47: Evaluation questions are appropriate to the student's knowledge.	3,41	1,024
48. Evaluation questions encourage students to think, discuss, and research.	3,57	0,910
49. The textbook includes techniques that allow students to evaluate themselves and their friends.	3,41	0,956

50. Evaluation questions consist of different types (multiple choice, matching, fill-in-the-blank, open-ended, true-false, puzzle, etc.).	3,74	1,042
51. The evaluation questions at the end of the unit are sufficient to assess the achievements in that unit.	3,59	1,107

Descriptive statistics for the “High School History Textbooks Evaluation Form” items are given in the table above (Table 3). When the descriptive statistics regarding HSHTEF scores were examined, it seemed that the teachers held the highest level of positive opinion ($\bar{X}$ = 3.91, s = 0.694) regarding the item "the written and visual sources used in the writing of the book are shown in the bibliography.". Similarly, teachers expressed positive opinions about "the questions are understandable" in the 11th-grade high school history textbooks ($\bar{X}$ = 3.83, s = 0.926).

When the descriptive statistics regarding the HSHTEF scores were examined, it seemed that the teachers did not have a positive opinion ($\bar{X}$=2.87, s=1.166) about "the general appearance of the book arouses the desire to read and examine". Similarly, it was observed that teachers did not have a positive opinion about “The textbook develops students' historical skills by providing activities in which they will use first-hand and second-hand sources" ($\bar{X}$=2.87, s=1.204).

Hypothesis Tests

Is age an effective factor in teachers' attitudes towards "Evaluation of 11th grade High School History Textbooks"?

Table 4. *Result of variance analysis regarding the mean of HSHTEF scores according to the "Age" variable*

Age Category	n	Mean	Standard Deviation	Source of Variance	Sum of Squares	sd	Mean Square	F	p	Difference
40 and below **(1)**	14	2,9370	0,64640	**Between Groups**	3,492	2	1,746	3,411	***0,042***	***2 > 1***
41-50 **(2)**	25	3,5475	0,73311							
51 and over **(3)**	7	3,1709	0,78298	**Within Group**	22,009	43	0,512			
Total	46	3,3043	0,75278	**Total**	25,501	45				

At the end of the variance analysis, a significant difference was found between the teachers' HSHTEF score mean according to the "age" variable ($F(2, 43)=3.411$, $p<0.05$). After conducting a post hoc test (Scheffe) to determine the source of this significant difference, it was found that the HSHTEF scores of teachers aged "41–50 (2)" were significantly higher than those of teachers aged "40 or below (1)" (Table 4).

Is the year of experience in the profession an effective factor in teachers' attitude levels towards "Evaluation of High School History Textbooks"?

Table 5. *Result of variance analysis for the mean of HSHTEF scores according to the "year of experience" variable*

Year of Experience	n	Mean	Standard Deviation	Source of Variance	Sum of Squares	sd	Mean Square	F	p
10 years or	8	3,0564	0,47736	**Between Groups**	3,706	3	1,235	2,380	*0,083*
11-20 years	15	3,3255	0,86417						
21-30 years	19	3,5449	0,73070	**Within Group**	21,795	42	0,519		
31 years or	4	2,5784	0,21149						

Total	46	3,3043	0,75278	**Total**	25,501	45

At the end of the variance analysis, no significant difference was found between the teachers' HSHTEF score mean according to the "Year of Experience" variable ($F(2, 43)=3.411$, $p<0.05$) (Table 5).

Is the Department of Graduation (Faculty) an effective factor in teachers' attitudes towards "Evaluation of High School History Textbooks"?*

Table 6. *Independent sample t-test results regarding the mean of HSHTEF scores according to the "the department (faculty) of graduation" variable*

Department (Faculty) of Graduation	N	Mean	Standard Deviation	t	sd	p
History (Faculty of Art and Sciences)	37	3,1717	0,72507	-2,570	44	***0,014***
History Teaching (Faculty of Education)	9	3,8497	0,63710			

*Faculty of Arts and Sciences in the table includes "Faculty of Arts and Science," "Faculty of Languages, History, and Geography," and "Faculty of Open Education."

A significant difference was found between teachers' HSHTEF score mean according to the "Department of Graduation" variable ($t44 = -2.570$, $p < 0.05$) (Table 6). According to this, the HSHTEF score mean of "History Teaching (Faculty of Education)" graduates is significantly higher than that of "History (Faculty of Arts and Science)" graduates.

DISCUSSION, CONCLUSION, RECOMMENDATIONS

This study aimed to assess the evaluation of the history textbook for 11th-grade high school students, published by the Ministry of National Education Publications, by history teachers in Kırklareli during the 2019-2020 academic year. The evaluation focused on physical design, educational design, use of visual materials, and assessment and evaluation. At the end of the research, the teachers' responses to the items indicated that the reliability coefficient of the "High School History Textbook Evaluation Form" for the 11th grade was $\alpha = 0.979$. Accordingly, it has been noted that this form is a reliable tool for teachers regarding the "evaluation of high school history textbooks.". In addition, the reliability coefficients of the sub-dimensions of this tool are as follows: $\alpha = 0.856$ for the "Physical Design" dimension, $\alpha = 0.972$ for the "Educational Design" dimension, $\alpha = 0.933$ for the "Use of Visual Material" dimension, $\alpha = 0.838$ for the "Language, Wording, and Spelling" dimension, and $\alpha = 0.884$ for the "Assessment and Evaluation" dimension.

Looking at the HSHTEF scores, it was concluded that the teachers generally held a positive attitude ($\bar{X}$ = 3,30, s = 0,75) toward the 11th-grade high school history textbooks. At the same time, when the scores of each sub-dimension of HSHTEF were examined, it became evident that the same situation held true. In addition, it was observed that the teachers showed the highest positive attitude towards the 11th-grade high school history textbooks in the "Language, Wording, and Spelling" sub-dimension ($\bar{X}$ = 3,63, s = 0,77). In addition, it appeared that the dimension in which teachers had a lower level of positive attitude towards 11th-grade high school history textbooks than the others was the "Educational Design" sub-dimension ($\bar{X}$ = 3, 16, s = 0,84). A similar result is also seen in the research of Candan (2023), who examined the 9th, 10th, 11th, and 12th-grade history textbooks in high schools according to the opinions of history teachers. The teachers' opinions regarding most high school history textbooks were sufficient in the relevant study. In other words, the teachers evaluated the secondary school history textbooks as sufficient in general. Another similar result was found in the research of Özgür and Öztaş (2023), who examined the 10th-grade history textbook according to the opinions of history teachers. In the relevant research, history

teachers seemed to have a positive attitude toward the 10th-grade history textbook.

When the descriptive statistics regarding the HSHTEF scores were examined, it seemed that the teachers had the highest level of positive opinion ($\bar{X}$ = 3,91, s = 0,694) regarding "the written and visual sources used in the writing of the 11th-grade high school history textbooks are shown in the bibliography.". Similarly, when compared to the other items in the evaluation form, teachers had a higher level of positive opinions ($\bar{X}$ = 3,83, s = 0,926) regarding "the questions in the 11th-grade high school history textbooks are understandable" and ($\bar{X}$ = 3,78, s = 0,941) regarding "the textbook complies with the spelling and grammar rules" and ($\bar{X}$ =3,78, *s*=1,009) regarding "foreign words are given with their Turkish pronunciations". In addition, when the descriptive statistics regarding the HSHTEF scores were examined, it appeared that, in contrast to this, the teachers did not have a positive opinion ($\bar{X}$ =2,87, *s*=1,166) about "the general appearance of the 11th-grade high school history textbooks arouses the desire to read and examine.". Similarly, it was observed that teachers did not have a positive opinion ($\bar{X}$ = 2,87, s = 1,204) about “The textbook improves students' historical skills by providing activities in which they will use first-hand and second-hand sources.". Similarly, in Candan's (2023) study examining high school history textbooks according to the opinions of history teachers, the item with the lowest mean score in the "physical design” dimension was the item "the general appearance of the history textbook arouses the desire to read and examine.".

In our research, although the item "Presenting the content in the textbook chronologically contributes to an easier understanding of the subjects" ($\bar{X}$ = 3,07, s = 1,412) received a mean score of $\bar{X}$ = 3,07, the variability of the score of this item (*s* = 1,412) turned out to be relatively higher than that of other items. It can be argued that teachers' opinions on this item are not homogeneous, so there are differences of opinion on this item.

The study revealed that age was effective on teachers' attitude levels towards "Evaluation of High School History Textbooks.". It has been observed that the attitudes of teachers aged "between 41 and 50" in "Evaluation of High School History Textbooks" are notably more positive compared to their colleagues aged "40 or below.". Teachers' "year of experience" was not found to be an effective factor in teachers' attitude levels towards "Evaluation of High School History Textbooks.". Also, in Candan's (2023) research, it was concluded that teachers' opinions regarding textbooks in general, in terms of their professional seniority, were the same. It has been observed that "the department (faculty) of graduation" is effective on teachers' attitude levels towards "Evaluation of High School History Textbooks.". According to this, it was observed that the attitudes of teachers who graduated from "History Teaching (Faculty of Education)" in "Evaluation of High School History Textbooks" were significantly more positive than those of their colleagues who graduated from "History (Faculty of Arts and Science)".

In this study, history teachers working in Kırklareli during the 2019-2020 academic year were asked to evaluate the history textbook for 11th-grade high school students published by the Ministry of National Education Publications in terms of physical design, educational design, use of visual materials, and assessment and evaluation with survey questions. According to the research results, the following suggestions can be made:

• The content of history textbooks should direct students to do research and benefit from different sources.

• The general appearance of the textbook should be prepared in a way that will arouse the desire to read and examine.

• The textbook should improve students' historical skills by providing activities in which they will use first-hand and second-hand sources

• Conducting other research on history textbooks will be useful in preparing more qualified textbooks.

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