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From the Editor

Dear IEJES reader,

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In the present issue, there are eight articles. Two of them are review articles. Our authors present in this issue are composed of researchers working in different universities and institutions.

We look forward to seeing you in 2024 July Volume 8 Issue 17 of the International e-Journal of Educational Studies (IEJES). We are inviting you submission of manuscripts for the forthcoming issue.

Yours Sincerely

Prof.Dr. Tamer KUTLUCA
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Literature review, methodology, implementation, translation

Abstract

The aim of this study is to conduct a content analysis of theses on the Turkish Language Teaching Curriculum conducted between 2002 and 2023 in Turkey. The study includes the theses available in the National Thesis Center database and accessible to other researchers. We employed a qualitative research approach and its e method of document analysis in this study. We identified 328 theses related to the Turkish Language Teaching Curriculum through a comprehensive search in the National Thesis Center database. However, upon closer examination, we determined that 238 of these theses were not directly relevant to the Turkish Language Teaching Curriculum and therefore we excluded from the study. We analyzed the remaining 90 theses using content and frequency analysis methods. The analysis involved determining the publication year, subject area, study group, methodology, and findings of the theses, and identifying the frequencies of the determined findings. Subsequently, we presented the findings in the form of figures, graphs, and tables for better understanding. According to the results of our study, we found many theses conducted between 2002 and 2023 focused on learning outcomes, predominantly employed qualitative research methods, and that 2019 had the highest number of thesis studies. We observed that teachers were the most preferred sample group in the studies.

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Review Article

Analysis of Theses on Turkish Language Teaching Curriculum in Turkey: A Document Analysis *

Cengiz AĞLAR [1] **Aysel ARSLAN** [2] **Ahmet Furkan ŞAHBAZ** [3]

Abstract

The aim of this study is to conduct a content analysis of theses on the Turkish Language Teaching Curriculum conducted between 2002 and 2023 in Turkey. The study includes the theses available in the National Thesis Center database and accessible to other researchers. We employed a qualitative research approach and its e method of document analysis in this study. We identified 328 theses related to the Turkish Language Teaching Curriculum through a comprehensive search in the National Thesis Center database. However, upon closer examination, we determined that 238 of these theses were not directly relevant to the Turkish Language Teaching Curriculum and therefore we excluded from the study. We analyzed the remaining 90 theses using content and frequency analysis methods. The analysis involved determining the publication year, subject area, study group, methodology, and findings of the theses, and identifying the frequencies of the determined findings. Subsequently, we presented the findings in the form of figures, graphs, and tables for better understanding. According to the results of our study, we found many theses conducted between 2002 and 2023 focused on learning outcomes, predominantly employed qualitative research methods, and that 2019 had the highest number of thesis studies. We observed that teachers were the most preferred sample group in the studies.

Keywords: Turkish language teaching curriculum, mother tongue education program, theses, document analysis, content analysis

1. INTRODUCTION

Language is the identity and sacred treasure of a nation. Atatürk expressed the importance he attached to the Turkish language with the quote: "The connection between national sentiment and language is very strong. The national richness of the language is the main factor in the development of national sentiment." Language is one of the fundamental elements of culture and enables communication among individuals. Additionally, language plays a significant role in bringing individuals together and expressing themselves (İmrol, et al., 2021). From the beginning of social life, language has emerged as a crucial element for individuals to live together, express themselves, and be understood. As stated in Article 3 of the constitution adopted by the Turkish Grand National Assembly in 1982, Turkish is the official language of the Turkish state and is among the immutable articles of the constitution. The 1982 constitution also emphasized the principle of mother tongue education with the provision that "Education is conducted under the supervision and control of the state in accordance with the principles and reforms of Atatürk, contemporary science, and education" (Constitution of the Republic of Turkey, 1982).

Mother tongue acquisition and education are essential processes that enable individuals to develop their language skills and communicate effectively, and this process begins within the family

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(Melanlığoğlu, 2008). To communicate in the mother tongue, individuals need to have knowledge about the language and its purposes and possess the ability to express various events in written and oral forms (Kaya & Kardaş 2020). The effective use of the fundamental language skills of listening, speaking, reading, and writing in the mother tongue can only be achieved through qualified education and instruction. Mother tongue education strengthens language skills, such as grammar, vocabulary, reading, writing, listening, and speaking, while also contributing to students' individual and social development (Ağlar, et al., 2024). In this context, the Turkish language teaching curriculum (TLTC) prepared for the education process from the first grade of primary school onwards plays a crucial role.

The preparation of the TLTC in Turkey is the responsibility of the Commission established by the Ministry of National Education (MoNE) under the auspices of the Board of Education (Demirel, 2015). The commissions consist of three committees: the program decision and coordination committee, the program implementation committee, and the program advisory committee. The composition of the commissions and the individuals involved in the committees are as follows:

1. "*Program decision and coordination committee: Representatives from the Ministry of National Education, experts in program development from universities, teacher union representatives, subject area representatives, parent representatives, and student representatives.*
2. *Implementation committee representatives: Program development specialist, assessment and evaluation specialist, experts in the subject area from universities, and teachers.*
3. *Program advisory committee: Educational philosopher, educational psychologist, educational sociologist, educational economist, educational technologist, inspector, school administrator, and communication specialist*" (Ercan-Güven, 2020).

The TLTC developed by these commissions provides teachers with a guiding resource that regulates the instruction of the Turkish language, which is used as the mother tongue in Turkey (Demirhan-Bal, 2019). The TLTC comprises goals (achievements), content, teaching methods, and assessment dimensions. The goal dimension of the curriculum answers the question of "why," the content dimension addresses the question of "what," the teaching methods dimension focuses on the question of "how," and the assessment dimension addresses the question of "how much." TLTC determines the strategies in Turkish language instruction, aiming to enhance the effectiveness of process (Akçay & Safalı, 2020).

The goals of the TLTC aim to develop students' language skills and enable them to use Turkish correctly and effectively (Maviş, 2015). The goals set in various areas, such as language proficiency, grammar knowledge, communication skills, and cultural awareness aim to enable students to understand the structures of the language, apply grammar rules, and use the functions of the language effectively (Melanlığoğlu, 2008). In this sense, the TLTC emphasizes the development of listening, speaking, reading, and writing skills (Yıldırım & Er, 2013). Thus, the curriculum focuses on students exploring the functional use of the language, strengthening their communication skills, and developing a positive attitude towards language learning.

The content dimension of the TLTC consists of elements, such as themes, topics, grammar concepts, and reading texts (MoNE, 2019). The determination of units and topics to be given to students within a limited time frame is accomplished in this dimension of the curriculum (Kaya & Kardaş, 2020; Keskin & Yazar, 2020). The commissions carefully selected the content to support students' language development and enhance their language skills. Various texts, written and oral activities are presented to improve students' four language skills (listening, speaking, reading, writing), enrich their vocabulary, and understand the functionality of the language (MoNE, 2019). While previously the teaching program was determined based on the content, since 2006, the Ministry of National Education has adopted the method of determining the content based on the goals set in the program (MoNE, 2006). Teaching materials, such as textbooks, workbooks, and supplementary materials are determined based on the content (Bingöl & Saraçoğlu, 2022).

In recent years, the TLTC has aimed to encourage students' active participation and active involvement in the language learning process through teaching methods, strategies, and techniques that promote student-centered approaches, group work, games, drama, technological tools, and various teaching strategies (MoNE, 2006). By incorporating these methods, the TLTC aims to enhance students' language skills (MoNE, 2019). These methods allow students to explore the functionality of

the language, strengthen their communication skills, and develop a positive attitude towards language learning.

Another important dimension of the TLTC is the assessment and evaluation process. Assessing students' language skills and monitoring their development is crucial for evaluating the effectiveness of the teaching process (Akçay & Safalı, 2020).Within this context, the TLTC provides various assessment tools to measure and evaluate students' language skills. These assessment tools can include traditional assessment methods such as conventional exams, multiple-choice questions, or writing-based tasks, as well as alternative assessment methods that encourage students' critical thinking, such as self-assessment, peer assessment, presentations, and portfolio works (MoNE, 2006, 2018).

Programs need to be created and continuously updated according to the requirements and needs of the era, foreseeing and adapting to changes (Campbel, 2020). In this sense, program evaluation is considered equally important to reach ideal program (Aydın, et al., 2018). The dimension of program evaluation represents the final stage of the program development process. Determining the extent to which the developed programs contribute to education also enhances the quality of instruction (Ercan-Güven, 2020). While the Ministry of National Education (MoNE) is officially responsible for the evaluation of programs in Turkey, articles, conference proceedings, and postgraduate studies presented by academics and researchers are also of significant importance (Özdemir, 2009). According to the information obtained from the literature review, the TLTC emerges as a guide aimed at enhancing the quality and effectiveness of Turkish language instruction. The TLTC develops students' language skills and strengthens their mother tongue and preserves their cultural identity. Postgraduate studies evaluating the effectiveness and applicability of the TLTC contribute valuable insights into the program's development process.

1.1. Purpose of the Research

The aim of this article is to examine the content of postgraduate studies published by the National Thesis Center and conducted on the TLTC in Turkey between 2002 and 2023. By compiling and collecting the contents of these scientific studies, we aim to provide researchers, curriculum developers, and all stakeholders in education with a comprehensive overview of the studies that are assumed to be important in the program development process. In doing so, we will contribute to the current knowledge on the effectiveness and applicability of the TLTC and shed light on future curriculum development. Based on these justifications, researchers have decided to conduct this study and anticipate that it will contribute to the literature in the field.

1.2. Research Questions

In this study, we will examine the following research questions regarding the postgraduate studies related to the TLTC:

a) Year,
b) Period
c) University,
d) Locations where the studies were conducted,
e) Topic,
f) Method,
g) Sample,
h) Data collection tools,
i) Distribution of the results obtained through the data analysis method.

We will explore these questions in line with the objectives of the study and presented in the section of research questions.

2. METHOD

In this section, we provide information on the research model, criteria for including studies in the research, data collection, and analysis.

2.1. Research Design

In this study, we employed the qualitative research method of document analysis to examine postgraduate theses and dissertations published between 2002 and 2023, which we accessed through the tez.yok.gov.tr website. Document analysis is a research method that can yield better results in studies that utilize documents as a primary source, and it is described as an economical method (Mogalakwe, 2006). There has been an increase in using document analysis as a research method, particularly in recent times (Sak, et al., 2021). Bailey (1994) states that document analysis comprises two stages: the first stage involves accessing and examining all available documents, while the second stage involves classifying and including the documents in the research based on their relevance to the study. In this study, we analyzed the obtained data using content analysis.

2.2. Sample and Study Group

We present the process for determining the population and sample of this study in Figure 1.

Figure 1. Process of identifying postgraduate studies

As seen in Figure 1, the population of this research comprises 328 master's and doctoral theses related to TLTC written between 2002 and 2023. We accessed the population of the research from the tez.yok.gov.tr website, where the theses uploaded by universities to the National Thesis Center system are available. In accordance with the research's scope and objectives, we included 90 theses in the study, consisting of 82 master's theses and eight doctoral theses, determining the study group.

2.3. Data Collection and Analysis

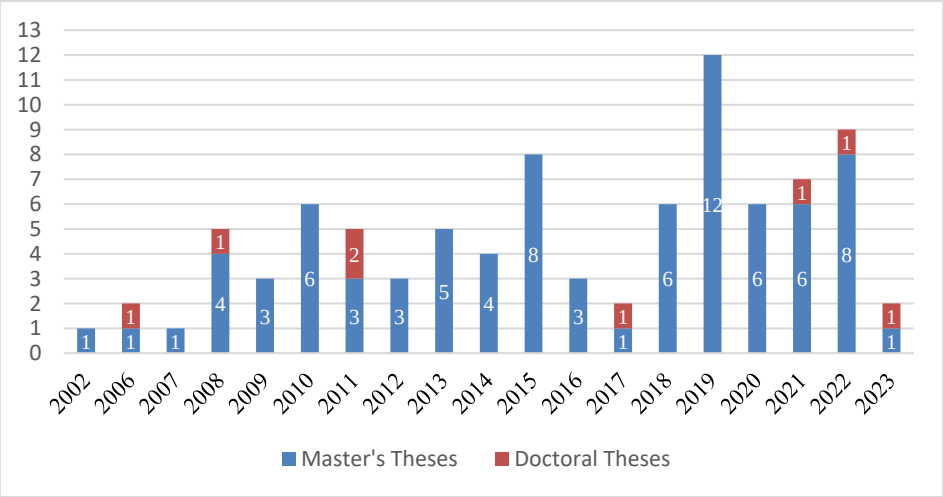
For this research, we included the thesis studies available in the National Thesis Center database and accessible through the tez.yok.gov.tr website. The the study comprised the theses that contained one of the expressions "Turkish language teaching" "Turkish language teaching program" or "Turkish language teaching curriculum" in any part of the theses (abstract, keywords, introduction, methodology, findings, conclusion, discussion, and recommendations). We conducted a search by entering the keywords "Turkish language teaching" "Turkish language teaching program" and "Turkish language teaching curriculum" in Turkish language in the YÖK Thesis Search Center. We determined that the first thesis study related to the TLTC was from 2002, and the latest study was from 2023. Through a detailed search in the National Thesis Center, we identified 328 theses, downloaded the theses by using the author's surname and the year of the thesis as the filename, and created a folder for them. In June 2023, we examined the downloaded theses and prepared independent lists, organizing them into a list of the theses that could be included in the study. We compared the lists we prepared separately and re-examined the studies that showed differences. In this context, we identified 17 studies that were not common. We then reviewed these 17 studies together, consulted with each other, and decided to include five more theses from this list in the scope of the study, resulting in 90 theses being included in the research. Subsequently, we consulted two experts who had conducted studies in this field regarding the list and made the decision to include the 90 theses in the study based

on their opinions. Out of the 328 theses we identified, we did not include 238 of them in the study, as they were outside the scope. Within the research, we examined 90 theses and determined that 82 of them were master's theses and 8 of them were doctoral theses. We organized the data obtained from the theses in an Excel document. Using the Excel document ensured a more systematic and organized presentation of the information. In the Excel document, we collected the data under basic headings, such as thesis title, year, topic, methodology, sample, period, university where the thesis was conducted, location of the study, data collection tools, and data analysis. We presented a draft of this document to two experts who had experience in this field for their opinions and obtained their approval. Then, we transferred the data to the SPSS 26 software package. We transformed the findings into tables by conducting frequency analysis.

We assume that the contribution of two experts who have conducted similar studies and have been part of the research teams will lead to more reliable and valid results in this research. Since we conducted this study to examine the existing postgraduate studies, we did not seek ethical approval for the research.

3. FINDINGS

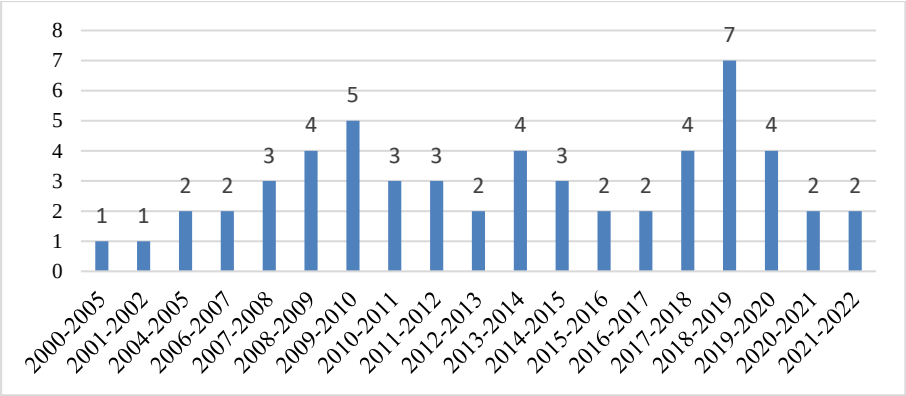
In this section of the study, we present the findings obtained through document analysis of the thesis studies related to TLTC conducted from 2002 to 2023, which are within the study. We include the results of the research regarding the years in which the studies related to TLTC were conducted in Graph 1.



Graph 1. Distribution of postgraduate thesis studies by year

According to the data in Graph 1, we determined that the number of postgraduate thesis studies related to TLTC varies. We observed researchers reached the highest number of theses in 2019, and the next highest number was in 2022. In 2018, there were 54 theses in the field of TLTC, while this number has now increased to 90.

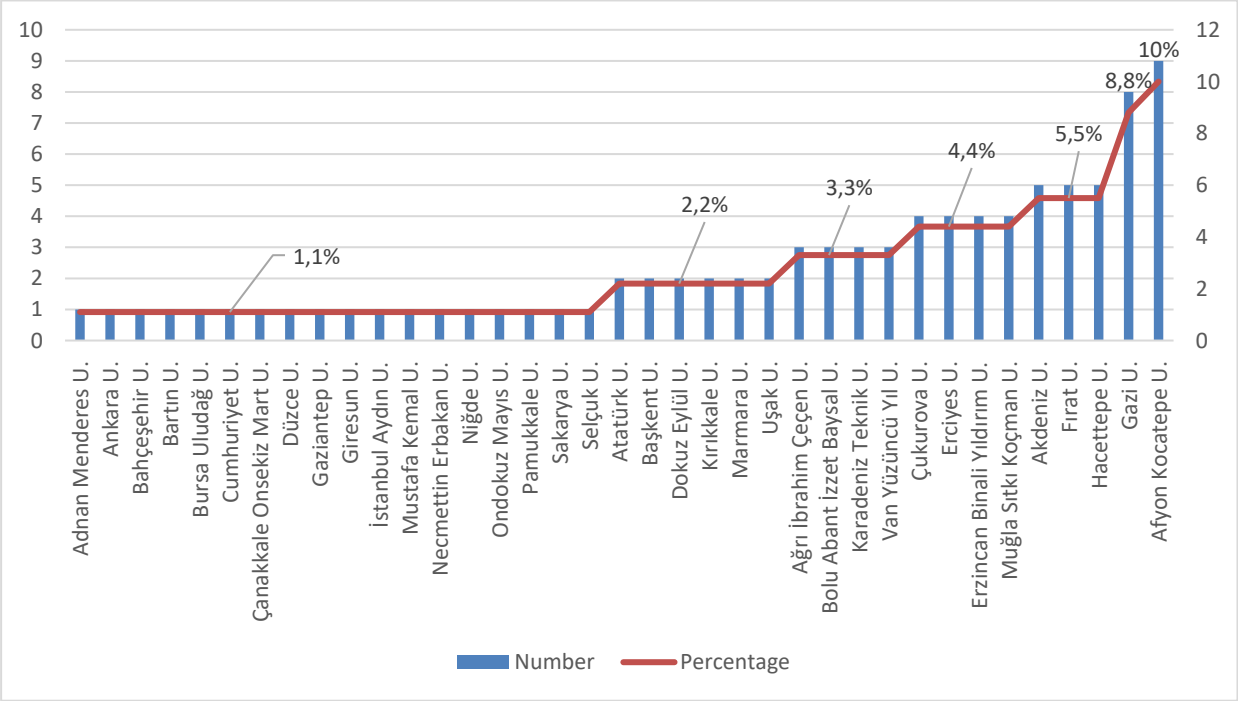
Graph 2 presents the results of our research on the period in which researchers conducted the studies related to TLTC in the educational context.



Graph 2. Distribution of graduate thesis studies according to the period in which they were conducted

When we look at Graph 2, we determined that the researchers mostly preferred the 2018-2019 period as the research period in the included studies. We found that the least preferred period is the early 2000s. In the 34 studies not included in the Graph 4 because we could not find information about the research period.

We presented the results of our analysis regarding which university students conducted the studies related to TLTC in Graph 3.



Graph 3. Distribution of graduate thesis studies according to the universities

As seen in Graph 3, many thesis studies on TLTC and its dimensions were conducted by graduate students of Afyon Kocatepe University, followed by graduate students of Gazi University.

In Figure 2, we present the results of our research regarding the cities from which we selected samples to include in the studies related to TLTC.

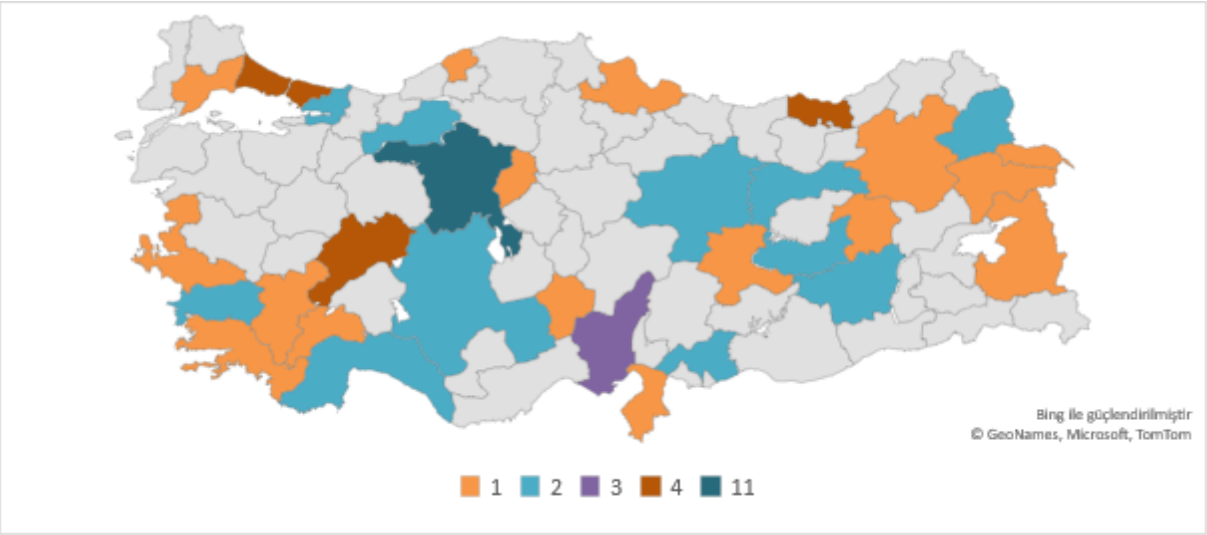
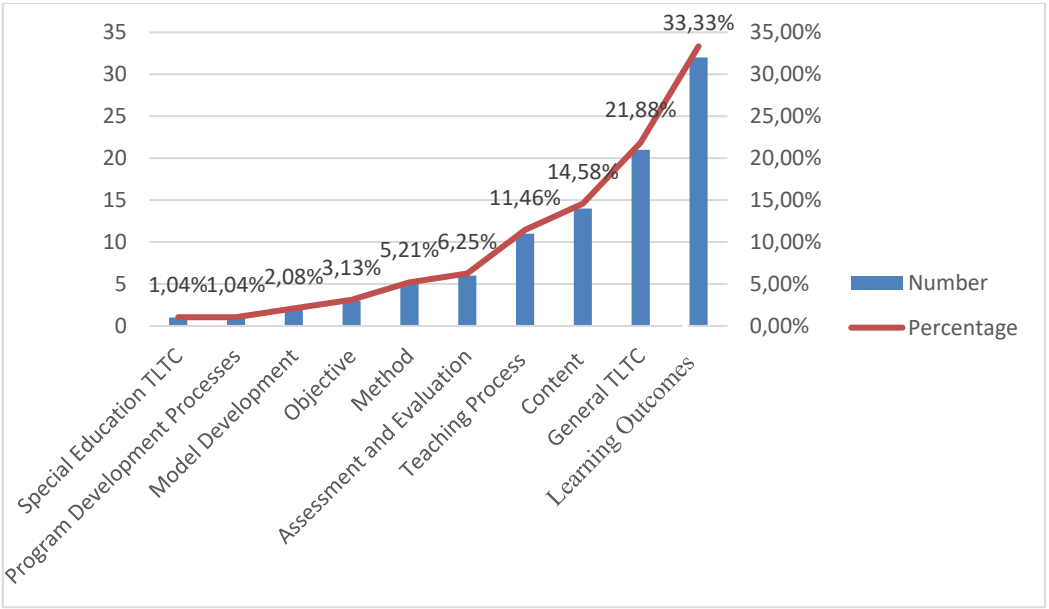


Figure 2. Distribution of graduate thesis studies according to cities

According to the data presented in Figure 2, we observe that in the conducted graduate thesis studies, Ankara stands out as the prominent city in terms of sample selection, followed by Afyonkarahisar, Istanbul, and Trabzon. In one of the included graduate thesis studies, interviews were conducted with teachers, but there was no information about the location of the study. However, location information was available in all other studies. We did not include the studies chose document analysis as the sampling method in Figure 2.

We presented the results of the analysis on the distribution of topics in the studies related to TLTC in Graph 4.



Graph 4. Distribution of topics in postgraduate thesis studies

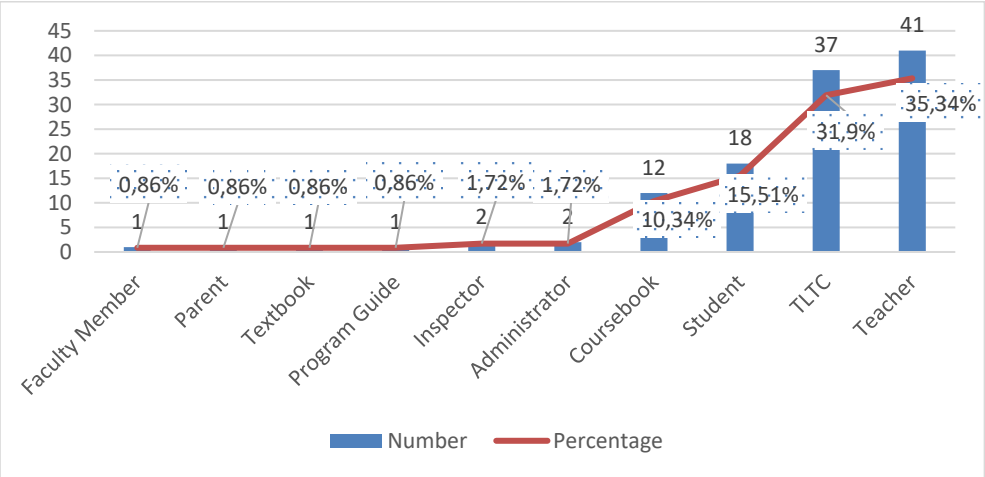
In terms of method, when we look at the distribution of topics in the theses presented in Graph 4, we can see that researchers studied 10 different topics in their thesis. While 94 topics are stated at Graph 2, we determined that this is because of some studies examining both attainment and content, or teaching process and assessment together. We found that the most studied topic in the theses was the dimension of learning outcomes in TLTC. Also, there are studies that cover all dimensions of TLTC. When we look at the least studied topics in the theses, we determined that there were topics related to TLTC specifically designed for special education students and topics related to program development processes, each studied only once.

When we examined the distribution of theses related to TLTC according to educational fields between 2002 and 2023, we found the theses were conducted in the fields of master's and doctoral degrees. We provided the relevant information in Table 1.

Table 1. Distribution of postgraduate thesis studies by used method

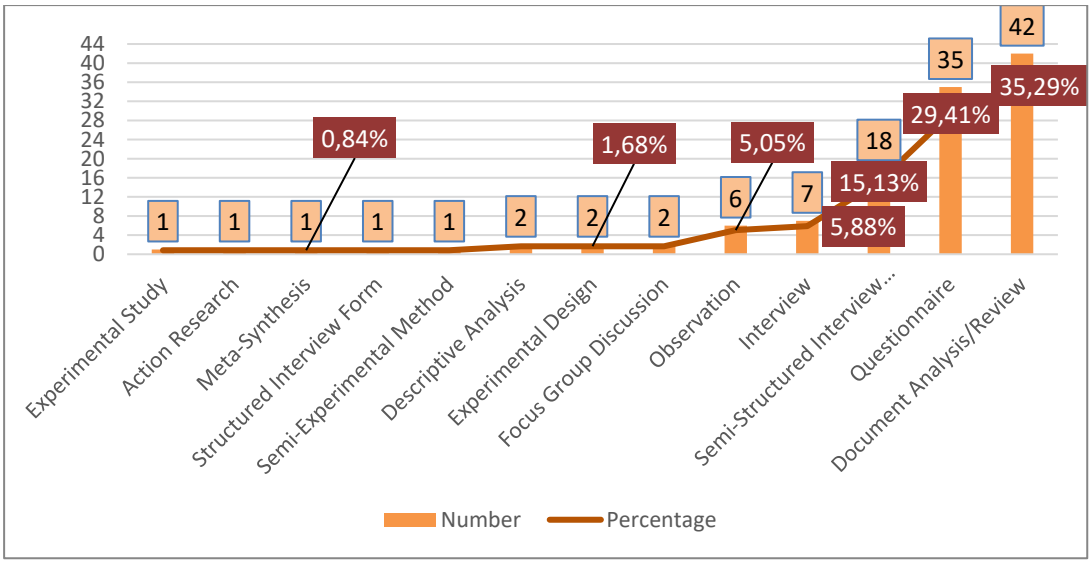
Method	*f*	%
Qualitative	47	52.22
Mixed	22	24.45
Quantitative	21	23.33
Total	**90**	**100.00**

When looking at Table 1, we found that more than half of the thesis studies included in the research employed a qualitative research method. However, we also identified researchers who used mixed methods and quantitative methods in their studies, and the proportions of these methods was similar. We presented the results regarding the sample groups selected in the studies related to TLTC in Graph 5.



Graph 5. Distribution of graduate thesis studies according to sampling

Looking at Graph 5, we can observe that in the conducted studies, teachers are mostly chosen as the sample, followed by TLTCs themselves. The least utilized sources in the theses are faculty members, parents, textbooks, and guidebooks. In our research on the measurement tools used in quantitative, qualitative, and mixed research designs related to TLTC, we present the findings in Graph 6.



Graph 6. Distribution of data collection instruments used in graduate thesis studies

When looking at Graph 6, we can see that there are 119 data collection tools used in postgraduate thesis studies related to TLTC. The most used data collection tool is document analysis/examination (35.29%), followed by surveys (29.41%), semi-structured interview forms (15.13%), and interviews (5.88%). Experimental studies, action research, structured interview forms, and meta-synthesis were each used once (0.84%). We presented the results of our research on the preferred data analysis methods in studies related to TLTC in Table 2.

Table 2. Distribution of data analysis methods used in postgraduate thesis studies

Data Analysis Method	Number	Percentage
Content Analysis	45	18,83%
Frequency Analysis	34	14,23%
Percentage Analysis	27	11,30%
Descriptive Analysis	19	7,95%
Mann-Whitney U Test	11	4,60%
Mean	10	4,18%
Independent Samples t-test	10	4,18%
Kruskal-Wallis H Test	9	3,78%
Dependent Samples t-test	8	3,35%
One-Way Analysis of Variance (ANOVA)	8	3,35%
LSD Test	5	2,09%
Unknown	5	2,09%
Levene's Test	5	2,09%
Standard Deviation	4	1,68%
Scale Development	3	1,26%
ANOVA	3	1,26%
Scheffe's Test	2	0,84%
Kolmogorov-Smirnov Normality Test	2	0,84%
Pre-test-Post-test	2	0,84%
Chi-square Test	2	0,84%
Product File	2	0,84%
Achievement Test	2	0,84%
Document Analysis	2	0,84%
Spearman Correlation Analysis	2	0,84%
Pearson Correlation Coefficient	1	0,42%
Tukey Test	1	0,42%
Dunn Test	1	0,42%
Document Review	1	0,42%
Sign Test	1	0,42%
Median	1	0,42%
Range	1	0,42%
Cramer's V Analysis	1	0,42%
Four Topic Monitoring Test	1	0,42%
Topic Monitoring Test	1	0,42%
Shapiro-Wilk Test	1	0,42%
Wilcoxon Test	1	0,42%
Scanning Method	1	0,42%
Exploratory Factor Analysis	1	0,42%

Barlett's Test	1	0,42%
Cronbach's Alpha Analysis	1	0,42%
Principal Component Analysis	1	0,42%
Total	**239**	**100,00%**

According to the findings in Table 2, we determined that the most used data analysis methods in postgraduate thesis studies in the field of TLTC were content analysis (18.83%), frequency analysis (14.23%), percentage analysis (11.30%), descriptive analysis (7.95%), and Mann-Whitney U test (4%). We did not come across information about the data analysis method used in five (2.09%) of the included studies.

4. DISCUSSION, CONCLUSION and RECOMMENDATIONS

In our analysis of postgraduate studies related to TLTC conducted between 2002 and 2023, we observed that the number of doctoral theses (n=8) was significantly lower than the number of master's theses (n=82). Furthermore, when we examined the years in which the studies were conducted, we found that there was a small number of studies (n=1) published in 2007 related to the changes in TLTC implemented by the Ministry of National Education (MoNE) in 2006. Considering the possibility of lengthy data collection and writing processes in postgraduate studies, we noticed a small number of studies conducted in the periods of 2006-2007 and 2007-2008 (n=5), which might be attributed to simultaneous control of multiple aspects of the studies. This led us to conclude that there was limited focus on conducting more studies related to the changes made in 2006 to observe their effectiveness. We also found that the highest number of studies on TLTC was conducted in 2019 (n=8), and the period of 2018-2019 had the highest data collection activities (n=7). These findings are supported by Kaplan and Özgen (2023) in their study on TLTC conducted between 2016 and 2022, and by Önal and Maden (2021) in their study on Turkish language education between 2015 and 2019. We believe that more research should be conducted regarding the changes made in 2006, a year when significant modifications were made to the TLTC.

Examining the cities where researchers conducted the studies and the universities where they carried out the studies, we observed a parallel between the results. Afyon Kocatepe University had the highest number of TLTC studies, and similarly, there were four studies conducted in the province of Afyonkarahisar where individuals were selected as samples. Likewise, among the universities located in Ankara, 16 TLTC studies were conducted, which aligns with the number of studies conducted with samples from this city. In terms of theses on Turkish language teachers, Eyüp (2020) found that Kırşehir Ahi Evran University conducted the most studies. Kaplan and Özgen (2023), who examined articles and theses published on TLTC between 2016 and 2022, also reported that the most research was conducted by Muğla Sıtkı Koçman University. As shown in Figure 2, we did not come across any studies conducted with samples from the Southern Marmara, Central Anatolia, Central Black Sea, and Southeastern Anatolia regions between 2002 and 2023. We believe that one of the reasons for this is the centralized nature of the programs, which may not be suitable for educational environments in districts, towns, villages, or hamlets. Eyüp (2020) found that researchers conducted many studies on Turkish language teachers with samples from Istanbul and Kırşehir. Based on these results, we can infer those individuals living in regions or locations, where researchers do not conduct studies, may not share their opinions on the program in academic research. Program development experts may not have access to studies conducted in all parts of Turkey when reviewing and improving the programs.

In terms of the included studies, we found that one out of every three studies focused on competencies (n=32). We attribute the high number of studies on competencies to the decision made by MoNE (2006) to shift from predetermined competencies to target-oriented competencies in the TLTC. Despite this, textbooks on program development emphasize the importance of all dimensions. However, we found a few of studies on program development processes in Turkish language education and TLTC for special education students. In contrast, Önal and Maden (2021) found several topics in their study on Turkish language teaching.

Regarding the research methods used in the included studies, we observed that qualitative research methods were selected more than quantitative and mixed methods. Considering the studies, this is a common trend. Therefore, many studies in TLTC focused on document analysis. Many

researchers reported similar findings in their studies, Sur (2023) reported in his research on Turkish language textbooks, Dönmez and Gündoğdu (2016), Kaplan and Özgen (2023), Arı, et al., (2020) in their studies on TLTC, and Önal and Maden (2021) in their researches on Turkish language teaching. However, Koç (2016) found a higher number of quantitative studies in their study on primary education programs.

In terms of sample selection, teachers were the most frequently chosen group. This can be attributed to convenience sampling or suitability of teachers as participants in postgraduate studies. Parents, academicians, textbooks, and guidebooks were selected as samples in only one study, while researchers selected inspectors and administrators twice. These findings are consistent with previous literature (Dönmez & Gündoğdu, 2016; Önal & Maden, 2021). The sample selection in the studies included in our research also revealed a similarity in terms of data collection from similar groups.

When examining the data collection tools used in the included studies, we noticed a scarcity of experimental studies, with only one study using experimental methods, which are considered highly valuable for program preparation, design, implementation, and evaluation. In terms of quantitative research methods, we found surveys were the most frequently used data collection tool, with 35 studies employing this method. For qualitative research methods, we found that document analysis/examination was the most used tool, with 42 studies employing this method. We also observed a parallel between the most preferred research methods and the most preferred data analysis methods, with content analysis, frequency analysis, and percentage analysis being the most used data analysis methods. However, in five of the studies, we did not find any information regarding the data analysis method used, and in 34 studies, we did not find any information regarding the time in which researchers collected the data. This lack of information may affect the reliability and validity of the studies.

Based on the findings of our study, we offer the following recommendations:

There is a need to increase the number of postgraduate studies related to TLTC. Our study reveals that the number of postgraduate studies on TLTC is limited. Therefore, we recommend conducting more postgraduate studies on TLTC, particularly doctoral theses, which are significantly fewer compared to master's theses. This shows the need for more comprehensive research on different dimensions of TLTC.

There is a need to examine the effects of changes made in TLTC through postgraduate studies. Our study identified a lack of sufficient research on the effects of significant changes made in TLTC by MoNE in 2006. Therefore, we suggest that future postgraduate studies should focus on investigating the effects of these changes in TLTC.We found a few studies on the development of TLTC. There is a need for research to determine and improve the effectiveness of curriculum development, assess the impact on student achievement, and evaluate the feasibility and effectiveness of the programs. We recommend conducting experimental studies that focus on different dimensions of the curriculum and contribute to the program development process.

Our study revealed a few studies conducted in certain regions of Turkey related to TLTC. Specifically, we did not come across any studies conducted with samples from the Southern Marmara, Central Anatolia, Central Black Sea, and Southeastern Anatolia regions. This shows a limited opportunity for teachers, students, parents, and administrators from different regions to share their views and experiences related to TLTC. Therefore, we recommend conducting studies that consider different educational environments in various regions.

In future research, we suggest including information about the time of the study, data analysis methods used, and the location where researchers conducted the study, particularly if individuals were selected as samples. Including this information will enhance the reliability and validity of the research. We advised to researchers to pay attention to these details.

We have shared these recommendations to contribute to the scope and effectiveness of postgraduate studies related to TLTC. We believe that by doing so, we can make a greater contribution to the development and implementation of TLTC in a more effective manner."

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Due to the scope and method of the study, ethics committee permission was not required.

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Abstract

The fact that the mathematics course is abstract, that it is not possible to associate it with daily life, and that it is impossible to concretize abstract expressions causes a prejudice against the this course and leads to a decrease in the academic achievements of students. It is seen that throughout history, various studies have been carried out taking this situation into consideration. A group of these studies is on realistic mathematics education. Realistic mathematics education is an approach that aims to concretize the abstract concepts of mathematics by relating them to real-life situations. The purpose is to make mathematics more understandable by concretizing it. In the study, the subject of calculating the surface area of prisms with the use of realistic mathematics education was taught, and the purpose of the study was to examine the effects of this application. The study group consisted of 20 5^{th} grade students. While determining this group, maximum variety sampling strategy was preferred. In the study, action research, one of the qualitative research methods, was used, and the data were interpreted with the help of descriptive analysis and content analysis. The data collection tools in the study included semi-structured interview forms, video recordings, photos and activity sheets prepared by the students under the guidance of the researcher in accordance with the realistic mathematics education approach. When the findings were examined, it was seen that the students showed a positive development in the meaning and visualization processes; that they could reach mathematical inferences on their own; that they enjoyed the mathematics lesson; and that the realistic mathematics education approach gave positive results on learning. Based on these results, it was suggested that not only the application of the realistic mathematics education approach for different acquisitions but also the inclusion of these activities in the textbooks in accordance with the curriculum will result in improvements in favor of learning.

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Research Article

Examining 5th Grade Students' Learning on Surface Area Calculations with Realistic Mathematics Education Approach*

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Abstract

The fact that the mathematics course is abstract, that it is not possible to associate it with daily life, and that it is impossible to concretize abstract expressions causes a prejudice against the this course and leads to a decrease in the academic achievements of students. It is seen that throughout history, various studies have been carried out taking this situation into consideration. A group of these studies is on realistic mathematics education. Realistic mathematics education is an approach that aims to concretize the abstract concepts of mathematics by relating them to real-life situations. The purpose is to make mathematics more understandable by concretizing it. In the study, the subject of calculating the surface area of prisms with the use of realistic mathematics education was taught, and the purpose of the study was to examine the effects of this application. The study group consisted of 20 5th grade students. While determining this group, maximum variety sampling strategy was preferred. In the study, action research, one of the qualitative research methods, was used, and the data were interpreted with the help of descriptive analysis and content analysis. The data collection tools in the study included semi-structured interview forms, video recordings, photos and activity sheets prepared by the students under the guidance of the researcher in accordance with the realistic mathematics education approach. When the findings were examined, it was seen that the students showed a positive development in the meaning and visualization processes; that they could reach mathematical inferences on their own; that they enjoyed the mathematics lesson; and that the realistic mathematics education approach gave positive results on learning. Based on these results, it was suggested that not only the application of the realistic mathematics education approach for different acquisitions but also the inclusion of these activities in the textbooks in accordance with the curriculum will result in improvements in favor of learning.

Keywords: Mathematics education, realistic mathematics education, prisms, surface area

1. INTRODUCTION

Mathematics is a course including various abstract models and the relationships between them. It is a science, a way of thinking and an art. There is an order and consistency in its character. It is a language and a tool made up of carefully defined terms and symbols (Yıldırım, 1996). Therefore, it was inevitable to benefit from actions that facilitated learning. In this respect, the emphasis was put on the learner-centeredness of mathematics education, one of the variables affecting the learning process, and on the reflection of daily life situations in the classroom environment (Çilingir & Artut, 2016). More than one sensory organ should be addressed in the education given (Yenilmez & Bozkurt, 2006). In this way, the mathematics course concretized will lead to an increase in the level of learning (Dündar et al., 2015). In addition, students will be active in their learning processes, and they will be able to gain the skills, attitudes and knowledge important for their own lives (Piht & Eisenschmidt, 2008; cited in Çilingir & Artut, 2016). This will make learning permanent, yet it is important to ask the right questions to the students in this process. In addition to the questions asked, the solutions

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should be shaped accordingly. In addition to the questions asked, the solutions to these questions should be shaped accordingly. As there is a direct proportion between a good-quality teaching process and understanding mathematics, it is necessary to make use of different approaches (Turgut, 2021). Different methods and techniques will have a positive impact on students (Piht & Eisenschmidt, 2008). Realistic Mathematics Education (RME), which emerged as a way of combining mathematics education with the situations students have experienced in this process, will be able to help students focus on the problem, question the problem and think (Akbaş & Alan, 2022). Regarded as an alternative to blending the language of mathematics with real-life situations, RME also provides students with the opportunity to use mathematical tools so that they can organize and solve the problem situations (Heuvel- Panhuizen & Drijvers, 2014). The term *real* is stated as expressing real-life situations from an empirical point of view, and it is seen that problems do not have to involve only real-life situations. In addition, the actions that students will perform should be something they can experience (Gravemeijer & Kapıcı, 1999). Therefore, it is seen that in mathematics teaching, reality and student experiences should be closely interrelated (Van den Heuvel-Panhuizen, 2001). RME plays an important role in moving from everyday life to the world of symbols. With the help of mathematical activities carried out in this way, more than one focal point is formed in students, and it is important for the student to find the right questions and follow-up instructions in this process.

RME was first used as an approach in mathematics teaching by the Freudenthal Institute in the Netherlands. Later, it was seen that it was adopted as a popular approach in countries such as England, Denmark, Germany, Spain, Brazil, Portugal, Japan and Malaysia (Demirdöğen & Kaçar, 2010). RME is based on Freudenthal's view that "Mathematics has to be connected with reality" and "Mathematics is a human activity" (Freudenthal, 1991). Formalization happens by modeling, symbolizing and schematizing. In this process, which is described as mathematization, students reach mathematical information themselves (Altun, 2002). The realistic Mathematics Education approach starts with a real-life problem. Students learn mathematics while solving this problem. Mathematization involves reaching the mathematical concept through the concept acquired as a result of daily experiences; in other words, reaching the formal information is the last step. The first step of mathematization is horizontal mathematization. Horizontal mathematization is the transition from everyday life to the world of symbols. The second step of mathematization is vertical mathematization, which is defined as moving through the world of symbols (Çilingir & Artut, 2016). This last point should not be the first point of the mathematics we teach (Üzel, 2007).

When the literature is reviewed, it is seen that the Realistic Mathematics Education approach increases the quality and success in teaching, provides meaningful and permanent learning, and helps students develop a positive view towards mathematics (Çilingir, & Artut, 2016; Kutluca, & Gündüz, 2022; Saracoğlu & Uça, 2017; Üzel, 2007). This is an indication that RME has had positive effects on learning.

Calculation of surface area in mathematics education is an important problem in mathematics education because these calculations have been used to reveal not only the practical applications in many different fields but also many problems in daily life. Here are some areas where calculating the surface area is important:

Construction and Architecture: Calculating the surface area is important in construction and architectural projects, when designing a construction or calculating the materials. For example, surface area is used to calculate the amount of paint needed to paint the exterior of a house or to determine the wall cladding material needed for a building. In a study conducted to investigate the effect of building envelope surface area and insulation thickness on energy saving in Elazig, one of the coldest cities in Turkey, it was concluded that in an energy-efficient building design, the building envelope surface area must be taken into account; that the surface area was shaped according to the direction of the

building; and that the surface area was a parameter to be taken into account (Aksoy & Keleşoğlu, 2007).

Industrial Manufacturing: In manufacturing processes, it is important to manage the surface area to identify resources. In a study on energy saving and emission reduction opportunities in industrial annealing furnaces, it was concluded that insufficient heat transfer surface area was a factor on savings and that a new recuperator with more heat transfer surface area was needed to reduce the flue gas temperature at the furnace exit (Eyidoğan et al., 2014). This reveals that surface area calculations are of vital importance as well as being effective in terms of economic factors.

Engineering: In engineering, surface area calculation is important in many design and analysis processes. For instance, calculating the surface width of a pipe passing through a heat exchanger or a screen is an important factor for efficiency and performance analysis.

Agriculture: With the rapid increase in population, it is important to make more systematic estimations of agricultural production and consumption. Here, again, the surface area calculation comes into play. There are various studies in relation to this. Hobson (1972) presented the first studies on the estimation of real surface area values. On the other hand, Jennes (2004) conducted studies on why it is important to calculate real surface area values correctly.

Graphic Design and Drawing: The field of graphic design and drawing is important in terms of directing the surface effect, use of materials and visual impact. For example, when designing an advertising distribution or creating a 3D model, the surface area must be calculated correctly.

Computer Graphics and Game Development: Surface area calculation is important for computer graphics and game development, 3D imaging and visual effects. Accurate surface area calculations are used for operations such as lighting, shading, and collision detection. It is known that the perception of space in computer games is directly related to the user's point of view (Ayanoğlu, 2006). Accurate reflection of this point of view is also possible with the correct calculation of the surface area.

Mathematical Modeling: Mathematical modeling is defined as a field that transforms real-life situations into a mathematical problem, allows creating the necessary mathematical models to solve the problem and helps interpret the results (Berry & Nyman, 1998, cited in Bukova Güzel, 2011). Therefore, it is important to calculate the surface area while modeling. Similarly, mathematical modeling activities have a supportive role in students' mathematical explanation of a situation that requires area measurement as well as in their structuring mathematical relations (Kutluca, & Kaya, 2023; Erdem & Gürbüz, 2018). For this reason, it is possible to see mathematical modeling and surface area calculation as mutually contributing factors.

In this respect, knowing the surface area of the prism, which is one of the geometric shapes, is important in real life because a prism is a geometric shape used in many areas in real life. Joining the surface of prisms plays an important role in many practical applications and design processes. Here are some known reasons why the surface arrangement of the prism is important:

Construction and Architecture: Prisms are building elements commonly used in construction and architectural projects. For example, the roof of a house or the facade of a building can be prism-shaped. It allows an accurate calculation of the surface coating of the prism, material consumption and costs. It is also important in design-related decisions, with factors such as surface area, heat transfer, utilization, and energy consumption.

Packaging and Transportation: Prism-shaped boxes are used in the packaging and transportation industries. For example, a product packaging or a shipping box can be prism-shaped. Expanding the surface of the prism also helps not only calculate material consumption and cost but also design it in ways suitable for safe handling and distribution.

Optics and Lighting: Prisms are used in optics, mirrors, mirroring and lighting. For example, prisms are essential parts of an optical device because of their reflecting light, scanning or scattering

properties. The surface area of the prism also has influence on the interaction of light and optical performance effects. Additionally, prismatic magnifiers consist of prisms, and this type of magnifier refracts light with the help of the prisms on it. These prisms increase the magnification ratio and the field depth by extending the path of the light with the help of mutual mirrors between the lenses. They also increase the field of vision by providing a longer distance for working (Karaca & Gündoğdu, 2018). Due to these connections, it is possible to talk about the importance of prisms in many areas like expanding the surface of the prism, design, cost calculations, material usage, performance analysis and system optimization.

1.1. Purpose of the Study

Within the scope of the study, 5th grade students were taught the learning outcome of "students can calculate the surface area of a rectangular prism" with Realistic Mathematics Education, and the purpose of the study was to determine the opinions and suggestions of the students.

1.2. Research Problem

The main problem of this research was to determine students' views about the RME-based teaching of the learning outcome of "can calculate the surface area of the rectangular prism" within the scope of the lesson unit of "Geometry and Measurement" in the 5th grade primary school mathematics course. It is possible to list the sub-problems of the study as follows:

- Within the scope of the education given in line with the RME approach, what kind of strategies were developed related to the learning outcomes of "students can recognize the rectangular prism and determines its basic elements" and "students can draw the surface expansions of the rectangular prism and decide whether the given different expansions belong to the rectangular prism"?
- Within the framework of RME approach, can the students construct formal knowledge regarding the learning outcome of “students can solve problems that require calculating the surface area of a rectangular prism”?
- To what extent 5^{th} grade students could transfer their knowledge about the rectangular prisms to different kind of prisms?

2. METHOD

2.1. Research Model

In this study, action research, one of the qualitative research methods, was used. In action research, process-oriented work is carried out; practice is done; and detailed and in-depth examinations and observations are made. In addition, it is a flexible approach that can bring together the research and application process and make it possible to transfer research results into practice. In this approach, the practitioner is also in the role of researcher (Türkkan et al., 2019; Yıldırım & Şimşek, 2018). This situation also exists in qualitative research itself, and in qualitative research, the researcher is also at the base of the study (Fraenkel et al., 2011).

2.2. Study Group

The study was carried out by the researcher with the participation of 20 5th grade students in a public school in Turkey by taking the necessary permissions. Maximum variation sampling was preferred as the purpose was to increase the variety in sample selection. The purpose of using maximum variety sampling is to increase the diversity of individuals in the study conducted on a small sample and to approach to the problem from different perspectives (Yıldırım & Şimşek, 2018). In this study, the aim was not to give the formula directly while calculating the surface area of the prisms, but to allow the students to discover the calculation on their own. As the practitioner undertook the role of

researcher in the study, the students were selected from the class that the practitioner taught. While examining the data, the students were coded as S1, S2,…, S20, and the researcher was coded as "A".

2.3. Data Collection Tool

The research data were collected using more than one data collection tool in order to ensure diversity in the study. The data were collected with the help of a semi-structured interview form made up of 5 open-ended questions, video footage, photographs and activity sheets prepared by the students with the help of the researcher by taking into account the RME approach. While preparing the semi-structured interview form, the related literature was reviewed, and the interview questions used in the study were examined. Likewise, the questions to be directed during the activity were determined and examined. The preparation stages of the activity sheets prepared by the students are presented in Appendix 1. In the semi-structured interview technique, the researcher prepares the draft of the questions in advance which he/she intends to ask (Türnüklü, 2000). The semi-structured interview form is presented in Appendix 2. This interview form generally aimed to obtain information about how the RME approach had an impact on learning. Necessary permissions were obtained for the video and photo shooting. Photos for the use of RME are presented in Appendix 3.

2.4. Data Analysis

While analyzing the data obtained in the research process, descriptive analysis and content analysis, which are among qualitative analysis methods, were used. With descriptive analysis, the data were made meaningful and transferred to the process in that way (Merriam, 2009). These data were interpreted considering the themes determined before the process, and the opinions of the individuals were directly included (Yıldırım & Şimşek, 2018). In content analysis, on the other hand, the basic operation ensures that similar data are combined on a common denominator and that this can be interpreted for the reader in accordance with the principle of clarity (Yıldırım & Şimşek, 2018). In this respect, while coding the data, concepts with similar meanings were brought together on a common denominator and named. This would make it possible for concepts from different sections to come together (Yıldırım & Şimşek, 2018).

2.5. Procedure

The teaching was carried out by the researcher. For the study, the general principles of teaching based on RME were explained to the students, and activities regarding the learning outcome of "can calculate the surface area of the rectangular prism" found in the curriculum. In these activities which included contextual problems, there was actually a real situation in each problem. While the students were looking for solutions to the problems, they reached the concepts and formulas in the lesson unit themselves.

Problem: Ali Asaf goes to the mall to buy a gift box with his father to put the gift he made for his mother. He likes the gift boxes he sees here, and the shapes of these boxes attract his attention.

2.5.1. Sample Activity 1

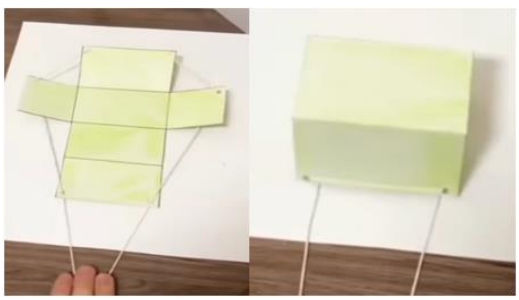

Figure 1. Rectangles Prism

- What is the name of this shape? Produce its definition
- Represent the opened form of the shape you have defined
- Define the geometric shapes you have obtained in their opened form
- Determine the areas of these geometric shapes
- Calculate the area of the geometric figure by using these areas.

The objectives of area calculation of the rectangular prism and knowledge of the properties of the rectangular prism were achieved with this study.

While a certain group in the class stated that it was due to the rectangular base, the remaining majority stated that it was due to its side surfaces. However, as a result of the shapes designed in different sizes, it was agreed that it was caused by the base. All the students were able to draw the opened form of the figure, and in this respect, as a result of the desired steps, the students discovered the formula for calculating the area of the rectangular prism.

Sample Activity 2

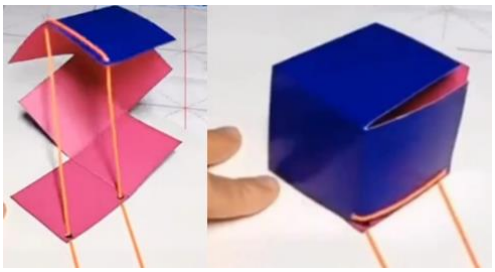

Figure 2. Cube

- *What is the name of the sample shape? Make its definition.*
- *Define the open form of this shape, and interpret its similarities and differences with the rectangular prism.*
- Calculate the area of the shape using its open form.

As the students came across the cube shape frequently in daily life, all of them knew the name of the shape correctly. In the square prism, the students were sure that the naming stems from the shape in the base. In this study, the students who examined the similarities and differences with the rectangular prism concluded that the square prism and the cube are special cases of the rectangular prism. The students who obtained the open form of the shape again obtained the areas of the prisms as a result of their own discoveries.

3. FINDINGS

In this part of the study, the activity sheets prepared by the students during the process, semi-structured interview forms, the photographs and videos taken during the lesson, and the findings obtained via the analysis of the data collected as a result of the observations are included.

Table 2. Flexible prisms activity

Theme	Categories	Codes	Frequency
Flexible Prisms	Theoretical Approach	Using Formulas	17
		Prism-Cube Misconception	3
		Factor Confusion in Prism Naming	15
	Practical Approach	Lack of Element Knowledge Required to Build	6

	Prisms	
Thinking Based on Visualization	Prism-Cube Distinction	3
	Square Prism and Rectangular Prism Distinction	14
	Square Prism-Cube Distinction	8
Formula-Based Thinking	Ability to Determine Side Lengths	9
	Having a Result-Oriented Approach	9
	Making Use of Geometric Shapes Obtained by Expansion	20
Transferring Knowledge	Using Prior Knowledge	20
	Making Sense with the Help of Model	18
	Desire to Visualize	18
Staticized Knowledge	Rectangular Prism-Square Prism-Cube Distinction	3
Positive Acquisition	Obtaining the Formula	18
	Ability to Transfer Knowledge to Other Prisms	20
Negative Acquisition	Dimension-Height Misconception	7

The themes and codes obtained with the Flexible Prisms Activity are given in Table 2. When the table was examined, it was seen that all of the students found the area of the prisms by making use of the expansion of the prism and associating it with their previous learning. Similarly, they made generalization about making area calculations for different prisms.

The analysis revealed that the students experienced conceptual confusion especially in relation to rectangular prism, square prism and cube shapes. It was seen that they were able to distinguish the cube after establishing a relationship with daily life, yet there was confusion between rectangular prism and square prism. An example of this situation was as follows:

Researcher: (The students were shown the Rectangular Prism shape) What is the name of this shape you see?
Students: Rectangular prism.
R: (Showing the Square Prism shape): So what's the name of this shape?
Students: This is a rectangular prism too.
R: Are you sure, children?
S6: Teacher, the sides of both are rectangular.

R: So what is the difference between the two shapes?
S19: All the rectangles on the side in one of them are the same, and in the other, two are different, and two are the same.

R: And if we change the dimensions, will this change?
S4: No, teacher, all the rectangles are the same in one of them, and in the other, two will be the same.

R: Then what distinguishes these shapes from each other is their side faces, isn't it?
S1: Teacher, can it be the base?

R: How?
S1: When the base is square, the rectangles on the side are the same, but when the base is rectangular, only two on the sides are the same.

R: Good for you. Then what would their names be?

S1: The first is rectangular prism, and the second is square prism.

While the students had static thoughts in the conversation with the researcher, they discovered this difference with the help of the clues and visuals given after the conversation. In this conversation, the following dialogue shows how to make the cube distinction.

R: (Showing the Square Prism shape) Guys, we called this shape a square prism, right?

Students: Yes, teacher.

R: Well, can I change the height of the rectangles on the side?

S14: But if we change the height, it will not be a square.

At this stage, the student made a dimension-height error and it was observed that six more students repeated the same thing.

S5: Why does the square change if the height changes?

S7: Because all the side lengths of the square are equal

S5: The height does not change the sides of the square.

S14: How so?

S5: Look, the parts that coincide with the sides of the square do not correspond to the height.

S14: Ohh, right.

R: Well done guys. So let's change it. (The height was gradually transformed into a cube shape.) What is the name of this shape then?

Students: Square prism

R: Shall we close our shape?

Students: Yes, teacher.

R: What do you think it looks like

S11: It looks like a sugar cube, teacher.

Students: Yes, it looks like a sugar cube, it's called a cube.

R: What distinguishes this shape from other shapes?

S2: In this, all sides are the same.

S13: The height of the cube is the same as the base sides, teacher.

At this point, the students tried to name them based on memorization, yet with the necessary clues, the students were able to reach the correct answers. While calculating the area of the shape, the students obtained the formula themselves by making use of the open form of the figure. At this stage, the following conversation took place:

S16: Teacher, if we will look at the shape, we will see that

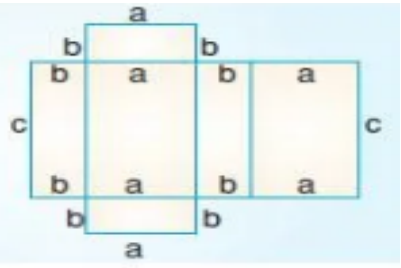

Figure 3. Open Form of the Rectangular Prism

there are six rectangles here (calculates one by one: ab, bc, ac, bc, ac, ab). If we add them up, we find the area: ab+ bc+ ac+ bc+ ac+ ab

R: Good for you. Well, let's show it another way.

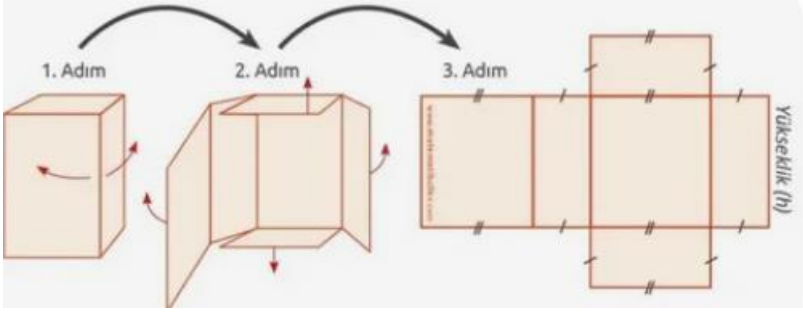

Figure 4. Opening the rectangular prism

S3: Teacher, if we name the sides as a, b, c, we get the same thing again.

S20: Teacher, there are already two of the same shapes. Wouldn't it be easier to find them and multiply them by 2?

R: How?

S20: I mean first we find (ab+ac+ab) and then we multiply it by 2.

R: Well done. very good idea ☺

In this way, the student found the formula of Area = 2(ab+ac+bc) with his own association, and in the later stages of the lesson, the students obtained formulas for square prisms and cubes with similar reasoning.

Table 3. Findings obtained via the semi-structured interview form

Thema	Categories	Codes	Frequency
Calculating the Surface Area of Prisms Using RME	Positive Effects on the Process	Visualization	20
		Having Fun	18
		Positive Thinking about Mathematics	18
		Ability to Open and Close the Shape Anytime	20
		Ability to Interpret Concepts	10
		Developing self-confidence	12
		Being able to see the difference between shapes	20
		Possibility to Distinguish Between Shapes	20
	Negative Effects on the Process	Failure to Place Ropes	8
		Not Closing the Shape Due to Determining the Side Lengths Wrong	9
		Tearing the Shape When Making a Hole	2

4. DISCUSSION and CONCLUSION

In the study, the learning outcome of "Can calculate the surface area of the rectangular prism", which belonged to the elementary school 5th grade mathematics lesson unit of "Geometry and Measurement", was taught to the students with the realistic mathematics education. As a result of the semi-structured interviews held with 20 students in the experimental group after the teaching of this learning outcome, it was observed that the students' thoughts about the realistic mathematics education approach were positive. When the findings obtained in the study were examined, it was seen that the

students were able to reach the rules of mathematics teaching on their own if the necessary environment was provided. It was revealed that after the teaching process conducted with realistic mathematics education activities, the students' attitudes towards the mathematics lesson in general increased. In addition, the students liked the lesson more, and they enjoyed the lesson. Moreover, the lesson became more fun, and they understood the subject better. Additionally, their participation in the lesson and their self-confidence increased as well.

The findings obtained in the study showed that the students' reasoning was in the background and that they tried to progress by using the memorization technique with the help of result-oriented approach. When the literature was examined, it was seen that there were many studies conducted on the negative effects of the memorization approach in mathematics education (Çimen, 2012; Özkan & Sezen, 2017). In addition, there were also other various studies with contents similar to the codes we obtained (Akbaş, 2021; Okuyucu & Erdoğan, 2021). As it can be understood from these studies, educators who consider the process with a memorization approach may cause students to have static thoughts, and students should therefore be allowed to think freely. However, it was observed that the students' lack of self-confidence, fear of making mistakes, inability to adapt to daily life and their inability to make inferences on their own cause them to be weak both in theory and in practice. There are studies in the literature that reached this conclusion (Arslan & Yıldız, 2010; Yenilmez & Dereli, 2009). The situation that the students liked most was that they could turn the object on and off. The fact that the students could touch them personally not only improved their imagination but contributed to their mathematical processing skills as well. There are studies in which similar results were obtained (Mutlu & Söylemez, 2019; Zengin, 2017).

Similarly, the students were provided with the opportunity to reinforce the concept of dimension and to develop their three-dimensional thinking skills. According to the findings, it was concluded that the students had positive views on the teaching method supported with realistic mathematics education. Based on the findings of the study, the following suggestions could be put forward:

Especially in geometric subjects, students should be allowed to touch the shape. Realistic mathematics education is suitable for providing this environment. In order to determine the effect of realistic mathematics education, quantitative research could be conducted according to different subjects or to different levels of the mathematics course. Realistic mathematics education could be taught as a course in education faculties of universities, and preservice teachers could be trained accordingly. Teaching materials necessary for the application of realistic mathematics education in teachers' classes can be obtained. In addition, necessary training can be provided so that teachers can have information about realistic mathematics education before they start to work.

It should be considered that if students are encouraged to adopt three-dimensional mathematics, this will have positive academic effects. It is thought that this will make the teaching process efficient and help increase the quality of education.

Ethics Committee Decision

This research was carried out with the permission of Van Yüzüncü Yıl University Publication Ethics Board with the decision numbered 17135 dated 04.08.2023.

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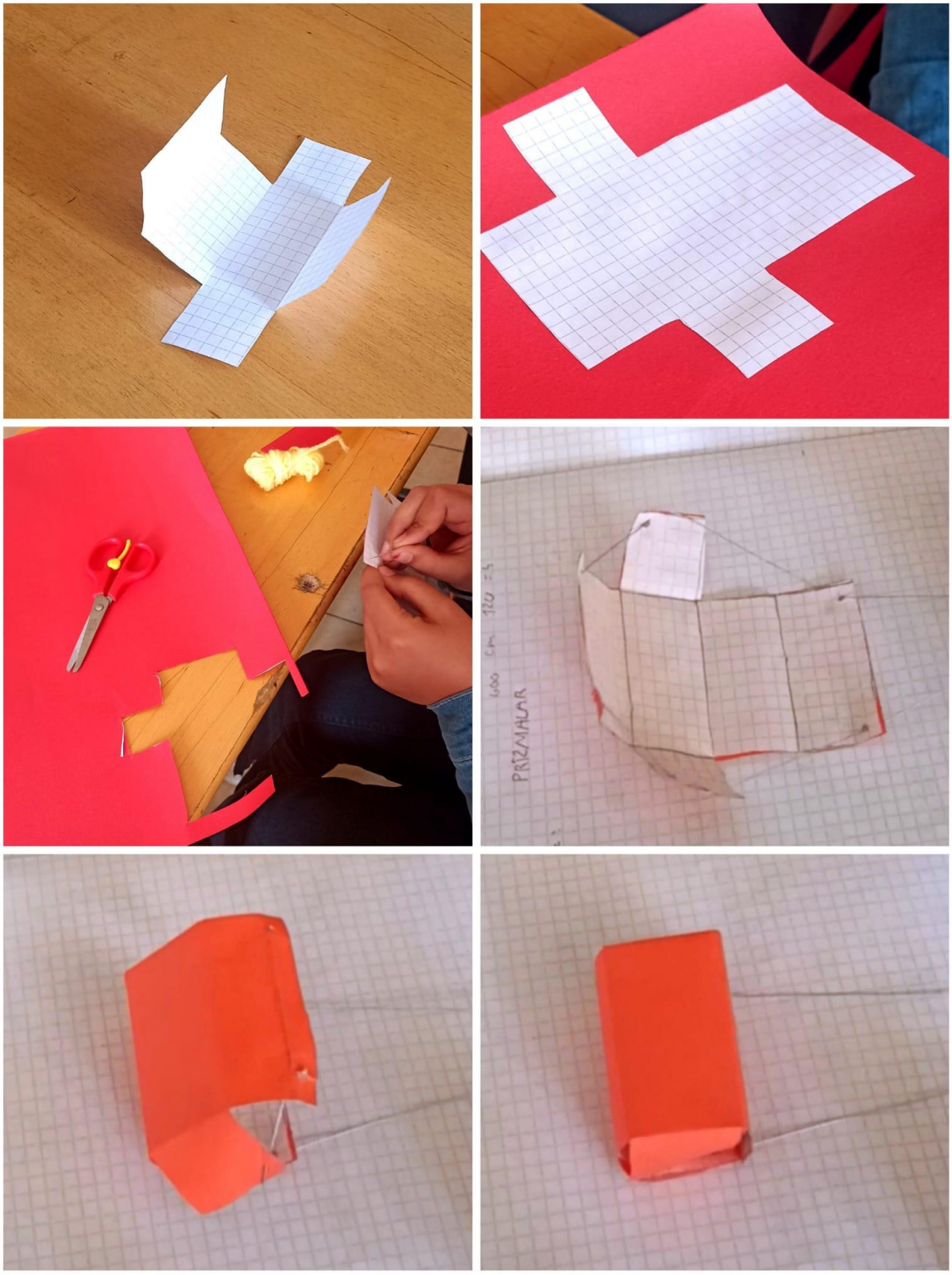
APPENDIX
APPENDIX 1.



APPENDIX 2.

STUDENT INTERVIEW FORM

Dear students, your sincere answers in the study will contribute to the quality of the study. Thank you in advance for your hard work.

1. Do you think that concrete tools should be used in teaching mathematics? Please explain.

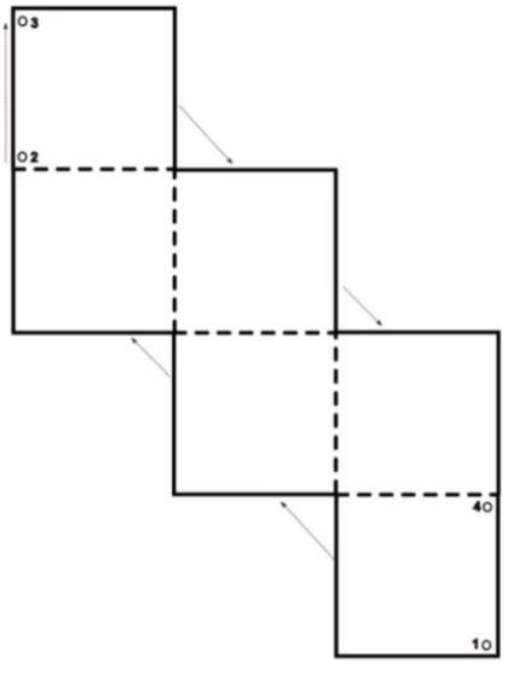
2. Did the use of Realistic Mathematics Education in Mathematics lessons facilitate learning? Please indicate your opinion about this.

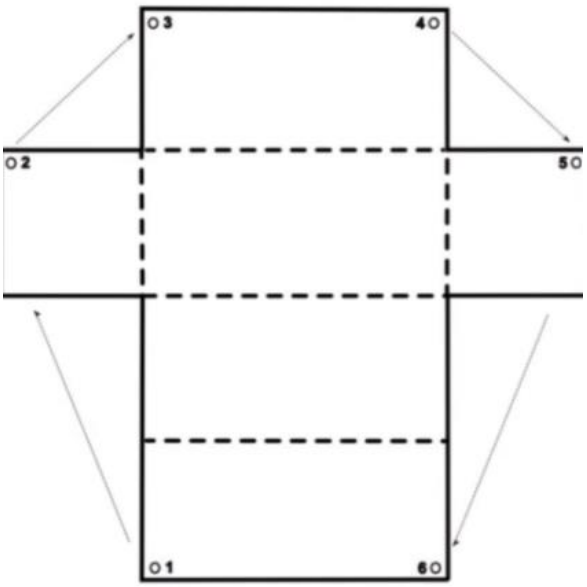
3. How did the use of Realistic Mathematics Education affect in-class participation? Please explain.

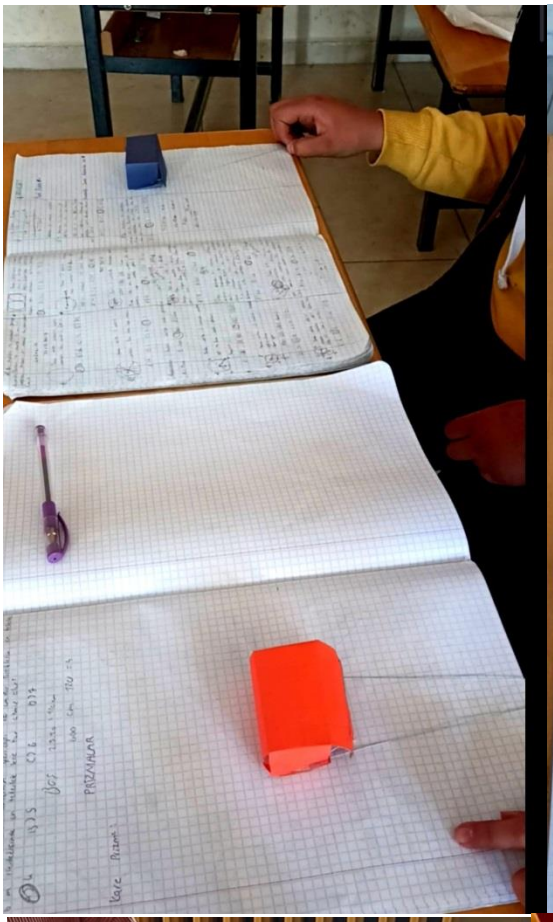
4. In which subjects do you think Realistic Mathematics Education can be more effective?

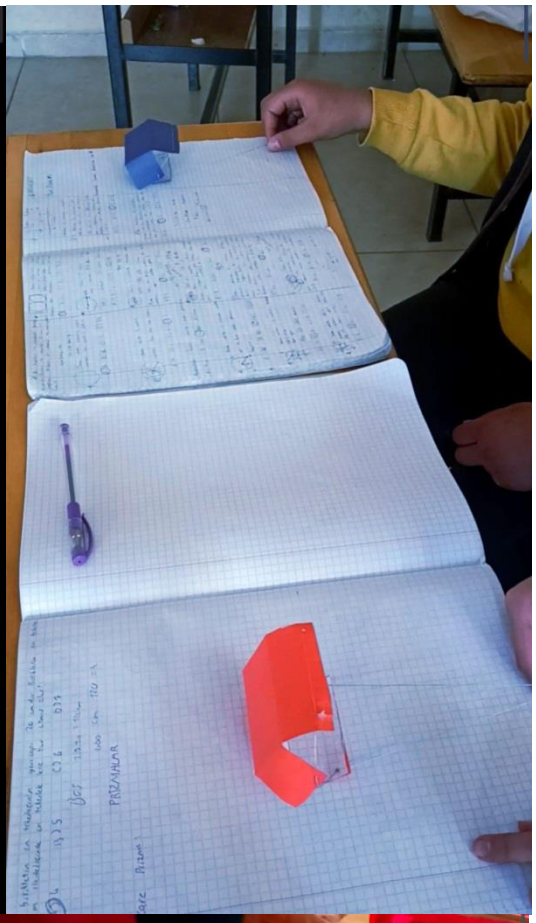
5. Did Realistic Mathematics Education change your attitude towards math lesson? Why?

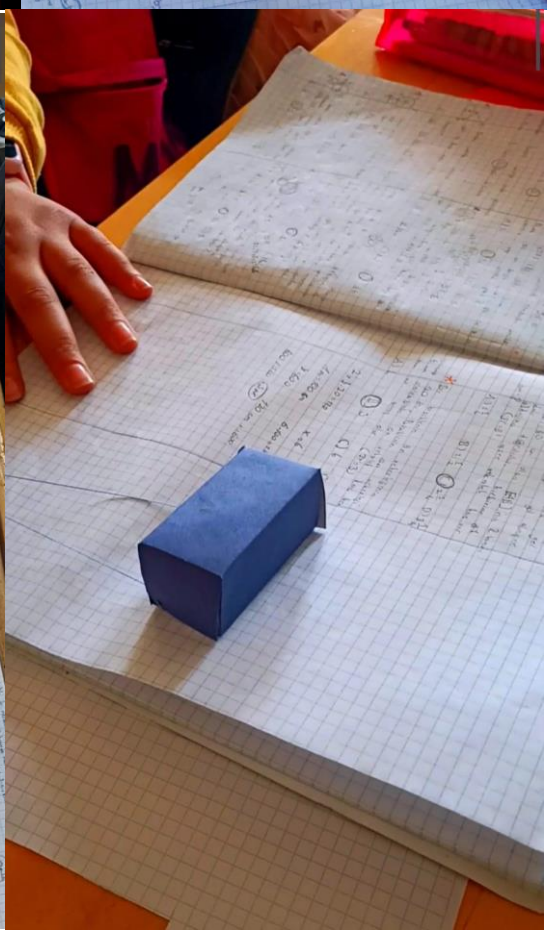
APPENDIX 3.
PHOTOS OF THE USEO F RME

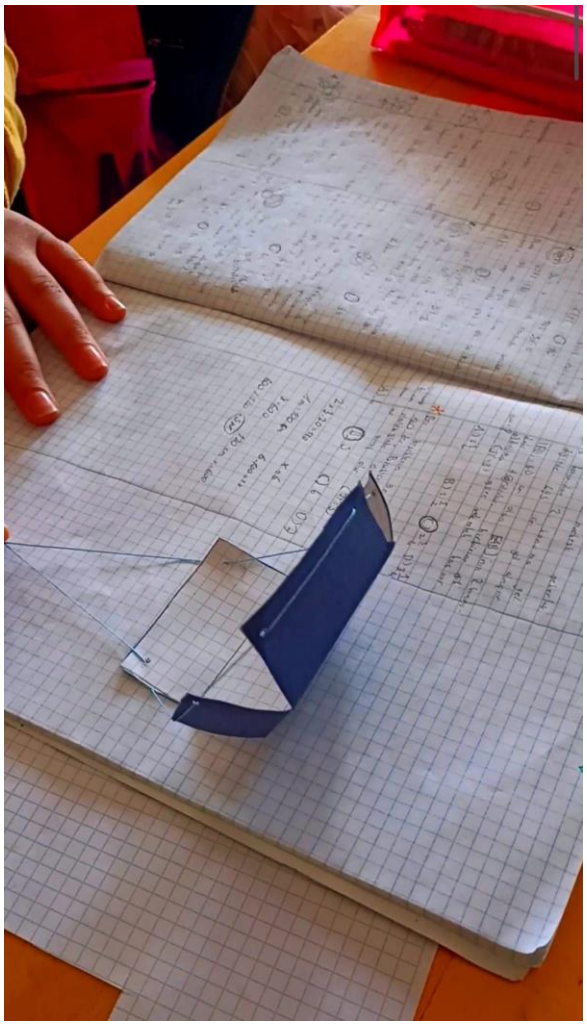


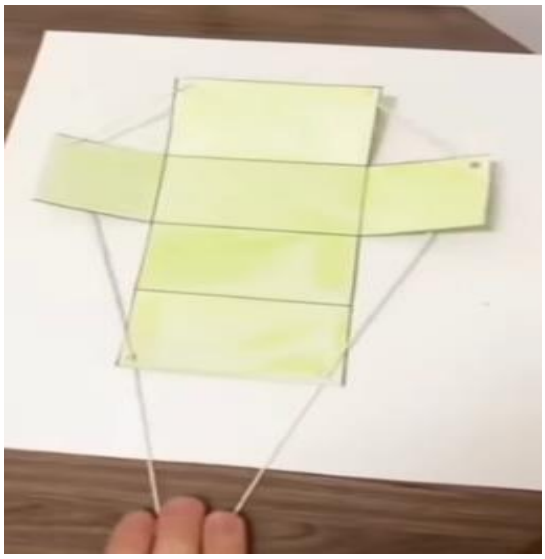












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Conceptualization, literature review, methodology, implementation, data analysis

Methodology, data analysis, translation, and writing

Abstract

One of the major obstacles to the continuation of life on Earth is the global climate change. The fact that our nation is experiencing a minor impact from the global climate change does not change the reality that there is no problem. It is well recognized that the polar areas are the most impacted by the global climate change, or that the triggering of the Polar Regions would have a significant influence on the whole planet. In this scenario, science teachers have a significant deal of responsibility for raising awareness of polar science subject among future generations. As a result, it is in our hands to mitigate the impacts of global climate change through increased student knowledge. The screening model was used in the study to show the knowledge and awareness levels of science teachers on polar sciences, who will supply this awareness. The "Polar Sciences Awareness Questionnaire-PSAQ" data collecting instrument, whose validity and reliability were calculated, was employed within the parameters of the study. PSAQ was created in Google Form style with web-based access. The data were collected voluntarily from 205 science teachers working in a province in the Southeastern Anatolia Region, which is the population of the study. The statistical package program SPSS 26 was used to analyze the data that had been collected. The research revealed that while science instructors were aware of the North Pole, South Pole and climate change, their awareness was not very high. It is because science instructors lack a specific education in polar sciences that they do receive explicitly. The report makes several recommendations, one of which is to include polar science learning outcomes and lessons in teacher and student education programs.

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Research Article

Polar Science Awareness of Science Teachers *

Fatma Kübra UYAR [1] **Orhan KARAMUSTAFAOĞLU** [2]

Abstract

One of the major obstacles to the continuation of life on Earth is the global climate change. The fact that our nation is experiencing a minor impact from the global climate change does not change the reality that there is no problem. It is well recognized that the polar areas are the most impacted by the global climate change, or that the triggering of the Polar Regions would have a significant influence on the whole planet. In this scenario, science teachers have a significant deal of responsibility for raising awareness of polar science subject among future generations. As a result, it is in our hands to mitigate the impacts of global climate change through increased student knowledge. The screening model was used in the study to show the knowledge and awareness levels of science teachers on polar sciences, who will supply this awareness. The "Polar Sciences Awareness Questionnaire-PSAQ" data collecting instrument, whose validity and reliability were calculated, was employed within the parameters of the study. PSAQ was created in Google Form style with web-based access. The data were collected voluntarily from 205 science teachers working in a province in the Southeastern Anatolia Region, which is the population of the study. The statistical package program SPSS 26 was used to analyze the data that had been collected. The research revealed that while science instructors were aware of the North Pole, South Pole and climate change, their awareness was not very high. It is because science instructors lack a specific education in polar sciences that they do receive explicitly. The report makes several recommendations, one of which is to include polar science learning outcomes and lessons in teacher and student education programs.

Keywords: Polar regions, neo-climate, global climate awareness, science teacher

1. INTRODUCTION

Three of the ten items that will pose risks on a global scale in the next 10 years are climate change, unusual weather events and the decline in biodiversity, according to the National Risk Report published in 2022. Human damage to nature, which is one of the main causes of the first three items, ranks seventh. According to the sixth assessment report of the Intergovernmental Panel on Climate Change [IPCC] (2021), the 1.5-degree temperature increase projected to take place between 2030 and 2052 is now expected to be achieved between 2021 and 2040. This shows that it will lead to stronger global warming consequences. When the variables are compared with the past, it is predicted that the way to slow down human-induced warming will be to reduce carbon dioxide absorption. The poles are seen as the Earth's barometer, a fundamental building block that protects the health of the planet (Smetacek & Nicol, 2005). The change will be faster in the Polar Regions than at any other area on Earth. It is unavoidable that the Polar Regions, which are home to approximately four million people, will be the areas most affected by climate change. According to the report presented by NASA (2018), more than two-thirds of the ice cover in the Arctic ice sea has been exhausted. Since the 1970s, the Arctic has warmed by about 2 °C, three times the global average. Soil that has been frozen for thousands of years (permafrost) is beginning to thaw and release carbon dioxide into the atmosphere more rapidly. The microorganisms that are released with dramatic temperature increases cause the

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degradation of organic matter and increase the emission of greenhouse gases. Organisms living in the Polar Regions have been exposed to unfamiliar weather conditions such as strong winds, solar radiation, temperature increase, water level rise, etc. The biodiversity of polar ecosystems that cannot respond to changing weather conditions will be more deeply affected and it will not be long before they disappear (Convey et al., 2012). Due to the limited biodiversity of the Arctic, the loss of a single keystone species has the danger of causing the loss of many species (Post et al., 2009). Despite increasing efforts to conserve biodiversity worldwide, biodiversity continues to decline (Barnosky et al., 2012).

1.1. Literature of the Polar Science

There are various studies on polar sciences and climate change in national and international field. In the literature, there are studies to develop awareness in students about polar sciences (Barış, 2020; Yalçınkaya et al., 2020). Also, there are studies on special/gifted students in the literature (Arslan, 2019; Bodur, 2021). Polar sciences were gamified, and studies were carried out to raise awareness and inform students (Kepir & Toktaş, 2021).When national and international studies are examined, it is seen that the studies are on raising students' awareness, measuring the level of knowledge, the place of polar sciences in the curriculum and polar science instructional designs. However, there are no studies on polar sciences with teachers. The fourth Sustainable Development Goal is quality education. It is an undeniable fact that the first prerequisite for providing quality education is qualified teachers. Science is one of the leading disciplines in raising individuals who recognize climate change and its effects with the understanding of education for sustainable life. Science teachers have a lot of responsibility on this issue. The study group consists of science teachers due to the lack of sufficient number of studies on teachers in national and international studies and the fact that science teachers have more responsibilities on the subject.

1.2. Purpose of the Study

This study was carried out to determine the knowledge and awareness levels of science teachers about polarity issues. Accordingly, the main problem of the study was determined as "What is the level of knowledge and awareness of science teachers about pole points?". The following sub-problems were investigated within the framework of the main problem.

1- What is the level of knowledge of science teachers about the North Pole?
2- What is the level of knowledge of science teachers about the South Pole?
3- What is the level of knowledge of science teachers about the consequences of climate change?
4- What is the level of awareness of science teachers about the North Pole?
5- What is the level of awareness of science teachers about the South Pole?
6- What is the level of awareness of science teachers about the consequences of climate change?
7- Are the awareness levels of science teachers towards polar sciences affected by demographic levels?

2. METHOD

2.1. Research Design

The method in which data are collected from the universe or a sample representing the universe to determine characteristics such as abilities, opinions, attitudes, beliefs and knowledge is called survey method (Selçuk-Sezgin, 2019, p.140). The survey model is conducted with the aim of reaching a general opinion about the universe with the whole universe or a certain group of the universe (Bailey, 1982). Cross-sectional survey, which is one of the screening models, has the advantage of measuring the current situation or attitudes (Selçuk-Sezgin, 2019, p.142). In the cross-sectional survey model, data are collected once, even if the time required for data collection extends from one day to

several weeks (Fraenkel & Wallen, 2009). In this study, cross-sectional survey model was used to reveal science teachers' awareness of polarity sciences.

2.2. Research Group

The population of the study consisted of 426 science teachers working in public schools in a province in the Southeastern Anatolia region in the 2022-2023 academic years. The sample of the study consisted of 426 teachers determined by stratified sampling method among the teachers working at the secondary school level.

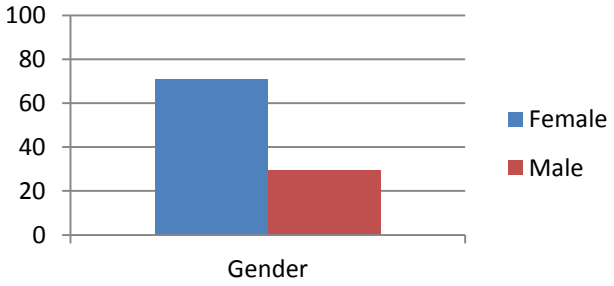

Figure 1. Gender information of the population and sample in the study

Figure 1 is shown the distribution of the population and sample of the study according to gender. The female participants of the study were 70.7%, while the male participants were 29.3%.

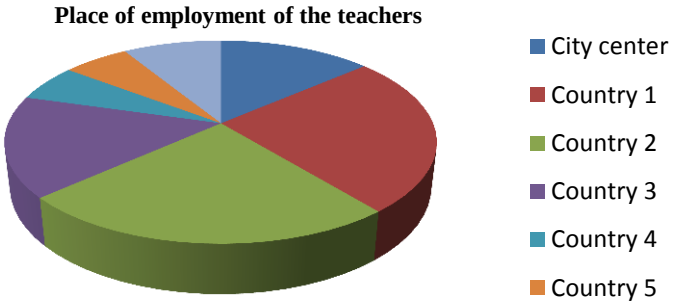

Figure 2. Place of employment of the teachers and sample of the study

Figure 2 is shown the work location of the participants of the study is shown in. The distribution of the place of employment of the teachers is as follows; 13.7% City center, 25.4% Country 1, 24.4% Country 2, 16.1% Country 3, 5.9% Country 4, 5.9% Country 5, 8.8% Country 6.

2.3. Data Collection Tools and Process

Barış (2020) "Polar Science Awareness Questionnaire" (PSAQ) was used to collect the research data together with the personal information form. The data collection tool was submitted by Barış (2020) to the expert opinion of a science teacher, a chemistry teacher and a polar science researcher. PSAQ was prepared in Google Form format and web-based access was provided. Of the data collection tools sent out, 205 (48.1%) were returned as answered. The analyses were carried out with the data collection tool of 205 science teachers.

The responses to the PSAQ were collected web-based via Google Form. In the information form of the data collection tool, teachers' gender and place of employment were included. In the first part of the questionnaire, there are twelve true-false questions aiming to measure the knowledge of the participants about polar sciences. In the second part, twelve questions of 4-point Likert type questions (not at all important, less important, important, very important) were included to determine the

knowledge and priorities of the participants about polar sciences. In the third section, there are eleven 5-point Likert type questions (I don't know at all, I know little, I know a little, I know a lot, I know completely) aiming to measure the knowledge of the participants about polar sciences. Table 1 shows information about the sections in the data collection tool and the distribution of the questions.

Table 1. Sections and distribution of questions in the data collection tool

Name of the questinnare	Part	Question Number	Question Types
PSAQ	I	12	True-False
	II	13	4-point Likert type (not at all important, less important, important, very important)
	III	11	5-point Likert type questions (I don't know at all, I know little, I know a little, I know a lot, I know completely)

The data collection tool consists of three sub-dimensions. These dimensions are North Pole, South Pole and Climate Change. The number of items and Cronbach alpha values of these subsections are given in Table 2.

Table 2. Information on the sub-dimensions of the data collection tool

Sub-dimensions	Item Number	Cronbach alpha değeri
North pole	9	,556
South pole	9	,462
Climate change	18	,703
Total	36	,801

Permission was obtained from the Provincial Directorate of National Education Research Evaluation Commission for the implementation of the data collection tool consisting of personal information form and KBFA. The data collection tool sent via Google Form was delivered to 426 science teachers. The number of returned data collection tools was 205 and the return rate was 48.1%.

2.3. Data Analysis

Descriptive statistics method was used to analyze the demographic information of the science teachers participating in the study. Frequency and percentage analyses of the data on gender and place of employment of the teachers were made. The answers given to the questionnaire applied to the science teachers participating in the study were analyzed with the help of SPSS 26 package programme.

3. FINDINGS

In this section of the study, the findings related to the sub-problems of the study are given.

3.1. Science Teachers' Level of Knowledge about the North Pole

Table 3. Descriptive statistics of Arctic knowledge level

Sub-dimensions	Min.	Max.	Mean	Standard Deviation	Skewness	Kurtosis
North Pole (Part I)	0	1	,86	,21	-1,471	1,523
North Pole (Part III)	1	5	2,98	,85	,300	-,305

When Table 3 is analyzed, the average score obtained from the questionnaire according to each item of the questions related to the North Pole, which is evaluated over 1 point in Section I, is 0.86. This shows that the participants answered the North Pole knowledge level questions very close to the "true" level. Evaluated out of 5 points, the average score obtained from the questionnaire according to each item of the North Pole questions in Section III is 2.98. This shows that the participants answered the North Pole knowledge level questions very close to the level of "A little".

Table 4. Descriptive Statistics for the questions of the North Pole section I.

Questions	True		False		
North Pole (Part I)	**n**	**%**	**n**	**%**	**Mean**
PSAQ 1	181	88,2	24	11,8	0,88
PSAQ 2	168	81,9	37	18,1	0,82
PSAQ 3	185	90,2	20	9,8	0,90

(PSAQ 1: Different groups live in the Arctic Region, PSAQ 2: The Arctic region has not been fully explored, PSAQ 3: The North polar region is also known as the "Arctic". n: Frequency, %: Percent)

Table 4 shows that 88.2% (n=181) of the science teachers who participated in the study know that different groups live in the Arctic region; 81.9% (n=168) know that the Arctic region has not been fully explored. It is seen that a large proportion of the participants (90.2%, n=185) know that the North Polar Region is the Arctic.

Table 5. Descriptive statistics for the questions in Section III of the North Pole

Questions	I don't know at all		I know little		I know a little		I know a lot		I know completely		Mean
North Pole (Part III)	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**	
PSAQ 28	6	2,9	57	27,8	74	36,1	52	25,4	16	7,8	3,07
PSAQ 29	26	12,7	58	28,3	68	33,2	39	19	14	6,8	2,79
PSAQ 30	4	2	59	28,8	71	34,6	56	27,3	15	7,3	3,09

(PSAQ 28: Climate and vegetation of the Arctic, PSAQ 29: Human transport to the North Pole, PSAQ 30: Animals living in the Arctic. n: Frequency, %: Percent)

When the data in Table 5 are analyzed, it is seen that only 7,8% (n=16) of the participants know the climate and vegetation of the Arctic region; 6,8% (n=14) know the transportation of people to the Arctic; 7,3% (n=15) know the animals living in the Arctic.

3.2. Science Teachers' Level of Knowledge about the South Pole

Table 6. Descriptive statistics of South Pole knowledge level

Sub-dimensions	Min.	Max.	Mean	Standard Deviation	Skewness	Kurtosis
South Pole (Part I)	0	1	,62	,27	-,247	-,541
South Pole (Part III)	1	5	2,51	,80	,663	,214

When Table 6 is analyzed, the average score obtained from the questionnaire according to each item of the questions related to the south pole evaluated over 1 point in section I is 0.62. This shows that the "correct" level of the participants is slightly higher than the "incorrect" level in the South Pole knowledge level questions. Evaluated out of 5 points, the average score obtained from the questionnaire according to each item of Section III South pole questions is 2.51. This shows that the participants expressed the levels of "I know a little" and "I know a little" a lot in the questions on the level of knowledge about the South Pole.

Table 7. Descriptive statistics for the questions of South Pole section I.

Questions	True		False		Mean
South Pole (Part I)	**n**	**%**	**n**	**%**	
PSAQ 4	87	42,4	118	57,6	0,42
PSAQ 5	157	76,6	48	23,4	0,77
PSAQ 6	139	67,8	66	32,2	0,68

(PSAQ 4: No country has territorial rights in the South Polar region. PSAQ 5: Few ethnic groups live in Antarctica. PSAQ 6: The South Polar Region is half the size of the African continent in area. n: Frequency, %: Percent)

In Table 7, 42, 4% (n=87) of the participants know that no country has territorial rights in the South Pole region; 23,5% (n=48) know that not a few ethnic groups live in Antarctica; 67,8% (n=139) know that the South Pole is half the size of the African continent in terms of area.

Table 8. Descriptive statistics for the questions of south pole section III

Questions	I don't know at all		I know little		I know a little		I know a lot		I know completely		Mean
South Pole (Part III)	n	%	n	%	n	%	n	%	n	%	
PSAQ 31	11	5,4	60	29,3	77	37,6	47	22,9	10	4,8	2,93
PSAQ 32	12	5,9	77	37,6	62	30,2	40	19,5	14	6,8	2,84
PSAQ 33	117	57,1	38	18,5	32	15,6	14	6,8	4	2	1,78

(PSAQ 31: Climate and vegetation of the South Polar Region, PSAQ 32: Animals living at the South Pole, PSAQ 33: Blood Falls at the South Pole. n: Frequency, %: Percent)

Table 8 shows that only 4.8% (n=10) of the participants know the climate and vegetation of the South Polar Region completely; 6.8% (n=14) know the animals living in the south polar region completely; 2% (n=4) know the Blood waterfall in the south pole completely.

3.3. Science Teachers' Level of Knowledge about the Consequences of Climate Change

Table 9. Descriptive statistics of climate change knowledge level

Sub-dimensions	Min.	Max.	Mean	Standard Deviation	Skewness	Kurtosis
Climate Change (Part I)	0	1	,60	,12	,238	,824
Climate Change (Part III)	1	5	3,39	,65	-,255	,411

When Table 9 is analyzed, the average score obtained from the questionnaire according to each item of the questions related to climate change evaluated over 1 point in Section I is 0.60. This shows that the "correct" level of the participants in the climate change knowledge level questions is slightly higher than the "incorrect" level. Evaluated out of 5 points, the average score obtained from the questionnaire for each item of the climate change questions in Section III is 3.39. This shows that the participants expressed "I know a little bit" and "I know quite a lot" to the climate change knowledge level questions.

Table 10. Descriptive statistics for the questions of Part I on climate change

Questions	True		False		Mean
Climate Change (Part I)	n	%	n	%	
PSAQ 7	200	97,6	5	2,4	0,98
PSAQ 8*	18	8,8	187	91,2	0,09
PSAQ 9	203	99	2	1	0,99
PSAQ 10	182	88,8	23	11,2	0,89
PSAQ 11	17	8,3	188	91,7	0,08
PSAQ 12	129	62,9	76	37,1	0,63

(PSAQ 7: Gases arising from industrial and agricultural activities cause temperatures to rise by keeping more energy in the world. PSAQ 8: Climate change does not have much negative impact on humans. PSAQ 9: As a result of the uncontrolled increase in greenhouse gases, global climate change problems have emerged. PSAQ 10: As a result of the melting of the glaciers in Antarctica, all the world's seas could rise by 60 meters as the ice reaches the ocean. PSAQ 11: Environmental problems in the Arctic region only adversely affect the animals living there. PSAQ 12: With the melting of glaciers due to global warming, sea voyages to Greenland can be organized. n: Frequency, %: Percent)

In Table 10, 97.6% (n=200) of the majority of the participants know that the gases emitted due to industrial and agricultural activities cause the temperatures to rise by keeping more energy in the world; 91.2% (n=187) know that climate change has a negative effect on humans; 99% (n=203) know

that global climate change problems arise as a result of the uncontrolled increase in greenhouse gases; 88,8% (n=182) know that all of the world's seas can rise up to 60 meters when the ice reaches the ocean as a result of the melting of the glaciers in Antarctica; 91,7% (n=188) know that environmental problems in the north polar region do not only affect the animals living there negatively; 62,9% (n=129) know that sea voyages can be organized to Greenland when the glaciers melt due to global warming.

Table 11. Descriptive statistics for the questions of Section III on climate change

Questions	I don't know at all		I know little		I know a little		I know a lot		I know completely		Mean
Climate Change (Part III)	n	%	n	%	n	%	n	%	n	%	
PSAQ 26	138	67,3	25	12,2	20	9,8	13	6,3	9	4,4	1,68
PSAQ 27	67	32,7	64	31,2	48	23,4	16	7,8	10	4,9	2,21
PSAQ 34	1	0,5	8	3,9	41	20	28	13,7	127	62	4,33
PSAQ 35	1	0,5	6	2,9	33	16,1	36	17,6	129	62,9	4,40
PSAQ 36	1	0,5	2	1	44	21,5	33	16,1	125	61	4,36

(PSAQ 26: El Nino effect, PSAQ 27: The urban heat island effect, PSAQ 34: The effect of deodorants on global warming, PSAQ 35: The extent to which the vehicles used for transport trigger global climate change, PSAQ 36: How rubbish thrown on the ground has an impact on the environment. n: Frequency, %: Percent)

Table 11 shows that only 4.4% (n=9) of the participants are fully aware of the El Nino effect; 4.9% (n=10) are fully aware of the urban heat island effect; 62% (n=127) are fully aware of the effect of the deodorants we use on global warming; 62.9% (n=129) know how much the vehicles we use for transport trigger global climate change; 61% (n=125) know exactly how a rubbish you throw on the ground affects the environment.

3.4. Awareness Level of Science Teachers about the North Pole

Table 12. Descriptive statistics of Arctic awareness level

Sub-dimensions	Min.	Max.	Mean	Standard Deviation	Skewness	Kurtosis
North Pole (Part II)	1	4	2,84	,61	-,002	-,291

When Table 12 is analyzed, the average score obtained from the questionnaire according to each item of the questions related to the north pole in Part II, which is evaluated over 4 points, is 2.84. This shows that the participants expressed "less important" and "important" levels to the questions on the level of knowledge of the North Pole.

Table 13. Descriptive statistics of items related to the level of awareness of the North Pole

Questions	Not at all important		Less important		Important		Very important		Mean
North Pole	n	%	n	%	n	%	n	%	
PSAQ 20	26	12,7	43	21	81	39,5	55	26,8	2,80
PSAQ 22	18	8,8	54	26,3	86	42	47	22,9	2,79
PSAQ 23	14	6,8	45	22	85	41,5	61	29,8	2,94

(PSAQ 20: Since there is only a thick ice mass at the North Pole, it is impossible to establish a station (research centre). PSAQ 22: Around 4 million people live in the Arctic. PSAQ 23: Frozen tundra plants are found in the Arctic. n: Frequency, %: Percent)

In Table 13, it is seen that 26,8% (n=55) of the participants find it very important that it is impossible to establish a station (research center) because there is only a thick ice mass in the Arctic; 22,9% (n=47) find it very important that approximately 4 million people live in the Arctic; 29,8% (n=61) find it very important that there are frozen tundra plants in the Arctic.

3.5 Awareness Level of Science Teachers about the South Pole

Table 14. Descriptive statistics of South Pole awareness level

Sub-dimensions	Min.	Max.	Mean	Standard Deviation	Skewness	Kurtosis
South Pole (Part II.)	1	4	2,87	,57	-,096	,052

When Table 14 is analyzed, the average score obtained from the questionnaire according to each item of the questions related to the South Pole in Section II, which is evaluated over 4 points, is 2.87. This shows that the participants expressed the level of knowledge of the South Pole at the "less important" and "important" levels.

Table 15. Descriptive statistics of items related to South Pole awareness level

Questions	Not at all important		Less important		Important		Very important		Mean
South Pole	n	%	n	%	n	%	n	%	
PSAQ 14	10	4,9	18	8,8	102	49,8	75	36,6	3,18
PSAQ 17	33	16,1	77	37,6	70	34,1	25	12,2	2,42
PSAQ 19	10	4,9	39	19	90	43,9	66	32,2	3,03

(PSAQ 14: At the South Pole, the temperature can drop to -70 degrees Celsius. PSAQ 17: The largest land animal at the South Pole is a wingless insect 1.3 cm long. PSAQ 19: 90 per cent of the glaciers and 70 per cent of the fresh water are at the South Pole. n: Frequency, %: Percent)

In Table 15, it is seen that 36,6% (n=75) of the participants find it very important that the temperature can drop to -70 degrees in the South Pole; 12,2% (n=25) find it very important that the largest land animal in the South Pole is a wingless insect 1,3 cm in length; 32,2% (n=66) find it very important that 90% of glaciers and 70% of fresh water are in the South Pole.

3.6. Awareness Level of Science Teachers about the Consequences of Climate Change

Table 16. Descriptive statistics of climate change awareness level

Sub-dimensions	Min.	Max.	Mean	Standard Deviation	Skewness	Kurtosis
Climate Change (Part II)	1	4	3,57	,40	-1,005	,773

When Table 16 is analyzed, the average score obtained from the questionnaire according to each item of the questions related to climate change in Section II, which is evaluated over 4 points, is 3.57. This shows that the participants expressed the level of knowledge about climate change at the "important" and "very important" levels.

Table 17. Descriptive statistics of items related to climate change awareness level

Questions	Not at all important		Less important		Important		Very important		Mean
Climate Change	n	%	n	%	n	%	n	%	
PSAQ 13	1	0,5	2	1	52	25,4	150	73,2	3,71
PSAQ 15	-	0	3	1,5	61	29,8	141	68,8	3,67
PSAQ 16	2	1	4	2	76	37,1	123	60	3,56
PSAQ 18	4	2	7	3,4	63	30,7	131	63,9	3,57
PSAQ 21	4	2	4	2	65	31,7	132	64,4	3,59
PSAQ 24	1	0,5	5	2,4	79	38,5	120	58,5	3,55
PSAQ 25	5	2,4	18	8,8	81	39,5	101	49,3	3,36

(PSAQ 13: Factors such as exhaust gases, factory wastes, fossil fuels increase Global Climate Change by a large amount. PSAQ 15: The polar ice caps melt rapidly due to Global Warming. PSAQ 16: Increasing the amount of micro plastics in the seas increases the amount of micro plastics accumulated in living organisms. PSAQ 18: The seas are polluted and drinking water is decreasing. PSAQ 21: Exhaust gases and deodorants deplete the ozone layer and increase global warming. PSAQ 24: Glaciers are decreasing, waters are rising and land animals living in the poles cannot find a place to live. PSAQ 25: Fresh water is getting more and more mixed with sea waters every day. n: Frequency, %: Percent)

In Table 17, 73,2% (n=150) of the participants find it very important that factors such as exhaust gases, factory wastes, fossil fuels increase global climate change in large amounts; 68,8% (n=141) find it very important that the glaciers in the poles melt rapidly due to global warming; 60%

(n=123) find it very important that the increase in the amount of micro plastics in the seas increases the amount of micro plastics accumulated in living things; 63,9% (n=131) find it very important that the seas are polluted and drinking water is decreasing; 64,4% (n=132) find it very important that the ozone layer is pierced by exhaust gases and deodorants and global warming increases; 58,5% (n=120) find it very important that the glaciers are decreasing, the waters are rising and the land animals living in the poles cannot find a place to live; 49,3% (n=101) find it very important that fresh water is mixed more and more into sea waters every day.

3.7. Awareness Levels of Science Teachers towards Polar Sciences

Table 18. Independent Sample t-Test Results of Participants' North Pole, South Pole and Climate Change Knowledge Level Scores According to Gender Variable

		N	X	SS	t	p
North Pole	Female	145	1,94	,44	,954	,341
	Male	60	1,88	,45		
South Pole	Female	145	1,58	,44	,941	,348
	Male	60	1,52	,40		
Climate Change	Female	145	2,02	,33	1,834	,068
	Male	60	1,93	,32		

Independent Group t-Test was used to investigate whether the participants' knowledge levels of the North Pole, South Pole and climate change differed effectively on gender and the results are shown in Table 18. The knowledge levels of the participants about the North Pole, South Pole and climate change did not differ statistically significantly at the $p<0.05$ level, although the scores of the female participants were higher than the male participants.

Table 19. Independent sample t-test results of participants' North Pole, South Pole and climate change awareness scores according to gender variable

		N	X	SS	t	p
North Pole	Female	145	2,82	,62	-,812	,418
	Male	60	2,90	,60		
South Pole	Female	145	2,85	,57	-1,129	,260
	Male	60	2,95	,58		
Climate Change	Female	145	3,57	,41	,016	,987
	Male	60	3,57	,38		

Whether the participants' awareness levels of the North Pole, South Pole and climate change differed effectively on gender was investigated by Independent Group t-Test and the results are shown in Table 19. The awareness levels of the participants about the North Pole, South Pole and climate change did not differ statistically significantly at $p<0.05$ level, although the scores of male participants were higher than female participants.

Table 20. Variance analysis of participants' north pole, south pole and climate change knowledge scores according to the place of duty variable

	Source	Sum of squares	ss	Mean square	F	p
North Pole	Between groups	0,426	6	0,071	0,349	0,910
	Within groups	40,310	198	0,204		
	Total	40,736	204			
South Pole	Between groups	1,119	6	0,186	1,001	0,426
	Within groups	36,875	198	0,186		
	Total	37,993	204			
Climate Change	Between groups	0,244	6	0,041	0,357	0,905
	Within groups	22,572	198	0,114		
	Total	22,816	204			

Whether the knowledge levels of the participants about the North Pole, South Pole and climate change are effective on the place of duty was investigated by analysis of variance and the results are shown in Table 20. It was not found significant in the North Pole, South Pole and Climate change sub-dimension values ($p<0.05$).

Table 21. Variance analysis of participants' north pole, south pole and climate change awareness scores by position variable

	Source	Sum of squares	ss	Mean square	F	p
North Pole	Between groups	2,714	6	0,452	0,311	0,910
	Within groups	74,950	198	0,379		
	Total	77,664	204			
South Pole	Between groups	4,365	6	0,727	0,037	0,426
	Within groups	62,890	198	0,318		
	Total	67,254	204			
Climate Change	Between groups	2,890	6	0,482	0,006	0,905
	Within groups	30,681	198	0,155		
	Total	33,571	204			

Whether the knowledge levels of the participants about the North Pole, South Pole and climate change are effective on the place of duty was investigated by analysis of variance and the results are shown in Table 17. It was not found significant in the North Pole, South Pole and Climate change sub-dimension values ($p<0.05$).

4. DISCUSSION and CONCLUSION

In this study, it was aimed to determine the knowledge and awareness levels of teachers working as science teachers in schools affiliated to the Ministry of National Education in Şırnak province and its districts towards polar sciences.

As a result of the findings obtained from the Arctic sub-dimension, it was determined that the participants had limited knowledge about the Arctic region. It was determined that the participants lacked a lot of information about the climate and vegetation of the Arctic region, the transportation of people to the Arctic, and the animals living in the Arctic. Arslan (2019) investigated the effects of pole education given to gifted students by experts on students' idea generation. The students were encouraged to participate in the webinar, which ended with a question-answer activity, in which the information that the participant of a project carried out in the Arctic region should provide and the studies carried out in the Arctic region were mentioned. At the end of the webinar, it was observed that gifted students increased their knowledge about life in the polar regions, were interested in the research carried out in the Arctic and created many research problems related to different fields. Kepir and Toktaş (2021) designed an educational game by classifying the information they obtained about the definition, borders, historical and current situation of the Arctic region with playing cards in various colors according to subject, content and question formats. Özaraz and Koç-Odabaşı (2021) In order to determine the knowledge of fine arts high school painting department students about the polar regions and to investigate the contribution of the awareness created in them by increasing the diversity of knowledge to the polar awareness studies to be carried out in the society, it was revealed with the technique of drawing and writing pictures. It was observed that the students had false information that there were indigenous people in both Polar Regions. Arslan (2020) determined the views of gifted students on polar phenomena and investigated the origin of the information sources they utilized in the process of obtaining information. It was concluded that gifted students were familiar with the phenomena in the field of physical sciences but remained distant from the phenomena in the field of earth sciences. It is recommended to carry out studies on Polar Regions for all students, including the fields of life sciences and social and human sciences, and to support teacher training in order to raise

awareness of scientists. Sasa-Fizan and Uzun (2022) examined the science curriculum in terms of polar research and climate change. It has been determined that there are no acquisitions for polar research in the science curriculum and that the curriculum is not sufficient in teaching these acquisitions despite the need for curricula designed according to the climate change education approach, which confirms the literature. Science teachers have a great responsibility in the transfer of polar sciences. It was concluded that this was since there were no acquisitions related to polar sciences in the science curriculum. It was concluded that it was not due to the fact that science teachers did not go through a certain training in which they implicitly received information about polar sciences.

As a result of the findings obtained from the South Pole sub-dimension, it was determined that the participants had limited knowledge about the South Pole region. In this direction, it was determined that the participants did not have sufficient knowledge of the climate and vegetation of the South Polar Region, the animals living in the region and the geographical names in the region. Yalçınkaya et al. (2020) investigated the contribution of Antarctic painting competition to polar science awareness activities. Antarctic painting competitions are organized every year by the Polar Research Student Team (PolSTeam) in cooperation with the Association of Polar Early Career Scientists (APECS). The paintings from all over Turkey were exhibited at two metro stations in Istanbul to reach a wider audience and raise awareness of climate change, especially in the Polar Regions, and to convey the issue to other segments of the public. Barış (2020) examined the change in students' awareness of Antarctica through online science interviews. During the implementation process, the online science interview "Science Journey in Antarctica" was shared with the students and they filled out an evaluation form after watching the video. It was concluded that the students who had no idea about Antarctica had in-depth knowledge and wanted to get information in the future in order to participate in the research to be conducted here. Ursavaş and Kandemir (2020) tried to determine the knowledge and awareness of secondary school students about Antarctica. According to the findings of the study, it was seen that students had inadequate and alternative concepts about Antarctica. To increase the awareness of students, it is recommended to carry out studies on biological, geographical and climatic characteristics. In another study of the researchers (2020), they used the Word Association Test (WAT) to reveal the cognitive structures of secondary school students about Antarctica. According to the findings obtained from the study, it was concluded that the students associated Antarctica with cold, that there were fewer words emphasizing the scientific features of Antarctica and that the students confused Antarctica with the North Pole due to the high frequencies of the features of the North Pole such as polar bear and Igloo. In the study conducted by Göktaş (2022), the contents of the 9th and 10th grade mathematics and physics curricula were examined and it was determined how much they were included in the achievements. In the study, it was found that the content of the curricula of the secondary education courses renewed in 2018 did not mention pole research and scientific studies conducted in this direction. The researcher suggested that to raise awareness of polar research, the subject should be spread to the units and acquisitions of the courses at all levels of education. It was concluded that even in the revised curriculum, there were no acquisitions related to polar sciences and teachers who were students at the time did not learn this information.

As a result of the findings obtained from the climate change sub-dimension, it was determined that the participants had high levels of knowledge about the causes and consequences of climate change. Although their level of knowledge on climate change was high, it was determined that their conceptual knowledge on climate change was at a low level. Eroğlu and Aydoğdu (2016) tried to determine the knowledge levels of pre-service science teachers about global warming. The level of knowledge of pre-service science teachers about the consequences of global warming was found to be quite high. Another result is that although pre-service science teachers' level of knowledge about global warming is above the average, their knowledge on some subjects is incomplete. When the answers given to the statements about what can be done against global warming and the precautions

that can be taken are analyzed, it is observed that the students' level of knowledge about these issues is quite high. Barak and Gönençgil (2020) conducted a comparison study of secondary school curricula in the world and Turkey according to the climate change education approach. In the study, it was found that basic information about climate change was given in the Turkey 2018 science curriculum, but there were not enough learning outcomes for a detailed teaching. Despite the need for curricula designed according to the climate change education approach, it is stated that there are no curriculum development studies that can meet this need in Turkey and there are very few examples in the world. It was concluded that science teachers have knowledge about the concepts of climate change and global warming in the light of science curriculum.

The knowledge levels of the participants about the North Pole, South Pole and climate change did not differ statistically significantly, although the scores of the female participants were higher than the male participants. The awareness levels of the participants about the North Pole, South Pole and climate change did not differ statistically significantly, although the scores of male participants were higher than those of female participants. Eroğlu and Aydoğdu (2016) did not observe any difference in the knowledge levels of pre-service science teachers about global warming according to gender and grade level. The reason why science teachers did not differ on the North Pole, South Pole and climate change on gender may be that they did not receive education on these subjects. It was concluded that they implicitly accumulated knowledge due to changing environmental conditions.

The knowledge levels of the participants about the North Pole, South Pole and climate change were not found to have a significant effect on the place of duty. The knowledge levels of the participants about the North Pole, South Pole and climate change were not found to have a significant effect on the place of duty. It was concluded that there was no difference because the undergraduate education of science teachers was similar to each other and the place of employment had the same conditions.

Based on the results of the study, the following recommendations are presented.

1-A polar sciences course can be added to the undergraduate courses.

2- Acquisitions related to the North Pole can be included in the science curriculum.

3-Gains related to the South Pole can be included in the science curriculum.

4-The number of acquisitions related to climate change can be increased in the science curriculum.

5-The diversity of concepts in the acquisitions related to climate change in the science curriculum can be increased.

6-In-service trainings for science teachers about polar sciences can be planned.

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Abstract

This research aims to analyze the results of studies conducted in Turkey on reasoning skills in mathematics teaching and to reveal what kind of trend there is in this field. Within the scope of this study, databases were searched with the keywords "reasoning"(muhakeme, akıl yürütme) and "reasoning skill" (Muhakeme becerisi, akıl yürütme becerisi), and the results were examined in accordance with the inclusion criteria regarding mathematics teaching. One hundred sixty-three studies were included. Each of the studies included in the meta-synthesis study was analyzed descriptively according to type, year, method, sample type and size, data collection tools, statistical analysis, learning field, keywords, reasoning type and purpose. In addition, the studies' results were content analyzed and tabulated by coding the differences and similarities between them with a holistic approach. It has been determined that studies on the learning fields in the mathematics curriculum are mostly carried out in the field of learning numbers and operations in the secondary school mathematics curriculum. When evaluated in terms of reasoning types, almost half of the studies were conducted on mathematical reasoning. It has been observed that after mathematical reasoning, the most focus is on proportional reasoning. When the aims of the studies included in the research were examined, it was determined that the most focused ones were "examining the factors affecting reasoning skills", "measurement of reasoning skills" and "the effect of teaching practices on reasoning skills". In the studies examined, it was seen that there were 33 teaching practices whose effects on reasoning skills were examined.

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Research Article

Reasoning Skills in Mathematics Teaching: A Meta-Synthesis on Studies Conducted in Turkey *

Ali TUM [1]

Abstract

This research aims to analyze the results of studies conducted in Turkey on reasoning skills in mathematics teaching and to reveal what kind of trend there is in this field. Within the scope of this study, databases were searched with the keywords "reasoning"(muhakeme, akıl yürütme) and "reasoning skill" (Muhakeme becerisi, akıl yürütme becerisi), and the results were examined in accordance with the inclusion criteria regarding mathematics teaching. One hundred sixty-three studies were included. Each of the studies included in the meta-synthesis study was analyzed descriptively according to type, year, method, sample type and size, data collection tools, statistical analysis, learning field, keywords, reasoning type and purpose. In addition, the studies' results were content analyzed and tabulated by coding the differences and similarities between them with a holistic approach. It has been determined that studies on the learning fields in the mathematics curriculum are mostly carried out in the field of learning numbers and operations in the secondary school mathematics curriculum. When evaluated in terms of reasoning types, almost half of the studies were conducted on mathematical reasoning. It has been observed that after mathematical reasoning, the most focus is on proportional reasoning. When the aims of the studies included in the research were examined, it was determined that the most focused ones were "examining the factors affecting reasoning skills", "measurement of reasoning skills" and "the effect of teaching practices on reasoning skills". In the studies examined, it was seen that there were 33 teaching practices whose effects on reasoning skills were examined.

Keywords: Mathematics teaching, reasoning skill, meta-synthesis

1. INTRODUCTION

It is necessary to raise individuals who can adapt to the pace of development of technology in accordance with the needs of modern life, are questioning, productive, open to innovations, and have high-level thinking skills. As a matter of fact, constantly updated curricula due to developments in technology, changing needs of individuals and society, and changes in learning-teaching approaches indicate the need to raise individuals who can produce knowledge, use it in daily life, think critically by solving problems, etc (Ministry of National Education [MoNE], 2015; 2018, Salite et al., 2020). In this context, the individual is expected to analyze information and synthesize new information in the process of creating knowledge. While structuring information, in-depth thinking should occur, and mental processes should be activated on a fact or idea (Van De Walle, Karp & Bay –Williams, 2010). Reasoning is at the forefront of these mental processes. However, considering that reasoning not only creates new ideas but also undertakes the task of making the most accurate decision about an event, situation, or subject with existing information (Toulmin, et al., 1984), it can be seen that reasoning plays a role in structuring mathematical knowledge. In other words, it is the individual's reasoning ability that will decide the connection to be established between the information. Because this skill has the feature of examining the relevant situation in depth from many perspectives. Similarly, individuals

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with developed reasoning skills examine the current situation by asking some descriptive questions in order to discover the situations they are faced with (Ersoy, et al., 2017).

Reasoning skill, which is seen as the most important step of mathematical competence (Van de Walle et al., 2010), is seen as a behavior that shapes learning in learning mathematical knowledge (Harms, 2003). While mathematics, by its nature, deals with many topics in fields such as numbers, algebra, and geometry, it also includes discovering patterns, reasoning, making predictions, and justifying (Umay, 2003). Thus, learning mathematics includes not only the acquisition of basic concepts and skills but also the ability to think about mathematics, comprehend problem-solving strategies, and realize that mathematics has a very important place in real life (MoNE, 2018). Therefore, this skill is considered very important in terms of mathematics education and teaching (Erdem & Gürbüz, 2015).

A student's ability to discover the connections between subjects in mathematics and to use these connections to solve the problems he encounters will indicate that he is reasoning (Mandacı-Şahin, 2007). This student's ability to make predictions and assumptions will largely depend on his mathematical reasoning (Yavuz-Mumcu, 2011). As a matter of fact, what gives meaning and explains mathematics is seen as mathematical reasoning (Ev-Çimen, 2008). According to Umay (2003), in order for reasoning to occur, the thought formed through higher-level thinking must be based on knowledge and include approaches within the framework of logic. In other words, if the product obtained through the mental processes performed by the individual is not based on a knowledge base, cannot be justified, and does not contain a correct approach, mathematical reasoning cannot be considered (Gürbüz, et al., 2018). Reasoning teaches us to use discourses such as “if… then…” and “Because…” regarding drawing conclusions and making assumptions (Mason, 2001).

Mathematical reasoning aims to reach a reasonable conclusion by taking into account all aspects of a problem or situation through higher-level thinking (Gürbüz et al., 2018). In other words, this process directs mental processes to work with the data at hand, assigning meanings to the problem or situation from different perspectives, drawing conclusions from them, and ultimately making the right decisions from the results generated. In general terms, mathematical reasoning is seen as a culture that helps to give meaning to the events by examining the events in life from a mathematical perspective and making inquiries with questions such as "Why", "Why" and "How", and leads to make the right decisions as a result of this meaning (Erdem, 2015). Then, we can think that the culture of mathematical reasoning can be formed by changing depending on the mathematical knowledge, perspective, and experiences of the individual. As a matter of fact, Erdem (2015) attributed its formation primarily to the student's positive attitude towards mathematics. In this context, the student's positive attitude towards mathematics will activate the process that will reveal the individual's mathematical reasoning by providing cognitive and affective readiness (Tum, 2019). Therefore, it can be said that the student can take the first step in the process of making mathematical reasoning in this way. Because if an individual wants to achieve something, he must first want it. It can be said that taking the request step in the process of creating this culture of judgment will affect the other steps to be carried out easily. When this desire (positive attitude) that will motivate the individual is combined with sufficient knowledge of methods and mathematical concepts, a culture of mathematical reasoning will be formed. It is seen in studies that creating a culture for mathematical reasoning is possible through creating enriched learning environments that include various teaching methods and techniques of mathematics subjects to be taught at school (Erdem & Soylu, 2019; Kutluca, et al., 2020). Enriched learning environments will develop positive attitudes as they increase students' participation in class. At the same time, effective and permanent learning will occur, and the student will gain sufficient knowledge of methods and mathematical concepts as it encourages reasoning (Kutluca et al., 2020). Thus, the culture of reasoning will be firmly integrated into the mathematics taught at school.

Mathematics taught at school aims to provide the individual with basic mathematical skills to overcome problems that may be encountered in daily life (Fitriana, et al., 2018). In the primary and secondary school mathematics curriculum (MoNE, 2018); emphasis has been placed on raising students who can easily express their own ideas and reasoning in problem-solving processes, who can see the deficiencies in the reasoning of others, and who will logically explain and share mathematical thinking by using mathematical arguments correctly. Trends in International Mathematics and Science Study [TIMSS] sees reasoning as one of the most fundamental goals of mathematics education (Mullis, et al., 2020). The National Council of Teachers of Mathematics [NCTM] (2014); states that an effective mathematics teaching program should help students make sense of their mathematical ideas, involve them in the discussion process, and encourage them to use reasoning skills. On the other hand, Kilpatrick et al. (2001) emphasized that reasoning has a role in holding mathematics together. Therefore, developing students' mathematical reasoning and encouraging them to use it should be a goal in every mathematics course (Bragg, et al., 2018). Because confirming the accuracy of an assumption or event is done by observation in science and by reasoning in mathematics, the basis of mathematics is reasoning (Ross, 1998). Activities such as reasoning, making assumptions, and making logical inferences are the products of intelligence that give mathematics its identity (Baki, 2008). Reasoning appears as an important issue in understanding and learning mathematics (Herbert, et al., 2016). Therefore, we can compare mathematics and reasoning to intertwined wheels that turn each other. For a meaningful learning process to occur, these two wheels must be together. Because it is necessary to use reasoning when solving mathematical problems, and reasoning skills can be improved by learning mathematics (Niswah & Qohar, 2020).

In mathematics education and training, mathematical reasoning is an important part of mathematical ability (Sukirwan, et al., 2018). The way to fully learn mathematics and achieve success in this subject is through mathematical reasoning and mathematical thinking (Umay & Kaf, 2005). The duty of educators is to enable the development of mathematical reasoning, which is seen as one of the vital skills, and to raise awareness in individuals on this issue (Bal-İncebacak & Ersoy, 2016). It is known that reasoning skills are related to mathematics success and that individuals who use reasoning skills achieve success better by developing more effective solutions in problem solving (Kutluca & Tum, 2021). When students' reasoning skills are not developed, there is a perception that mathematics consists of calculations and drawings to which certain rules are applied and made without thinking or justifying (Ross, 1998). Therefore, while it has been demonstrated how important mathematical reasoning is for learning and that it is among the needed 21st-century skills, studies on this skill will have an important place.

In the literature review conducted by Ergün, et al. (2023), the theses on scientific reasoning conducted in Turkey were analyzed. In their meta-synthesis study, postgraduate theses that did not have any curriculum restrictions and dealt with the concept of Reasoning (Turkish version: "Muhakeme") were examined. Similarly, in the meta-synthesis study of Ersanlı, et al. (2018); Postgraduate theses on Reasoning skills (Turkish version: "akıl yürütme becerisi") in the field of educational sciences were examined according to the fields in Bloom's taxonomy, the disciplinary fields used (Cognitive, Affective and Psychomotor) and their main results. In his research, Mercan (2021) examined the type of reasoning skills used with a thematic approach in early childhood Reasoning Skills (Turkish version: akıl yürütme becerileri) in Turkey between 2010 and 2020, in relation to the year and method of the study. Similarly, Uçar (2022) studied 63 articles on the proportional reasoning skill, one of the reasoning types identified through the Web of Science database - without country restrictions - to determine the distributions according to publication year, method, country, sample groups, and sample sizes, themes, topics and results he did. Additionally, Akdoğan (2021), who examined postgraduate theses written about mathematical thinking and mathematical reasoning in Turkey, points out that theses on mathematical reasoning have increased in

recent years. Barak (2022) examined postgraduate theses written in Turkey regarding mathematical reasoning. Unlike the previous studies, our study will examine the articles and theses written in Turkey, which include the concept of reasoning in mathematics teaching and its Turkish synonym, " akıl yürütme ", and determine what kind of tendency the studies show. In addition, a meta-synthesis will be conducted to reveal the similarities and differences of the studies, create a general framework, and integrate the results. It was thought that more accurate results would be obtained if the study included both postgraduate articles and articles based on mathematics teaching and also addressed the synonyms of the concept. For this purpose, we tried to find answers to the following questions:

1. What is the distribution of research according to their types and the years they were conducted?
2. What is the distribution of the sample types and sizes used in the research?
3. What is the distribution of the methods, models, or approaches used in the research?
4. What are the data collection tools used?
5. What types of statistical analyzses were performed?
6. What is the distribution of research according to learning fields?
7. What is the distribution of keywords used in research?
8. What is the distribution of the types of reasoning used in research?
9. What aims were intended to be achieved in the research?
10. What are the results obtained in the research?

2. METHOD

2.1. Research Design

This study was conducted within the scope of qualitative research. The meta-synthesis (thematic content analysis) method, which is the qualitative version of the meta-analysis method, was used (Türkoğlu & Cihangir, 2017). These are studies that aim to evaluate and interpret the findings of research conducted in a specific discipline or subject by comparing their similarities and differences. Meta-synthesis studies involve in-depth synthesis (Polat & Ay, 2016). When the studies in which the meta-synthesis method is used (Aspfors & Fransson, 2015; Ergün et al., 2023; Ersanli et al., 2018; Polat & Ay, 2016) are examined, it is seen that the following process steps are generally followed:

i. Determining the subject,

ii. Determining keywords for the subject and scanning the literature,

iii. Selecting the studies to be evaluated by determining the inclusion criteria of the studies;

iv. Identifying and writing research problems;

v. Analysis and coding of findings for problems;

vi. Evaluating and interpreting the results obtained and interpreting them in the context of the literature

vii. Writing Conclusions and Suggestions.

2.2. Data Collecting

In order to access the studies to be included in the meta-synthesis, databases such as the Council of Higher Education (CoHER) national thesis center, Google Scholar, National Academic Network and Information Center (NANIC), Educational Resource Information Center (ERIC) were used. While scanning the literature, the keywords “reasoning” (Turkish Version: “muhakeme”, “akıl yürütme”) and

"reasoning skill" (Turkish Version: "muhakeme becerisi", "akıl yürütme becerisi") were used. As a result of the scans, a total of two hundred seventy-four studies, two hundred five of which were postgraduate theses and sixty-nine of which were articles, were found in Turkey. When these studies were examined, they were not included in the study because their content was done outside of mathematics teaching or some articles were produced from theses. Even if some articles were produced from a thesis, if one of the keywords specified in the title of the thesis did not appear, the article was included in the study instead of the thesis. No time period was determined when the studies were included in the meta-synthesis study in order to ensure that the concept of reasoning in Mathematics Teaching has a wide range and that its dimensions are examined in as wide a variety as possible and reflected in the research results. In meta-synthesis studies, after a certain amount of data was analyzed and findings started to be created, the relevant databases were scanned one last time on the day of the analysis, as the inclusion of new data would make the analysis and creation of findings difficult. The last scan was conducted on June 19, 2023. Therefore, ultimately, a total of one hundred sixty-three studies (See Appendix-1), including one hundred twenty postgraduate theses and forty-three articles, were included in the meta-synthesis.

2.3. Data Analysis

In this research, the Microsoft Excel 2016 program was used to transfer the necessary information of all studies included in the meta-synthesis to the electronic environment. The way data is transferred to an electronic environment is shown in detail in Figure 1. As seen in Figure 1, the studies are transferred to the electronic environment respectively: author, publication year, publication type, keywords, the purpose of the research, learning field or development field, sample size, sample type, research method, data collection tools, data analysis methods and research results. It was conveyed as. Then, the data transferred to the electronic environment was analyzed with the NVIVO 12 Plus program, a qualitative data analysis software.

	Authors	Year	Publication Typ	Keywords	Aim	...rning or Development F	Sample Size	Sample Type	Methodology	Data Collection	Data Analysis
1	ÇOBAN, Halil	2019	Doctoral Dissertation	Differentiated Instruction, Mathematical Reasoning, Problem Solving	The effect of differentiated instructional	Numbers and Operations	93	Secondary School Stu	Quantitative experimental study/The control	Mathematical Reasoning	Descriptive Analysis, One-Way Anova, Scheffe Test, Kruskal Wallis,
2	ERTAMAN, Zeynep	2009	Master Thesis	Spatial reasoning, spatial visualization, spatial orientation	The effect of teaching activities on spatial	Geometry and Measurement	24	Secondary School Stu	Quantitative methods: The	Spatial Orientation Test	Wilcoxon signed rank test
3	BELİN, Mervenur	2018	Master Thesis	Unspecified	Pre-service mathematics teachers' quantitative reasoning on the development of decimal representation of real numbers and its effect on their comprehension of a related proof	Numbers and Algebra	19	Pre-service Mathema	mixed methods/Embedded experimental study	Proof Comprehension T	Wilcoxon Signed Rank test
4	TUM, Ali	2019	Master Thesis	Styles, Enriched Learning, Mathe	Determine the effect of learning environments enriched using different teaching methods on mathematical reasoning skills and problem solving attitude within the context of learning styles and to provide the reflections of this process from the perspective of the participants	Numbers and Operations	24	Secondary School Stu	mixed methods/Embedded experimental study	Learning Styles Scale, M	Wilcoxon Signed Rank test, K
5	AYDOĞDU, Gülbahi	2023	Master Thesis	Proof, Errors of Reasoning, Colle	Examine the mathematical proof processes of secondary school students through argumentation and to determine the reasoning errors that occur	Numbers and Operations; Geometry and Measurement	64	Secondary School Stu	Qualitative methods/Case Study	Mathematical Proof Test	Content Analysis

Figure 1. How data is transferred to electronic media

The data uploaded to the Nvivo 12 Plus program was coded according to the research questions determined. While coding the sizes of the working groups, if a document review was carried out, the number of documents examined was added to the relevant group size category as a reference. Learning fields are coded according to the fields in the Ministry of Education's preschool, primary, secondary, and high school mathematics curriculum. Since there is a development field instead of a learning field

in preschool, it is coded according to the developmental field. If the learning field was not clearly stated in the studies examined, the learning field was determined by examining the subject examined in the study, the applications made, or the measurement tools applied in detail. If a clear learning field could not be identified after a detailed examination, it was categorized as unspecified. Similarly, the same method was followed when coding the types of reasoning that the studies focused on. While coding the aims of the research, not only the purpose sentence but also the problem and sub-problem sentences were examined. Studies examining postgraduate theses and articles were not included in the synthesis of the results of the studies included in the research, and these were evaluated in the discussion section.

The findings, along with the coding, were presented visually with tables, graphs, or word clouds. The coding was done by the researcher, and approximately 10 percent of the studies included in the study were sent to an academician in mathematics education and asked to code for the research questions. The coding made by the academician and the coding made by the researcher are compatible. The reliability formula of Miles and Huberman (1994) was used to calculate coding reliability. This formula is based on the ratio of coders' common code frequency to the sum code frequency. In this context, coding reliability was calculated as 96%.

3. FINDINGS

3.1. Findings Regarding the Publication Year and Type of Studies

The distribution of the studies included in the research according to publication year, and type is given in Chart 1.

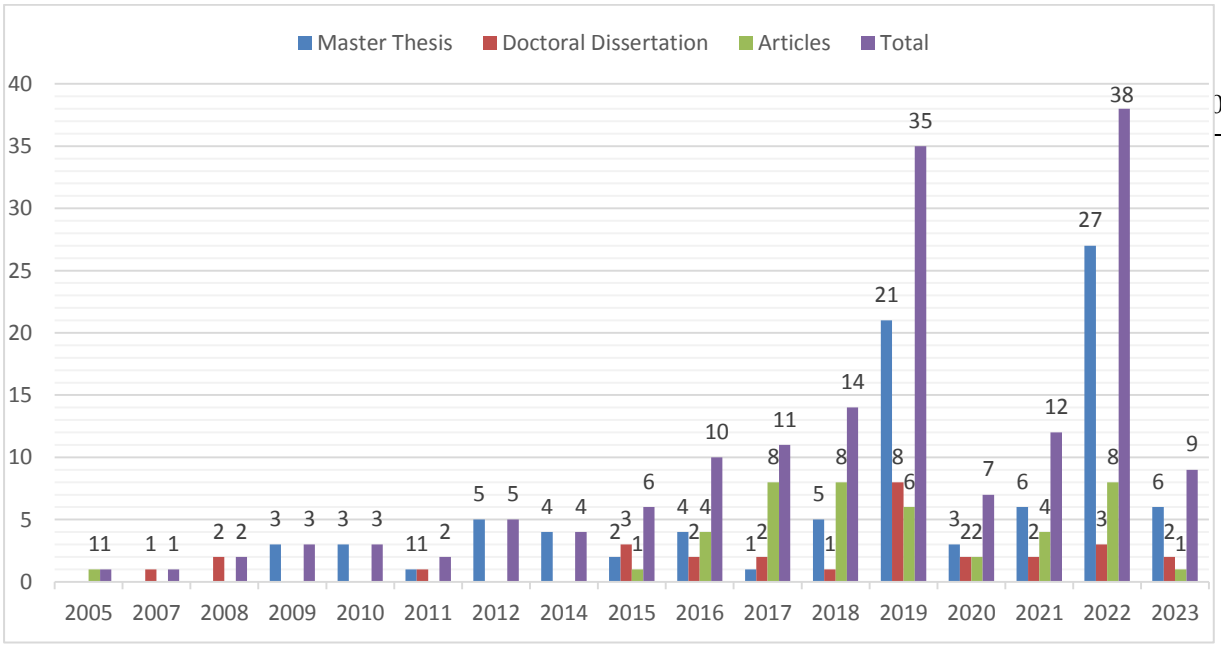

Chart 1. Distribution of publication types by years

When Chart 1 is examined, considering the publication dates of the studies, it is seen that the studies are distributed between the years 2005-2023. The studies included in the research were published mostly in 2022 and 2019. Of the studies examined, 91 are master's theses, 29 are doctoral theses and 43 are articles. Doctoral thesis studies on reasoning are rarely done. It is seen that the increase rate of studies was slow between 2005-2014, but it accelerated slightly in between 2015-2017, and although the number of studies decreased in 2020 and 2021, the number of studies increased after 2018. While the year in which the master's thesis was least published was 2011, the years in which the doctoral thesis was least published were 2007 and 2011. Additionally, the years in which

articles were published the least were 2005, 2015, and 2023. It is a striking finding that only one article on reasoning was published before 2015.

3.2. Findings Regarding the Study Group and Size Focused on in the Studies

Data regarding the study group are shown in Chart 2. The data shown in Chart 2 exceeds the number of studies due to the presence of more than one study group in the same study. The total frequency of the distribution according to the study group is 174. 54.29% of the studies were conducted with secondary school students, 15.52% with candidate teachers, 10.34% with teachers, 6.9% with secondary school students, 5.75% with documents, 3.45% with preschool students, 3.45% with primary school students and 0.57 of them were conducted with families.

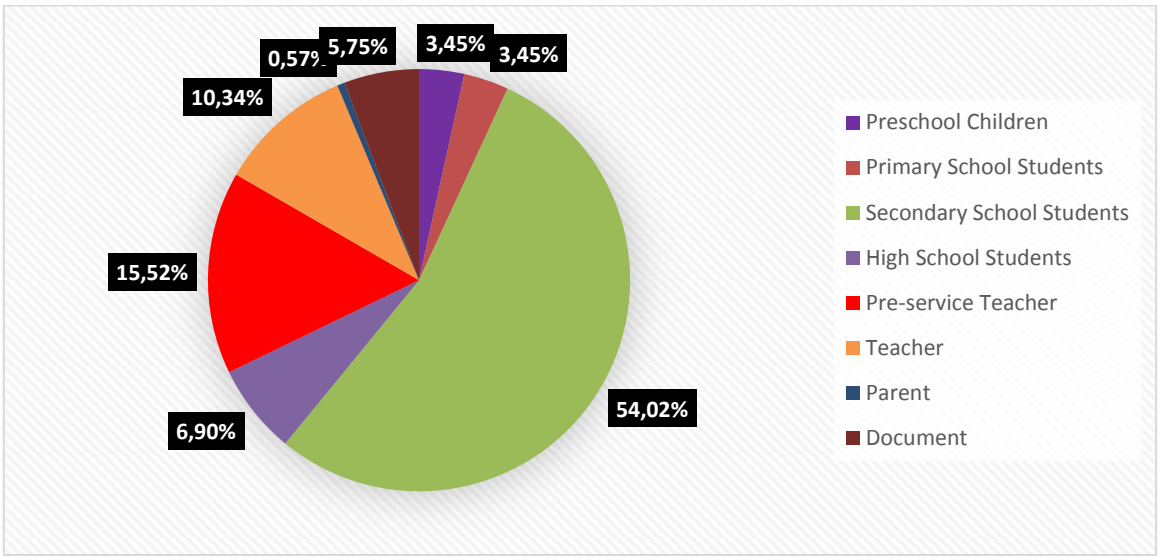

Chart 2. Distribution of working groups

In the studies examined, the size of the study group was also evaluated. The size of the study group was determined and coded within the ranges as given in Chart 3.

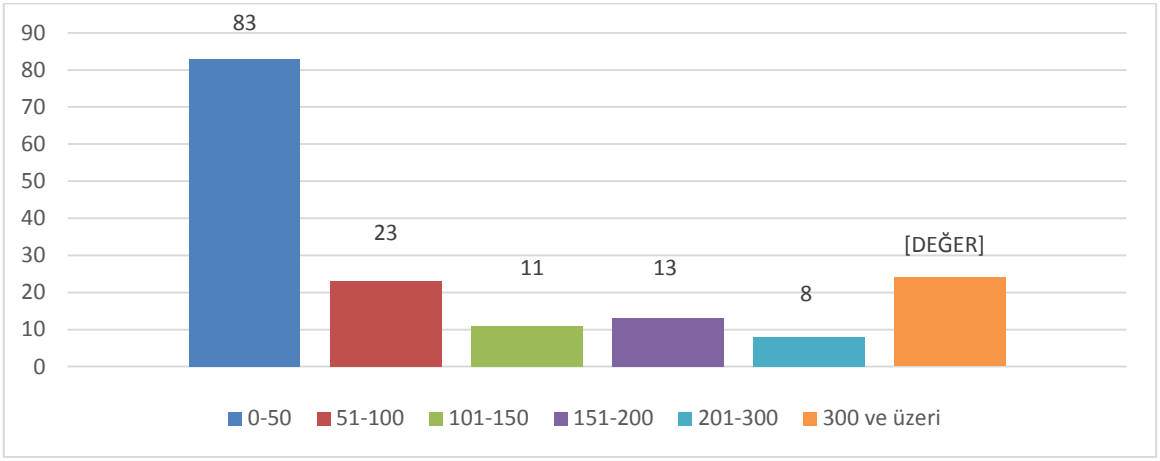

Chart 3. Distribution of the sizes of working groups

When Chart 3 is examined, it is seen that the most preferred working group size is between 0-50. We can say that these researchers prefer to work with small groups in studies on reasoning skills.

3.3. Findings Regarding the Research Methods Used in the Studies

The distribution of findings regarding the research methods used in the studies according to the methods and designs of the studies included in the research is given in Table 1.

Table 1. Distribution of the studies examined according to research methods and designs

Method	**Design**	f	f
Quantitative	Causal Comparative Research	3	55
	Causal Design	1	
	The Action Research	2	
	Descriptive Research Design	1	
	Experimental Study	13	
	Detailed Research	1	
	Developmental Research Method	1	
	Survey	13	
	Relational Survey	13	
	Descriptive Survey	5	
	Cross-Sectional Survey	2	
Qualitative	The Action Research	1	78
	Case Study	53	
	Ethnographic case Study	2	
	Phenomenology	4	
	Teaching Experiment	9	
	Design-Based Research	3	
	Grounded Theory	1	
	Document Analysis Method	5	
Mixed		26	26
Compilation Research	Bibliometric Analysis Research	1	5
	Document Analysis Method	4	
Evaluation tool development Study		1	1
	Total		165*

**Since the studies examined were used in more than one research design, the sum of the frequency for the research design is more than the number of studies. For example, "Relational Survey" and "Descriptive Survey".*

As seen in Table 1, it has been observed that quantitative, qualitative, mixed, compilation research and evaluation tool development studies were used in studies on reasoning skills in mathematics teaching. The most used method in the studies included in this research is the qualitative method (f = 78), while the mixed method (f = 26) is used relatively less than the qualitative and quantitative methods. In addition, compilation research (f = 5) and evaluation tool development studies (f = 1) were carried out the least. When the designs used in the methods are evaluated, the most used quantitative design is the Survey (f = 33), while the Experimental Study (f = 13) is used relatively less than the Survey. Causal Design, Descriptive Research Design, Descriptive Research Design, Detailed Research, and Developmental Research Method are the least used designs, with one study each. In studies where the qualitative method was adopted, the most used pattern was case study (f = 53), while the least used patterns were Action Research and Grounded Theory, with one study each. While Document analysis was the most used method in compilation research, it was observed that bibliometric analysis was the least used research method. Researchers prefer to study case study design, one of the qualitative research methods on reasoning skills in mathematics teaching.

3.4. Findings Regarding the Data Collection Tools Used in the Studies

The distribution of data collection tools used in studies focusing on reasoning skills in mathematics teaching is given in Chart 4. As can be seen from Chart 4, a wide variety of data collection tools were used. Among these tools, it is seen that open-ended questions problems or skill tests (f = 124) are used due to the nature of reasoning, and interview (f = 79) is used due to the nature of reasoning. The questions generally used in skill tests are open-ended. Additionally, "audio and video recording" is accompanied by interviews used as data collection tools.

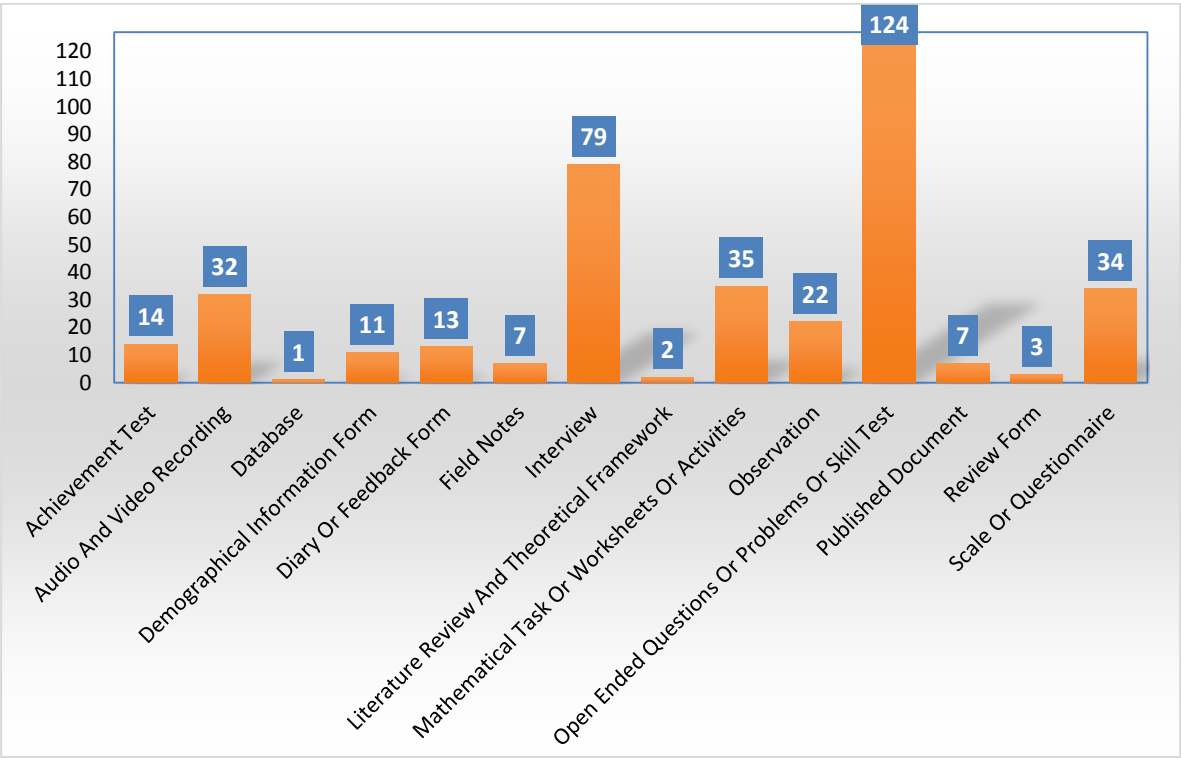

Chart 4. Distribution of data collection tools used in the studies examined

When Chart 4 is examined, it is seen that alternative data collection tools such as "demographic information form", "diary or feedback form", "field notes", and "mathematical task or worksheets or activities" are used.

3.5. Findings Regarding the Data Analysis Methods and Techniques Used in the Studies

The distribution of the findings regarding the data analysis methods and techniques used in the studies according to the data analysis methods and techniques used in the studies on reasoning skills in mathematics teaching in Turkey is given in Chart 5.

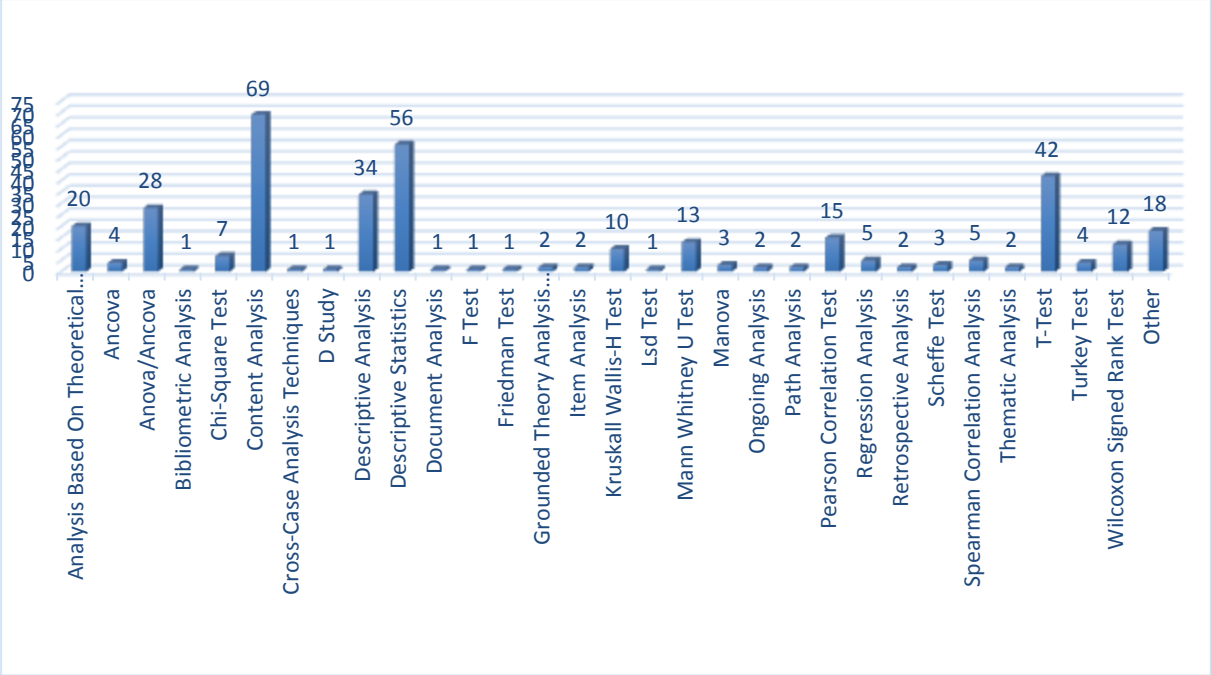

Chart 5. Distribution of methods and techniques used in data analysis in the studies examined

When Chart 5 is examined, it is seen that parametric tests are used more than non-parametric tests. Therefore, it can be said that in studies where a quantitative approach is adopted, the normality assumption required for the application of parametric tests is more met. Among the parametric tests, the t-Test (f=42), Anova/Ancova (f=27), and Pearson Correlation Test (f=15) were used most frequently. It is seen that among the non-parametric tests, Mann Whitney U Test (f = 13), Wilcoxon Signed Rank Test (f = 12), and Kruskall Wallis-H Test (f = 10) are used the most. It is seen that it is used in different analyses as well as parametric and non-parametric tests. The analysis based on the theoretical framework (f = 28) is one of the most prominent analyses. In studies where qualitative approaches were adopted, content analysis (f = 69) and descriptive analysis (f = 34) were most preferred. In addition, descriptive statistics were used in 56 of the 163 studies included in the research.

3.6. Findings Regarding Mathematics Course Learning Fields

The distribution of the learning field or development fields of the studies on reasoning skills in mathematics teaching in the mathematics curriculum published by the Ministry of Education is given in Table 2.

Table 2. Distribution of learning fields focused on in the studies examined

Curriculum	Learning Field or Development Field	f
Preschool Curriculum	Cognitive Development	6
Primary School Mathematics Curriculum	Numbers and Operations	4
	Geometry	2
	Measurement	1
	Data Processing	1
Secondary School Mathematics Curriculum	Numbers and Operations	65
	Algebra	25
	Geometry and Measurement	38
	Data Processing	14
	Probability	15
High School Mathematics Curriculum	Numbers and Algebra	11
	Geometry	10
	Data, Counting, and Probability	4
Unspecified		24
Total		220**

*** Since the studies examined were used about more than one learning field or development field, the sum of the learning field frequency is more than the number of studies.*

When Table 2 is examined, it is seen that studies focusing on reasoning skills in mathematics teaching mostly address the learning areas within the Secondary School mathematics curriculum. In this curriculum, the learning areas of numbers and operations (f=65), geometry and measurement f=38), and algebra (f=25) are covered the most, respectively, while the learning areas of Data Processing (f=14) and Probability (f=15) are covered the least. The least amount of work was carried out on the preschool curriculum. In the preschool curriculum, studies on reasoning skills were carried out only in the field of Cognitive Development (f = 6). When we look at the learning areas in the primary school mathematics curriculum, in the studies included in the research, the most learning areas were numbers and operations (f = 4) and geometry (f = 2), while the least was Measurement and Data Processing, with one study each. Similarly, studies have been conducted mostly on the learning areas of numbers and algebra (f=11) and geometry (f=10) for the secondary school mathematics curriculum. A minimum number of studies have been conducted on the data, counting and probability learning field in secondary school mathematics programs. Additionally, it needed to be specified which learning area the 24 studies focused on.

3.7. Findings Regarding the Keywords Used in Research

In line with the research, the frequency of use of the keywords used in the studies examined was analyzed and according to this result, the word cloud is given in Figure 2. The font size of the words in Figure 2 varies depending on the frequency of use of these words. In other words, as the frequency of use increases, the word size increases.

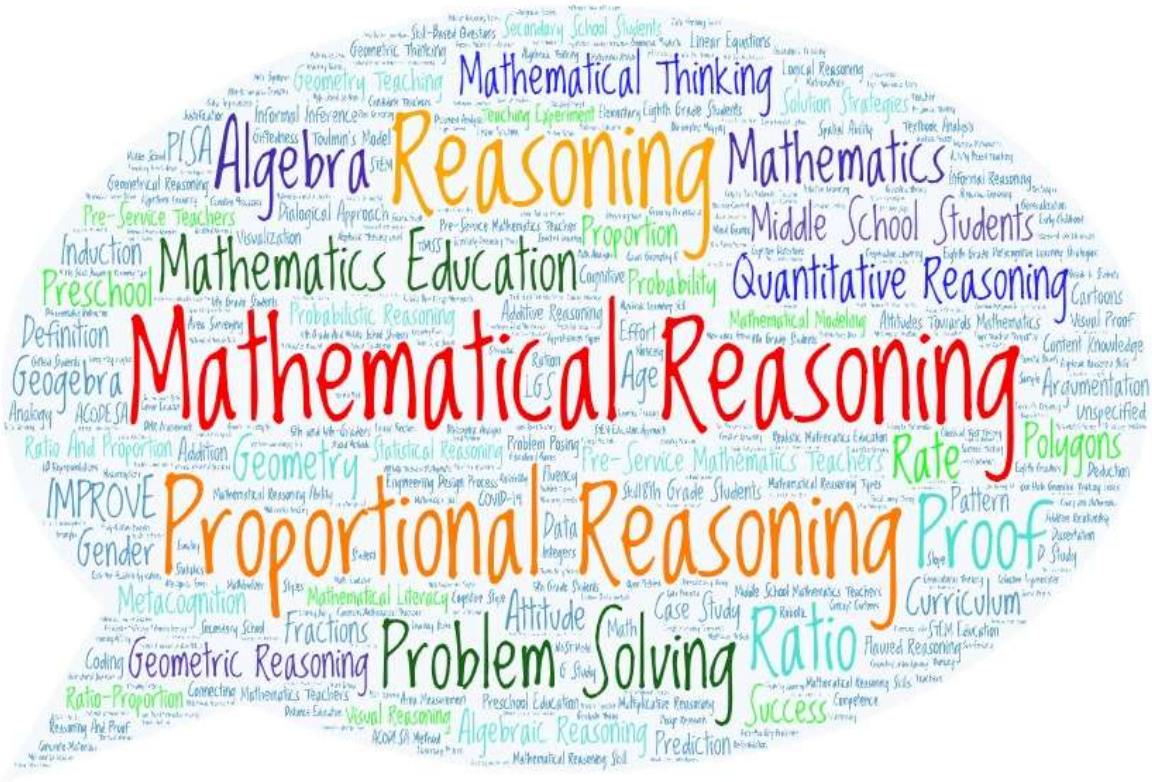

Figure 2. Word cloud of keywords in the studies examined

When Figure 2 is examined, it is understood that the words "Mathematical Reasoning" (f=45), "Proportional Reasoning" (f=31), and "Reasoning" (f=31) were most used as keywords in the studies. It can be said that the greater use of these keywords is due to the fact that the studies focus on the "Numbers and Operations" and "Numbers and Algebra" learning fields. Additionally, it was

determined that these keywords were followed by the words "Problem-Solving" (f=15), "Mathematics Education" (f=14), "Quantitative Reasoning" (f=9), "Mathematical Thinking (f=7) ", "Middle School Students" (f=7), "Algebra" (f=5), "Proof" (f=5) and "Ratio" (f=5).

3.8. Findings Regarding the Types of Reasoning That Research Focuses On

In line with the research, the types of reasoning that were the focal point of the studies examined were determined, and their frequencies were analyzed according to the number of studies. The word cloud in Figure 3 was created. The font size of the words or word groups in Figure 3 varies depending on the frequency of use of these words. In other words, as the frequency of use increases, the size of the words increases. In the studies examined, 21 types of reasoning were identified as focal points.

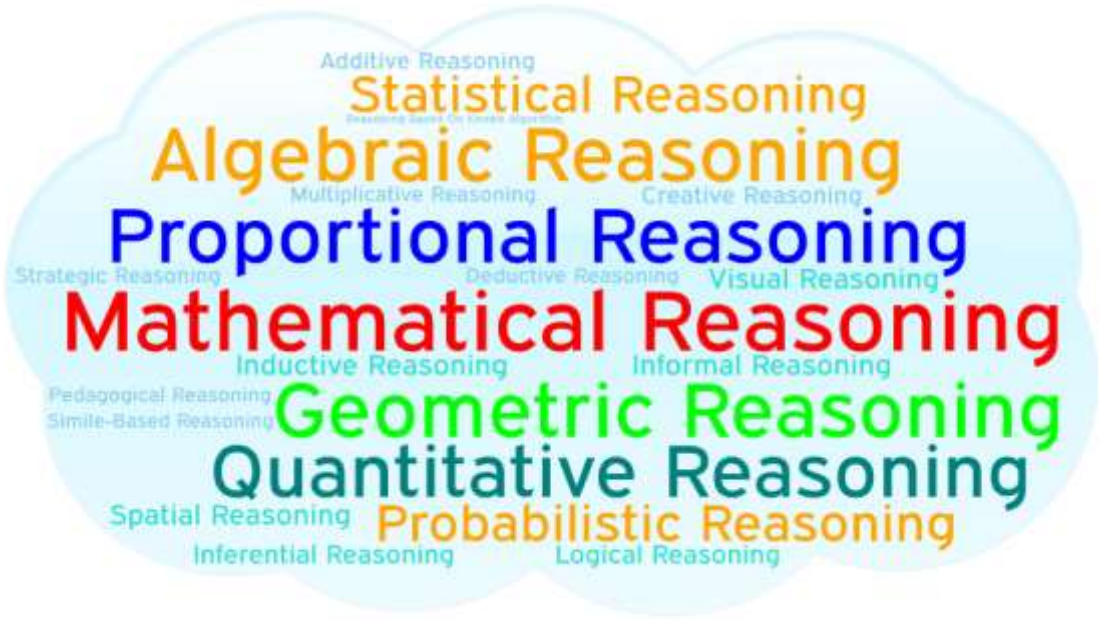

Figure 3. Word cloud of the type of reasoning that the studies examined focus on

When Figure 3 is examined, it can be seen that the studies were mostly focused on mathematical reasoning (f = 72). It was observed that the most focused reasoning after mathematical reasoning was proportional reasoning (f = 37). Geometric reasoning (f=13), quantitative reasoning (f=10), Algebraic reasoning (f=8), and probabilistic reasoning (f=6) are the types of reasoning discussed in more studies than other types of reasoning. Additive Reasoning, Creative Reasoning, Deductive Reasoning, Pedagogical Reasoning, and Strategic Reasoning are the least studied reasoning, with one study each. It has also been found that some of the studies focus on more than one reason.

3.9. Findings Regarding the Aims of the Studies

Findings regarding the aims of the studies included in the research are given in Table 3. Nine themes were created by examining the aims of the studies. These themes are document review, determining the relationships between different reasoning skills, examining the relationship between reasoning skills and other variables, examining the factors that affect reasoning skills in studies, measuring reasoning skills, reasoning process, determining opinions and field knowledge regarding reasoning, scale development, evaluation process and the effect of the applications on reasoning skills.

When Table 3 is examined, it is seen that the studies focus especially on examining the factors affecting reasoning skills (f = 62), measuring reasoning skills (f = 58), and the effect of teaching practices on reasoning skills (f = 54). It was investigated whether reasoning skills differ according to

variables such as gender, grade level, academic or mathematics achievement, age, and parental education level. In addition, under the umbrella of reasoning skills, it aims to measure different types of reasoning skills, such as mathematical reasoning, proportional reasoning, geometric reasoning, probabilistic reasoning, and quantitative reasoning. In addition, studies have been conducted to determine the effect of the use of different educational and instructional applications, such as methods, techniques, models, or activities on reasoning skills, originating from experimental approaches. In the studies examined, the effects of applications such as technology-supported learning, enriched learning environments, STEM, IMPROVE Model, intelligence games, hypothetical learning processes, mathematical modeling activities, multiple representation-based learning, and argumentation-based learning on different types of reasoning skills were examined.

Table 3. Distribution of the studies examined according to their purposes

Theme	Sub-theme	f	f
Document examination	Mathematical reasoning in postgraduate theses or articles	3	10
	Proportional reasoning in skill-based questions	1	
	Mathematical reasoning in early childhood	1	
	Proportional reasoning in articles	1	
	Logical reasoning in mathematics textbooks	1	
	Mathematical reasoning in mathematics textbooks	2	
	Statistical reasoning in the mathematics curriculum	1	
Determining the relationship between different reasoning skills	Algebraic Reasoning-probabilistic Reasoning	1	5
	Algebraic reasoning-spatial reasoning	1	
	Mathematical reasoning-Probabilistic Reasoning	1	
	Proportional reasoning-probabilistic reasoning	1	
	Spatial reasoning-probabilistic reasoning	1	
Examining the relationship between reasoning skills and other variables	Mathematics supported by Mind and Intelligence Games	1	29
	Metacognitive learning strategies	1	
	Algebraic thinking	1	
	Functional thinking	1	
	Visual estimation skills	1	
	Covariational thinking	1	
	High school entrance score	1	
	Mathematical achievement	2	
	Attitude towards mathematics	4	
	Coping with Math	1	
	Mathematical thinking profile	1	
	Reading comprehension	1	
	Learning styles	1	
	Patterning skills	1	
	Perception of self-efficacy	3	
	Problem solving success	2	
	Reflective thinking towards problem solving	1	
	Problem posing skills	1	
	Table and Chart Interpretation Performance	1	
	Spatial ability	1	
	Geometric thinking	2	
Examining the factors affecting reasoning skills	Socio-economic status	2	62
	Academic and mathematics achievement	7	
	Gender	19	
	COVID-19	1	
	Parents' education level	4	
	Duration of training	2	
	Number of siblings	1	

	Reading	1	
	Type of math teacher	1	
	Mathematical competence	1	
	School	1	
	School location	2	
	Problem type	2	
	Grade level	14	
	Age	4	
Examining and measuring reasoning skills	Algebraic reasoning	3	58
	Geometric reasoning	7	
	Visual reasoning	3	
	Statistical reasoning	3	
	Mathematical reasoning	16	
	Quantitative reasoning	4	
	Probabilistic reasoning	5	
	Proportional reasoning	12	
	Pedagogical reasoning	1	
	Strategic reasoning	1	
	Inductive reasoning	2	
	Spatial reasoning	1	
Reasoning process	Arguments and lesson plans used to elicit reasoning	6	24
	The effect of algebraic reasoning applications on misconceptions	1	
	Global argumentation structures	1	
	Reasoning error	5	
	Problem posing skills	2	
	Problem-solving strategies and reasoning types	9	
Determining opinion and field knowledge for reasoning	Awareness	3	7
	Statistical reasoning	1	
	Flawed reasoning	1	
	Mathematical reasoning	2	
Scale development and evaluation process	Development of the mathematical reasoning self-efficacy beliefs scale.	1	3
	Validity and reliability of the reasoning assessment rubric.	1	
	Reliability examination of data collection tool according to theories	1	
The effect of teaching practices on reasoning skills	Argumentation based learning	1	54
	Cognitively challenging activities	1	
	Individual learning	1	
	Mathematics teaching based on discovery learning approach	1	
	Knowledge framework for teaching algebra	1	
	Learning environment that supports algebraic reasoning	1	
	Multiple representations-based instruction	2	
	Educational robotic applications	1	
	Differentiated instruction	1	
	Realistic mathematics education	1	
	IMPROVE model	3	
	Teaching with concept cartoon	1	
	Coding education	1	
	In-service teacher training and practices in the field of mathematical literacy	1	
	Mathematics history activities	1	
	Mathematical modelling activities	2	
	Mathematics activities supported by Montessori materials	1	
	Reasoning and proof activities	1	
	Quantitative reasoning teaching approach	1	
	Focus group studies	1	
	Teaching module based on proportional reasoning	1	
	Origami based teaching	1	

	Game-based mathematics teaching	2
	Pattern-based mathematics education program	1
	Virtual manipulative team	1
	Scenario-based learning	1
	STEM	5
	Improve prediction skills activities	1
	Technology-enhanced learning	7
	Spatial visualization activities	1
	Hypothetical learning process	3
	Mind games	3
	Enriched learning environments	3
	Total	253*

*Since some of the studies examined included more than one purpose, the total frequency is higher than the number of studies included in the research.

In the studies, it is seen that after examining the effects of different teaching practices on reasoning skills, the relationship of this skill with other variables is discussed. When Table 3 is examined, it tries to reveal the relationship with variables such as mathematics attitude, self-efficacy perception, mathematics success, mathematical problem-solving success, geometric thinking, visual estimation, and algebraic thinking. In addition, although there are few studies, the relationship between reasoning types has also been examined. As can be seen in Table 3, the relationship between algebraic reasoning - probabilistic reasoning, algebraic reasoning - spatial reasoning, mathematical reasoning - probabilistic reasoning, proportional reasoning - probabilistic reasoning, and spatial reasoning - probabilistic reasoning was examined.

In the studies included in the research, the reasoning process was examined due to its structure. Especially since reasoning skills are demonstrated in problem-solving in mathematics, the strategies and types of reasoning used in this process have been tried to be examined. In addition, studies were carried out to identify the arguments and lesson plans used to reveal reasoning skills. Errors made while using reasoning skills were also tried to be identified. Reasoning skills are used not only when solving problems, but also in problem-posing studies. This aspect has been addressed in studies conducted.

When Table 3 is examined, studies have been conducted examining various documents according to different types of reasoning. These studies aim to examine mathematics textbooks, graduate theses, or articles with the main theme of mathematical reasoning, both published articles and skill-based questions published by MONE in terms of proportional reasoning, mathematics textbooks with a focus on logical reasoning, and mathematics curriculum in the context of statistical reasoning.

When we look at the studies examined, studies have been carried out to determine opinions and field knowledge regarding reasoning. It seems that the aim is to determine awareness of the skill in question and to determine opinions and field knowledge about mathematical reasoning, flawed reasoning, and statistical reasoning.

In the studies examined, a small number of scale development and evaluation studies have been carried out. It seems that the aim is to develop a mathematical reasoning self-efficacy scale. In addition, while it was aimed to conduct validity and reliability studies of the table prepared for the evaluation of reasoning skills, another study aimed to compare the reliability of a data collection tool for reasoning skills according to different theories.

3.10. Findings Regarding the Results Obtained in the Studies Examined

Findings regarding the results of the studies included in the research are given under nine themes. The results under the theme of examining documents in terms of reasoning are given in Table 4.

Table 4. Examination of documents in terms of reasoning

SUBJECT- THEME*	Result
• Proportional reasoning in skill-based questions • Mathematical reasoning and logical reasoning in mathematics textbooks • Statistical reasoning in the mathematics course curriculum	• Approximately one in every four questions published by MoNE involves proportional reasoning. The most were published on data analysis, the least on inequality and geometric concepts. Skills-based questions published are not evenly distributed across proportional reasoning problem types. • Reasoning and proof are not included enough in the mathematics textbook and are not sufficient for students to develop their own reasoning skills and strategies. • In current mathematics curriculum, there are deficiencies in some achievements in terms of collecting, defining, organizing, representing data and analyzing and interpreting data, and they are insufficient in terms of developing statistical reasoning.

**Systematic review studies examining theses or articles on reasoning skills are not included in the findings, and their results will be discussed in the discussion section.*

When Table 4 is examined, it can be seen that there are skill-based questions, mathematics textbooks, and mathematics curriculum published by MoNE for reasoning skills. Approximately 25% of published skill-based questions involve proportional reasoning. In addition, among skill-based questions involving proportional reasoning, most questions were asked about data analysis and the least about inequality and geometric concepts. Reasoning and proof are not included sufficiently in mathematics textbooks at different grade levels. Textbooks were deemed inadequate in terms of allowing students to develop their own reasoning skills. Mathematics teaching programs have been found inadequate in terms of statistical reasoning.

Findings regarding the theme of determining the relationship between different types of reasoning skills are given in Table 5.

Table 5. Determination of the relationship between different types of reasoning skills

Subject	Result
Algebraic Reasoning-Probabilistic Reasoning	• There is a weak positive significant relationship.
Algebraic Reasoning-Spatial Reasoning	• There is a positive, significant, and medium-level relationship.
Mathematical Reasoning-Probabilistic Reasoning	• There is a high level of positive correlation.
Proportional Reasoning-Probabilistic Reasoning	• There is a high level of positive correlation.
Spatial Reasoning-Probabilistic Reasoning	• There is a weak positive significant relationship.

Studies have found a positive relationship between algebraic reasoning and probabilistic reasoning, and between spatial reasoning and probabilistic reasoning, but this relationship is weak. If we look at the relationship between algebraic reasoning and spatial reasoning, it turns out that there is a moderate positive relationship. Mathematical reasoning and proportional reasoning separately have a high positive relationship with probabilistic reasoning.

Findings regarding the theme of examining the relationship between reasoning skills and other variables are given in Table 6.

Table 6. Examining the relationship between reasoning skills and other variables

Variable	Result
• Mathematics Teaching Supported by Mind and Intelligence Games	• There is a positive relationship.
• Metacognitive Learning Strategies	• There is a moderate relationship in the positive direction.
• High School Entrance Score	• There is a significant positive relationship.
• Coping with Mathematics	• There is a significant positive relationship.
• Reading Comprehension	• There is a significant positive relationship.
• Learning Styles	• There is a significant positive relationship.
• Skill of Pattering	• There is a significant positive relationship.
• Reflective Thinking Skills Towards Problem-Solving	• There is a significant positive relationship.
• Table Interpretation and Graphic Interpretation Performances	• There is a significant positive relationship.
• Spatial Ability	• There is a significant positive relationship.
• Algebraic Thinking	• There is a positive relationship.
• Functional Thinking	• There is a positive relationship.
• Covariational Thinking	• There is a positive relationship.
• Visual Estimation Skills	• There is a moderate relationship in the positive direction.
• Mathematical Thinking Profile	• There is a moderate relationship in the positive direction.
• Problem-Solving Success	• There is a moderate relationship in the positive direction.
• Problem Posing Skill	• There is a significant positive relationship.
• Mathematics Achievement	• There is a significant positive relationship.
• Mathematics Attitude	• There is a significant positive relationship.
• Perception of Self-Efficacy	• There is a significant positive relationship. (Moderate and weak level)
• Geometric Thinking	• There is a significant positive relationship.

In the studies examined, the relationship of 21 variables with reasoning skills was examined. It is seen that there is a positive relationship between all the variables given in Table 6 and reasoning skills. There is no variable in the studies for which no significant relationship was found.

Findings regarding the theme of factors affecting reasoning skills are given in Table 7.

Table 7. Factors affecting reasoning skills

Factor	Result
Socio-Economic Level	• As the socio-economic level increases, judgment becomes better.
Academic or Math Achievement	• Generally, as the level of success increases, the level of reasoning skills increases.

Gender	• In terms of mathematical reasoning, both girls perform better than boys and boys perform better than girls. However, most studies show that gender is not effective. • Although female students have higher level skills in probabilistic reasoning than male students, there are results showing that gender has no effect. • Although proportional reasoning shows that girls are more successful than boys, there are also results showing that gender is not effective. • It does not affect spatial reasoning, geometric reasoning, and algebraic reasoning.
Covid-19	• It negatively affected mathematical reasoning skills.
Educational Status of Parents	• It affects reasoning skills. As parents' education level increases, children use higher-level reasoning skills.
Duration of Training	• Whether children's duration of preschool education affects their mathematical reasoning varies from sample to sample.
Number of siblings	• It does not affect mathematical reasoning skills.
Reading	• It does not affect mathematical reasoning skills.
Mathematics Teaching Type	• It does not affect statistical reasoning skills.
Mathematical Proficiency	• It affects proportional and probabilistic reasoning. As mathematical proficiency increases, success in using reasoning skills will increase.
School Type	• It affects mathematical reasoning.
School Location	• It affects mathematical reasoning.
Problem Type	• It affects proportional judgment.
Grade Level	• It generally affects proportional reasoning. Proportional reasoning skills do not increase consistently as grade level increases. • It is not effective in inductive reasoning skills. • Although it affects mathematical reasoning skills in some samples, it exists in cases where it does not. • Although it affects geometric reasoning skills in some samples, there are cases where it does not. • It is effective in probabilistic reasoning skills.
Age	• It affects mathematical reasoning. As age increases, mathematical reasoning improves.

When Table 7 is examined, socio-economic level, academic and mathematics achievement, parents' education level, mathematical competence, school type, school location, problem type, and age factors affect reasoning skills. It also appears that the Covid-19 factor negatively affects reasoning skills. Type of mathematics teacher, reading books, and number of siblings are factors that do not affect your reasoning skills. Apart from this, when we look at the factors of gender, duration of education, and grade level, we see that there are different results indicating that they affect or do not affect reasoning skills. When we look at the gender factor, results show that it affects mathematical reasoning, probabilistic reasoning, and proportional reasoning. However, it seems that gender has no effect on spatial reasoning, geometric reasoning, and algebraic reasoning. Similarly, in the grade level factor, it can be seen that there are different results in proportional reasoning, inductive reasoning, geometric reasoning, mathematical reasoning, and probabilistic reasoning.

Findings regarding the theme of examining and measuring reasoning skills are given in Table 8. When Table 8 is examined, 12 types of reasoning are examined, including algebraic reasoning, geometric reasoning, visual reasoning, statistical reasoning, mathematical reasoning, quantitative reasoning, probabilistic reasoning, proportional reasoning, pedagogical reasoning, strategic reasoning, inductive reasoning, and spatial reasoning.

Algebraic reasoning skills have been measured, and it is seen that there are different levels of results in the studies. In studies conducted on geometric reasoning skills, it was found to be at an intermediate level. In addition, the most used components in geometric reasoning have been identified. In studies on visual reasoning, the stages used when using the skill have been identified. Statistical

reasoning skills were measured at the temporal level and quantitative level, and it was determined that there were difficulties in explaining ideas, making predictions, and making inferences.

Table 8. Examination and measurement of reasoning skills

Reasoning Type	Result
Algebraic Reasoning	• Reasoning Skill level was measured (Low, Medium, and Good).
Geometric Reasoning	• Measured as medium level. • The most common components are putting forward ideas and making inferences. They also make more flawed or faulty judgments.
Visual Reasoning	• When using visual reasoning, stages such as reading the question, explaining, making a plan, examining geometric shapes, explaining relationships, showing given mathematical expressions on a visual, expressing conceptual knowledge, adapting information to a visual, showing with a figure or model, proving, and evaluating are followed.
Statistical Reasoning	• Measured at Level 2 (temporary) and Level 3 (quantitative). • There is difficulty in expressing ideas, making predictions, and making inferences in questions that require reasoning.
Mathematical Reasoning	• Generally measured at medium and low levels. Expected strategies are not used sufficiently. • It is seen that they show a wide range of performance in all reasoning processes, such as analysis, generalization, and reasoning in mathematical problems. • A mathematical relationship is established between what is wanted and what is given, and the right and appropriate decision is made to solve the problem. • They exhibited superficial thinking structures and showed that they primarily preferred mathematical reasoning types based on analogy. • It has been observed that there are difficulties in the sub-steps of reasoning, such as "solving non-routine problems, developing logical arguments for the solution, making generalizations, determining and using appropriate reasoning".
Quantitative Reasoning	• He/she has weak and insufficient quantitative reasoning skills. The quantitative reasoning levels of those who resort to memorized knowledge and formulas that they do not understand, instead of reasoning by establishing relationships between quantities in the problems they encounter in daily life and at school, remain at a low level.
Probabilistic Reasoning	• Probabilistic reasoning skills were measured at poor, moderate, and good levels.
Proportional Reasoning	• It seems that they are not sufficient in terms of proportional reasoning skills.
Pedagogical Reasoning	• Teachers make pedagogical judgments by considering how the activities to be chosen for mathematics teaching will affect students' learning processes and how the teacher will organize his/her own teaching process.
Strategic Reasoning	• Different solutions are made in the process of making sense of the context in open-ended problems.
Inductive Reasoning	• Measured as good or moderate.
Spatial Reasoning	• Measured at a good level.

Mathematical reasoning skills were measured at medium and low levels, and it was determined that the expected strategies were not used sufficiently. It was determined that they exhibited very variable performances in the reasoning process steps and had difficulties in some sub-steps. When we look at the quantitative reasoning skill measurements, an inadequate and not strong performance was detected. It is seen that the use of rote knowledge and formulas that do not make sense in problem-solving decreases quantitative reasoning performance.

Probabilistic reasoning skills showed different levels of performance. In studies examining proportional reasoning, it is seen that the study group is not at a sufficient level. How teachers use their pedagogical reasoning in planning their lessons and selecting activities for this purpose was examined. In open-ended problems, different solution strategies are used, and convincing explanations are given. However, it is seen that there are problems in identifying connections and

relationships. Regarding spatial reasoning skills, good measurements were obtained in the studies, while different levels of measurements were obtained in the inductive reasoning skill.

Findings on the reasoning process theme are given in Table 9. When Table 9 is examined, the reasoning process is discussed over six topics. Arguments and lesson plans used to reveal reasoning, the effect of algebraic reasoning practices on misconceptions, global argumentation structure, reasoning errors, problem-posing skills and strategies used in problems, and reasoning types were included.

Teachers use arguments such as asking for answers, explanations, and evaluations to emphasize students' reasoning skills in the teaching and learning process. In the case of algebraic reasoning, lesson plans were developed, and learning environments were designed based on the indicators of this skill. In addition, it was determined that learning based on peer collaboration with computer-aided applications and the teacher's behavior to support this would have a positive effect on reasoning skills. It was determined that mathematics teachers act according to the reasoning framework in the literature to encourage the use of reasoning skills in their geometry lessons. Despite all these, it was also found that teachers provided limited opportunities to encourage students to use their mathematical reasoning.

Table 9. The reasoning process

Theme	Result
Arguments and lesson plans used to elicit reasoning	• Actions such as asking for an answer, confirming the correct answer, clarifying, asking for evaluation, giving conceptual information and making an explanation are performed. • The lesson was planned according to algebraic reasoning indicators, and the learning environment was developed within this framework. • Students are provided with limited opportunities to use their mathematical reasoning. • Prioritizing peer collaboration through computer-aided applications and providing teacher support reflects positively on the use of reasoning skills. • Mathematics teachers act according to Duval's reasoning framework in order to use geometric reasoning skills in geometry courses.
The Effect of Algebraic Reasoning Applications on Misconceptions	• Although algebraic reasoning applications are effective in eliminating misconceptions, it is not right to generalize this for all students.
Global argumentation structure	• It was revealed that mathematical reasoning skills were weak, and therefore, simple global argumentation structures were mostly used.
Errors in judgment	• Treating special cases as proof and starting with wrong assumptions are errors in reasoning. Missing mathematical definitions or including unnecessary steps and expressions in the proof creates a gap in reasoning. • In problems requiring reasoning, mistakes are made in additive relationships, neglecting data, using numbers and lack of context, responding emotionally, and not being able to determine non-proportional situations. • In proportional problems, additive or absolute is considered. • Students not completing the reasoning process or experiencing conceptual deficiencies and turning to formulaic solutions are used to create reasoning errors.
Problem posing skill	• The problems posed are routine problems that require judgment, contain quantitative data rather than being of a qualitative character, are far from original and uncreative, and can be solved directly with algorithms. • There are difficulties in posing problems based on semi-structured reasoning.
Strategies and types of reasoning used in problems	• The strategies used vary depending on grade level. For example, while there is no clear strategy at the 6th-grade level of secondary school, 7th-graders mostly use the inside-outside strategy and unit ratio, and 8th-graders use the unit ratio and equivalent fraction strategy. • Teachers mostly use curriculum-dependent and routine problems and avoid problems that require superior reasoning. • Students mostly use algorithm-based mathematical reasoning.

Although algebraic reasoning practices seem to be effective in eliminating misconceptions, this effect does not seem to be valid for every student or student group. It is seen that the argumentation structure used by individuals with weak mathematical reasoning skills in the reasoning process remains at a simple level.

When we look at the issue of judgment error, it is seen that treating special situations as proof, starting with wrong assumptions, including unnecessary expressions, additive relationships, neglecting data, using numbers and lack of content, responding emotionally, and not being able to determine non-proportional situations allow judgment errors to occur. In addition, students' use of formulaic solutions in their minds causes errors in reasoning.

In problem-posing studies, it has been determined that problems are posed that are quantitative rather than qualitative, that do not involve reasoning, that are far from originality and creativity, and that can be solved directly with algorithms. It has also been revealed that there are difficulties when posing problems that require semi-structured reasoning.

In the strategies used in problem-solving at the secondary school level, it is seen that there is no clear strategy in the 6th-grade, while the inside-outside strategy and unit ratio are used in the 7th-grade, and the equivalent fraction strategy with unit ratio is used in the 8th-grade. In addition, it is seen that teachers do not include problems that require reasoning and high-level reasoning in their lessons but rather routine problems related to the curriculum and related strategies. Students mostly use algorithm-based mathematical reasoning in problem-solving.

Findings regarding the theme of determining opinion and field knowledge regarding reasoning are given in Table 10. Under this theme, it can be seen that there are results regarding awareness of reasoning, statistical reasoning, flawed reasoning, and mathematical reasoning. When Table 10 is examined, it can be seen that students need to be made aware of how important reasoning is for their mathematical development and that they need to have sufficient experience in reasoning. It has also been determined that secondary school mathematics teachers do not have sufficient knowledge about mathematical reasoning. Despite this, it has been determined that teachers and teacher candidates are sufficient in terms of paying attention to the solutions made by students, interpreting their meanings in mathematics based on the solutions, and giving feedback to students regarding their mistakes. It has been determined that there are deficiencies in teachers' pedagogical content knowledge regarding statistical reasoning, and their level of knowledge about flawed reasoning is insufficient.

Table 10. Determination of opinion and field knowledge regarding reasoning

Theme	Result
Reasoning Awareness	• Students are not aware of the importance of reasoning in terms of mathematical development. Additionally, they do not have sufficient experience in terms of reasoning. • Secondary school mathematics teachers do not have comprehensive and sufficient knowledge and views on mathematical reasoning. • In general, it seems that teachers and teacher candidates are competent in paying attention to student solutions, interpreting students' understanding of mathematics from student solutions, and deciding how to give feedback on student mistakes.
Statistical Reasoning	• There are deficiencies in teachers' pedagogical content knowledge regarding statistical reasoning.
Flawed Reasoning	• Teachers' level of knowledge about flawed reasoning is insufficient.
Mathematical Reasoning	• Pre-service mathematics teachers gave various answers about what mathematical reasoning is. For example, relating the subject to with daily life, realizing the relationship between operations and concepts. • Pre-service mathematics teachers with high levels of Mathematical Thinking have more comprehensive views on reasoning.

It is seen that prospective mathematics teachers try to make sense of mathematical reasoning with expressions such as associating mathematical reasoning with daily life and determining the relationship between operations and concepts. In addition, in studies conducted with mathematics teachers, it was determined that teachers with a higher level of mathematical thinking had more comprehensive and qualified views on reasoning.

Findings regarding the theme of scale development and evaluation process are given in Table 11. When Table 11 is examined, it can be seen that the validity and reliability of the mathematical reasoning self-efficacy beliefs scale and reasoning evaluation table were developed. In addition, the reliability of the existing scale measuring mathematical reasoning performances of 7th-grade secondary school students was compared according to classical and generalizability theories, and it was determined that reliability was achieved according to both theories. Of these two theories, it is seen that the generalizability theory gives more detailed results.

Table 11. Scale development and evaluation process

Theme	Result
Development of the mathematical reasoning self-efficacy beliefs scale.	• It was developed for prospective mathematics teachers, and its validity and reliability have been ensured.
Validity and reliability of the reasoning assessment rubric.	• It was developed based on the mathematical reasoning criteria in the PISA 2021 Mathematics Framework and is sufficiently valid and reliable.
Reliability comparison of the data collection tool according to theories	• The reliability of the scale measuring mathematical reasoning performance for seventh graders was calculated according to classical test theory and generalizability theory. According to both theories, scale reliability is at a sufficient level, and generalizability theory provides more detailed results.

The findings regarding the theme of the effect of the applications on reasoning skills are given in Table 12. When the table is examined, it is seen that there were 33 teaching practices whose effects on reasoning skills were examined in the studies examined. It is seen that each of these practices has a positive effect on reasoning skills and improves reasoning skills.

Table 12. Effect of applications on reasoning skills

Application	Result
• Argumentation Based Learning • Cognitively challenging activities • Individual Teaching • Mathematics teaching is based on the discovery learning approach. • Knowledge framework for teaching algebra • Learning environment that supports algebraic reasoning • Multiple Representation-Based Teaching • Educational Robotic Applications • Differentiated Instruction • Realistic Mathematics Education • IMPROVE model • Teaching with concept cartoons • Coding Training • In-service teacher training and practices in the field of mathematical literacy • History of Mathematics Activities • Mathematical modeling activities • Mathematics activities supported by Montessori materials • Reasoning and Proof activities • Quantitative reasoning teaching approach • Focus Group Studies • Teaching module based on proportional reasoning • Origami Based Teaching • Game-Based Mathematics Teaching • Pattern-Based Mathematics Education Program • Virtual Manipulative Team • Scenario-based learning • STEM • Activities that improve forecasting skills • Technology supported learning • Spatial visualization activities • Hypothetical Learning process • Intelligence games • Enriched Learning environments	• It affects positively.

4. DISCUSSION and CONCLUSION

Reasoning skill is one of the most basic indicators of mathematical competence. This skill is considered extremely important in teaching, learning, and making sense of mathematics. While it is mentioned in the literature that reasoning skills positively affect mathematics achievement, it is necessary to develop reasoning skills in terms of mathematics education and training or to allow teachers to use this skill by giving students enough opportunities. Therefore, it is thought that conducting a metasynthesis study by holistically evaluating the studies on reasoning in mathematics teaching in Turkey will contribute to both the literature and researchers who want to work on reasoning skills in mathematics teaching. A total of 163 studies from theses and articles were included in the scope of the research. These studies were analyzed descriptively according to type, year, method, sample type and size, data collection tools, statistical analysis, learning field, keywords, reasoning type, and purpose. In addition, by combining the results of the studies included in the research with a holistic approach, the differences, and similarities between them were coded and tabulated.

Of the 163 studies within the scope of the research, 91 are master's theses, 29 are doctoral theses, and 43 are articles. In line with expectations, most master's theses were published. The number of theses at the doctoral level is quite low. It is recommended that you write a more qualified and comprehensive doctoral thesis. It is seen that there has been an increasing trend over the years in studies on reasoning skills in mathematics teaching. It is seen that there is a gradual increase in the number of studies after 2005-2014, 2015-2017, and 2018. It is thought that this gradual increase may be due to the updating of the 2013, 2015, and 2018 mathematics curriculum, which started in 2005, and the reasoning skill, one of the 20th-century skills, finding a place in these programs. In addition, despite the increasing trend, the reason for the decrease in studies in some years (2020 and 2021) is the negative effects of the COVID-19 epidemic, which has affected the whole world. The results regarding the publication year and type are parallel to the studies of Akdoğan (2021) and Barak (2022), who examined postgraduate theses on mathematical reasoning.

In terms of sample, most studies were conducted with secondary school students. After secondary school students, most studies were conducted on teacher candidates and teachers. The least studied sample type was parents. These results are parallel to the studies of Akdoğan (2021) and Barak (2022), who examined theses written on mathematical reasoning. Similar results were obtained with meta-synthesis studies on proportional reasoning (Uçar, 2022) and scientific reasoning in science education (Ergün, et al., 2023). According to Piaget's theory of cognitive development, the period in which the transition from the concrete operations period to the abstract operations period will be achieved corresponds to the secondary school level. With the transition to the abstract operations period, children will begin to use mathematical thinking skills. Therefore, it can be said that the use of reasoning skills will be more prominent and active in this period. However, a conclusion can be drawn more easily about the students' reasoning levels. For these reasons, studies on reasoning skills may have been carried out mostly with secondary school students. Additionally, there may be only one explanation for the fact that most studies are conducted on candidate teachers and teachers after secondary school students. It will be the teacher himself who will encourage these students to use reasoning skills and create suitable learning environments to develop these skills. Therefore, it is thought that the teacher or teacher candidate who will do these should have sufficient knowledge of reasoning skills and be able to use reasoning skills at a certain level.

When evaluated in terms of the methods and designs used in the studies, it was concluded that more studies using qualitative methods were conducted. While this result is parallel to the results of Akdoğan's (2021) and Barak's (2022) studies, it does not agree with Uçar's (2022) study. Fewer studies have been conducted with mixed methods compared to quantitative and qualitative methods, and while this result supports Barak's (2022) study, it does not agree with Akdoğan's (2021) study. It is thought that the reason for this is that more studies can be accessed due to the inclusion of articles other than the thesis in our study. When looking at the research designs, the most used quantitative ones were Survey and Experimental studies, while the most used qualitative ones were case studies. It is a striking result that, in general, case studies are the most preferred among the designs, regardless of whether they are quantitative or qualitative. It can be said that conducting more surveys and experimental studies in quantitative research may be prompting researchers to use these patterns, as it is emphasized in the literature how important the reasoning skill is in teaching mathematics, the current status of this skill should be determined, and learning environments should be designed to develop this skill with contemporary approaches. In addition, it is thought that the reason why case study is used more than other designs is due to the fact that it gives the opportunity to examine in depth how this skill is used with the questions "why?", "how?", rather than determining the current situation due to the structure of the reasoning skill. While this result overlaps with some studies in the literature (Akdoğan, 2021; Barak, 2022), it is also possible to come across a study that does not overlap (Ergün et al., 2023).

When the data collection tools used in the research are evaluated, it is concluded that skill tests and interviews are used more. The fact that reasoning is an abstract concept due to its nature and structure encourages researchers to use skill tests and interviews as data collection tools. In addition, it seems that skill tests consist mostly of open-ended questions. It is thought that open-ended problems, which cannot be easily solved, require the use of more than one strategy, and require students to think at a higher level, will better demonstrate reasoning skills. It is emphasized in the literature that open-ended problems are important in terms of reasoning skills in mathematics teaching (Erdem, 2015; Tum, 2019). In addition, it is thought that using interviews as a data collection tool is extremely important in terms of fully concretizing and in-depth examination of reasoning, which is a cognitive skill. In this sense, it can be said that conducting interviews will support the results of the skill tests. It can be said that the results obtained according to the data collection tools are parallel to the studies in the literature (Akdoğan, 2021; Barak, 2022; Uçar, 2022; Ergün et al., 2023).

When the methods and techniques used in the analysis of data are examined, it is seen that parametric tests (t-Test, ANOVA/ANCOVA, and Pearson Correlation Test) are used more than non-parametric tests (Mann Whitney U Test, Wilcoxon Signed Rank Test, and Kruskall Wallis-H Test) in studies where quantitative approaches are adopted. This indicates that the normality assumptions are more met in the studies. Content and descriptive analyses are seen more frequently in studies where qualitative approaches are adopted. It is seen as a striking result that content analysis and descriptive analysis are used more than other methods and techniques. The results regarding the methods and techniques used in data analysis coincide with the study of Ergün et al. (2023).

Studies on the learning fields in the mathematics curriculum are mostly carried out in the field of learning numbers and operations in the secondary school mathematics curriculum. This result is parallel to the studies of Akdoğan (2021) and Barak (2022). After the field of learning numbers and operations, most studies have been carried out in the fields of learning geometry and measurement, algebra, probability, and data analysis, which are also included in the secondary school mathematics curriculum. It is a remarkable result that among all learning fields, there are the least number of studies in the measurement and data analysis learning fields in the primary school mathematics curriculum compared to the others.

When the keywords used in the research are examined, it is seen that the words "Mathematical Reasoning", "Proportional Reasoning" and "Reasoning" are most used. It can be said that the use of these keywords is due to the fact that more studies are conducted in the field of numbers and operations in the secondary school mathematics curriculum and in the field of learning numbers and algebra in the secondary school mathematics curriculum, at each curriculum level, compared to the others. It can be seen that the keywords mentioned above are followed by the words "Problem-Solving", "Mathematics Education", "Quantitative Reasoning", "Mathematical Thinking", "Middle School Students", "Algebra", "Proof" and "Ratio", respectively. Çoban and Tezci (2022), who examined 545 publications published in different journals on mathematical reasoning with bibliometric analysis, revealed that the keywords "mathematical reasoning", "problem-solving", and "mathematical thinking" were used most. This result coincides with our result for keywords.

When evaluated in terms of reasoning types, which are the focus of the studies, almost half of the studies were conducted on mathematical reasoning. After mathematical reasoning, the focus was on proportional reasoning, followed by geometric reasoning, quantitative reasoning, algebraic reasoning, and probabilistic reasoning. Additive Reasoning, Creative Reasoning, Deductive Reasoning, Pedagogical Reasoning, and Strategic Reasoning are the types of reasoning that are least focused on with one study each. Another result is that some of the studies focus on more than one type of reasoning. In general, the results obtained in terms of the most and least focused reasoning type are parallel to Barak's (2022) study. Barak (2022) concluded that there was no study on deductive reasoning in the theses he examined in his study. It can be seen that our study focuses on the deductive

reasoning type. In his study, Mercan (2021) concluded that the theses and articles he examined regarding reasoning skills in early childhood in Turkey focused mostly on general reasoning, followed by mathematical reasoning and auditory/verbal reasoning types, respectively. In the same study, it was determined that the least focused type of reasoning was visual/spatial reasoning. Ersanlı et al. (2018), who examined the theses on reasoning skills in educational sciences, revealed that studies focused on the subject-based sub-dimensions of mathematical reasoning skills, mostly on algebraic reasoning and proportional reasoning. Studies have been carried out at least in terms of geometric reasoning and statistical reasoning. When we look at all these results, there are similarities with our study.

When the aims of the studies included in the research are examined, the most focused ones are examining the factors affecting reasoning skills, measuring reasoning skills, and the effects of teaching practices on reasoning skills. Reasoning skills have been mostly examined according to gender and grade level factors. Reasoning skills were measured by examining twelve types. Among these skills, mathematical reasoning and proportional reasoning skills were measured the most, respectively, compared to the others. Therefore, examination and skill measurement studies on the remaining ten types of reasoning are insufficient. It may be recommended to conduct studies on other types of reasoning on this subject. In terms of the effect of teaching practices on reasoning skills, Technology-supported learning, STEM, enriched learning environments, intelligence games, hypothetical learning proceses, and Improve model were discussed most, respectively. In studies, the relationship between mathematical reasoning skills or other types of reasoning skills and twenty-one variables has been examined. Among these variables, mathematics attitude, self-efficacy perception, mathematics success, problem-solving success and 'the relationship of geometric thinking variables with the focused reasoning skill' were investigated the most. In addition, in this process where the reasoning process was examined, lesson plans were prepared with the arguments used by teachers to reveal reasoning skills, as well as the strategies used in the problems, and studies were carried out to detect reasoning errors. When we look at the studies included in the scope of the research, it can be seen that at least studies on the scale development and evaluation process, studies on determining the relationship between reasoning types, and studies on determining opinions and field knowledge regarding reasoning skills have been carried out, respectively. It is a remarkable result that there are very few scale development studies on a skill that is extremely important for mathematics. The reason for this result is that the researchers created a scale within the study and presented it in the data collection tools section without directly aiming it at the purpose of the study. In addition, it is thought that due to the nature of reasoning, it is due to the greater use of one or more open-ended problems that can reveal the reasoning process. Similar results were obtained with the studies of Ergün et al. (2023), who conducted a meta-synthesis of theses on scientific reasoning, Barak (2022), who examined theses on mathematical reasoning, and Ersanlı et al. (2018), who examined theses in the field of educational sciences.

The results of the studies included in the research were examined under nine themes. When we look at the theme of examining the documents in terms of reasoning, it is seen that approximately one-quarter of the skill-based questions published by the Ministry of Education contain proportional reasoning, most topics are data analysis, and the least topics are about inequality. It seems that mathematics textbooks do not include enough room for reasoning and proof and are insufficient to allow students to develop their own reasoning skills and strategies. Similarly, it has been revealed that learning fields such as data processing and data analysis in the current mathematics curriculum are insufficient in terms of the development of statistical reasoning.

When we look at the results regarding the theme of determining the relationship between different types of reasoning skills, it turns out that mathematical reasoning and proportional reasoning have a highly positive relationship with probabilistic reasoning. There is a moderate positive relationship between algebraic reasoning and spatial reasoning. It has been determined that there is a

weak positive relationship between algebraic reasoning, spatial reasoning, and probabilistic reasoning. If we look at the theme of the relationship between reasoning skills and other variables, the relationship between twenty-one variables such as mathematics achievement, mathematics attitude, self-efficacy perception, geometric thinking, mathematical thinking profile, visual estimation skill, problem-solving success, algebraic thinking, spatial ability, learning styles, reading comprehension, and the focused reasoning skill was examined. It was revealed that reasoning skills had a positive and significant relationship with each of these variables at different levels. When we look at these variables, it can be said that all of them are directly or indirectly related to mathematics teaching. Therefore, nothing could be more natural than that reasoning skills have an important place in understanding and learning mathematics and that their relationship with reasoning skills has a positive relationship with the variables examined (Herbert et al., 2016).

The results of the studies included in the research were examined under nine themes. When we look at the theme of examining documents in terms of reasoning, it is seen that approximately one-quarter of the skill-based questions published by the Ministry of Education contain proportional reasoning and are published mostly on data analysis and least on inequality. It seems that mathematics textbooks do not include enough room for reasoning and proof and are insufficient to allow students to develop their own reasoning skills and strategies. Similarly, it has been revealed that learning fields such as data processing and data analysis in current mathematics curricula are inadequate in terms of the development of statistical reasoning.

When we look at the results regarding the theme of determining the relationship between different types of reasoning skills, it turns out that mathematical reasoning and proportional reasoning have a highly positive relationship with probabilistic reasoning. There is a moderate positive relationship between algebraic reasoning and spatial reasoning. It has been determined that there is a weak positive relationship between algebraic reasoning, spatial reasoning, and probabilistic reasoning. If we look at the relationship between reasoning skills and other variables, The relationship of twenty-one variables such as mathematics achievement, mathematics attitude, self-efficacy perception, geometric thinking, mathematical thinking profile, visual estimation skill, problem-solving success, algebraic thinking, spatial ability, learning styles, reading comprehension, and the focused reasoning skill was examined. It was revealed that reasoning skills had a positive and significant relationship with each of these variables at different levels. When we look at these variables, it can be said that all of them are directly or indirectly related to mathematics teaching. Therefore, it can be said that reasoning skills have an important place in understanding and learning mathematics (Herbert et al., 2016), and nothing could be more natural than the positive relationship between reasoning skills and the variables examined.

When we look at the results regarding the theme of factors affecting reasoning skills, the number of siblings, book reading, school type, and school location factors do not affect mathematical reasoning skills, and the type of mathematics teaching does not affect statistical reasoning skills. It can be said that as the socio-economic level increases, it will be better to make judgments. In terms of academic and mathematical success, it has been revealed that generally, as the level of success increases, the level of reasoning skills also increases. Although most of the studies examining the gender factor in terms of mathematical reasoning showed that gender had no effect, in some of the studies in which its effect was detected, it was observed that girls performed more successfully than boys, and in others, boys performed more successfully than girls. Similarly, the majority of studies show that gender is not effective in probabilistic reasoning and proportional reasoning. Studies indicating that it has an effect show that girls perform better than boys. It has also been shown that gender has no effect on spatial reasoning, geometric reasoning, and algebraic reasoning. As with the gender factor, although the duration of preschool education does not affect mathematical reasoning skills in general, there are a few studies indicating that it does. In the studies examined, a study was

found examining the effect of the COVID-19 factor on mathematical reasoning skills, and this study revealed that COVID-19 had a negative effect on this skill. As it is known, in this global epidemic, education and training were interrupted, especially in Turkey, and education activities were continued with distance education for a long time. It can be said that distance education activities are completely inadequate in eliminating students' learning losses in mathematics lessons. Therefore, we can easily state that a negative impact on the development of students' mathematical skills is an expected result. When the education level of the parents is examined, it is concluded that as the education level increases, their children use higher-level reasoning skills. The mathematical proficiency factor was examined in terms of proportional reasoning and probabilistic reasoning, and it was revealed that it affects both types of reasoning. It has been observed that those with higher mathematical proficiency have better reasoning performances. It has been revealed that the grade level factor affects proportional reasoning and probabilistic reasoning skills but does not affect inductive reasoning skills. It is seen that there are studies on both results in terms of whether the grade level factor affects mathematical reasoning and geometric reasoning skills or not. It has been concluded that the age factor affects mathematical reasoning and that mathematical reasoning develops as age increases. When we look at the results for all factors, we see that only a small number of reasoning types were examined. Therefore, it is recommended to conduct studies on other types of reasoning to fill the gap in the literature in terms of reasoning skills.

In the studies included in the research, 12 types of reasoning were examined, including algebraic reasoning, geometric reasoning, visual reasoning, statistical reasoning, mathematical reasoning, quantitative reasoning, probabilistic reasoning, proportional reasoning, pedagogical reasoning, strategic reasoning, inductive reasoning, and spatial reasoning. In studies conducted in terms of algebraic reasoning and probabilistic reasoning skills, skill levels vary (low, medium, and good). Geometric reasoning skills were determined to be at an intermediate level. The components of putting forward ideas and making inferences are more frequently encountered in geometric reasoning skills. It turns out that flawed and erroneous reasoning is quite common when using geometric reasoning. While using visual reasoning skills, it is seen that stages such as reading the question, making a plan, examining geometric shapes, explaining relationships, showing given mathematical expressions on a visual, expressing conceptual knowledge, adapting information to a visual, showing it with a figure or model, making a proof, and evaluating are followed. In studies examining statistical reasoning, two levels of skills were measured: temporal and quantitative. It is concluded that there are difficulties in explaining ideas, making predictions, and making inferences in questions that require statistical reasoning. In studies examining mathematical reasoning skills, it has been concluded that medium and low-level skills are generally used, and the expected strategies are not used at a sufficient level. It has been revealed that different performances are shown in reasoning processes such as analysis, generalization, and justification in mathematical problems. It has been revealed that students can establish a mathematical relationship between what is given and what is required in the problems and make appropriate and correct decisions to solve the problem. However, in solving non-routine problems, there are difficulties in the sub-steps of reasoning, such as developing arguments about the solution, making generalizations, and determining and using appropriate reasoning. When the studies examining quantitative reasoning are examined, it is stated that there are insufficient reasoning skills and a lack of strong reasoning skills. It has been stated that the reason for this is that students use memorized information and formulas that need to be clarified instead of establishing relationships between quantities in the problems they encounter in daily life and at school. Studies on proportional reasoning skills show that groups are inadequate in using this skill. In studies examining teachers' pedagogical reasoning, it has been determined that they reason by considering how the activities to be chosen for mathematics teaching will affect the learning processes of students and how the teacher will organize his own teaching process. It has been revealed that in strategic reasoning skills, different

solution strategies are used in open-ended problems, and although there is difficulty in determining the quantities and the relationships between them in the context of the problem, convincing explanations are made on algebraic grounds. In studies conducted in terms of inductive reasoning, the level of use of this skill varies (medium and good). In studies examining spatial reasoning skills, it was determined that the reasoning levels of the groups were at a good level.

When looking at the results for the reasoning process theme, results were found on six topics: arguments and lesson plans used to reveal reasoning, the effect of algebraic reasoning applications on misconceptions, global argumentation structure, reasoning errors, problem-posing skills and strategies, and reasoning types used in problems. In order to reveal reasoning, teachers take actions such as asking students for answers, confirming the correct answers, asking for evaluation, and making explanations by giving conceptual information. However, another striking result is that students are given limited opportunities to use their mathematical reasoning. The ideal learning environment for revealing and developing reasoning skills should be such that students interact with each other and can express their thoughts easily (Yankelewitz, et al., 2010). In addition, students will have a more detailed report card for their own learning as their mistakes are analyzed, and feedback is given by their teachers (Kramarski & Zoldan, 2008). The teacher should be a guide in this regard. During this guidance process, effective feedback should be provided that will reveal the quality of learning behaviors, reveal the aspects of the learner's deficiencies, and allow errors or deficiencies to be corrected (Çevikbaş & Argün, 2016). It is known that mathematics teachers do not provide sufficient feedback to make the student realize the mistake he made and correct it during the learning and problem-solving process (Smith & Ragan, 2005). If the lesson should be planned by taking algebraic reasoning indicators into consideration and the learning environment is developed within this framework, it is seen that the reasoning process will be created in a healthy way. It is also stated that prioritizing peer collaboration through computer-aided applications and providing teacher support will have a positive impact on reasoning skills. It was concluded that in geometry courses, mathematics teachers act in a structure that overlaps with Duval's reasoning framework in terms of geometric reasoning. It has been stated that algebraic reasoning applications are effective for some students in eliminating misconceptions. In the study conducted on the global argumentation structure, it was concluded that prospective mathematics teachers had weak mathematical reasoning skills, and therefore used simple global argumentation. Treating special cases as proof and starting with wrong assumptions are errors in reasoning. In addition, in problems that require reasoning, mistakes such as additive relations, neglect of data, using numbers and lack of content, responding emotionally and not being able to determine non-proportional situations are made. It is stated that failure to complete the reasoning process or experiencing conceptual deficiencies and turning to routine solutions to which they are accustomed causes errors in judgment. In terms of problem-posing skills, it is concluded that the problems are not of a qualitative character that requires reasoning but are posed with a quantitative content, original and uncreative, and routine that can be solved with algorithms. When an evaluation is made in terms of the strategies and reasoning types used in the problems, it can be said that the strategies used vary according to the grade level. For example, It has been revealed that while there is no clear strategy in the 6th-grades at the secondary school level, the inside-outside strategy and unit ratio are mostly used in the 7th-grades, and the unit ratio and equivalent fraction strategy are used in the 8th-grades. It is seen that teachers mostly use routine problems depending on the curriculum, and their students mostly use algorithm-based mathematical reasoning. We can say that the education system's dependence on the curriculum and exam-oriented teaching prevents the use of non-routine problems. Therefore, the student will focus more on problems that can be solved with algorithms.

Under the theme of determining opinion and field knowledge regarding reasoning, there are results on four topics: awareness, statistical reasoning, flawed reasoning, and mathematical reasoning. When students' awareness of reasoning skills was evaluated, it was stated that students were not aware

of the importance of reasoning for mathematical development and that students did not have sufficient experience in reasoning. In addition, it stands out that mathematics teachers do not have sufficient knowledge and opinions about mathematical reasoning. In this regard, it can be said that it will be extremely important for teachers to develop correct reasoning and be aware of reasoning in order to provide students with correct reasoning skills (Tum, 2019). In general, teachers and teacher candidates are not competent in interpreting students' understanding of mathematics and deciding how to give feedback to student mistakes, even if student solutions are not taken into consideration. It was stated that they were not sufficient in their pedagogical content knowledge regarding statistical reasoning. Studies examining teachers' level of knowledge about flawed reasoning have concluded that they are at an inadequate level. When the knowledge of pre-service mathematics teachers in terms of mathematical reasoning is examined, it is seen that they give various answers about what mathematical reasoning is, such as associating the subject with daily life and realizing the relationship between operations and concepts. In addition, it was determined that teacher candidates with high levels of mathematical thinking had more comprehensive views.

In the studies conducted on the scale development and evaluation process, results were obtained in three sub-themes: "development of the mathematical reasoning self-efficacy beliefs scale", "validity and reliability of the reasoning evaluation table", and "reliability comparison of the data collection tool according to theories". The mathematical reasoning self-efficacy beliefs scale was developed for prospective mathematics teachers, and its validity and reliability have been ensured. Criteria were determined for the evaluation of reasoning, taking into account the PISA 2021 mathematics framework, and the evaluation table was developed using these criteria, and its validity and reliability were ensured. Reliability calculations of the scale measuring mathematical reasoning performances of seventh-grade secondary school students were made according to two different reliability theories, and it was seen that the generalizability theory gave more detailed results than the classical theory.

When the results regarding the theme of the effect of the applications on reasoning skills were examined, it was seen that 33 teaching applications (enriched learning environments, intelligence games, technology-supported learning, game-based mathematics teaching, mathematical modeling activities, reasoning, and proof activities, teaching with concept cartoons, differentiated teaching, realistic mathematics teaching, etc.) were made. It is seen that each of these practices has a positive effect on reasoning skills and improves reasoning skills. It is stated that in order for reasoning to develop, environments are needed where a constructivist approach is adopted, learner-centered, evaluation is multidimensional, the teacher guides the student, and activities, technological tools, and daily life situations are used to develop reasoning (Garfield & Ben-Zvi, 2009). Creating learning environments that allow students to internalize mathematical activities and provide the opportunity for collaborative work and express their ideas about mathematical activities is considered important in terms of developing reasoning skills (Francisco & Maher, 2005). It is stated that, especially in learning environments, the use of problem situations that will make the student active in the learning process, include technology, and enable the student to make different types of reasoning that will increase their motivation for the course will play an important role in the development of reasoning skills (NCTM, 1989). It is also emphasized that the use of concrete materials in learning environments will allow students to put forward their mathematical ideas, discuss them, and use their reasoning skills (Pham, 2015). In the literature, it is stated that teaching in a way that relates to daily life (Fitriana et al., 2018), examining and discussing solution-related strategies in problem-solving (Naksutthi & Chidmongkol, 2017), and using open-ended problems whose answers cannot be found immediately (Kasmer & Kim, 2011) have an effect on the development of reasoning skills.

In this study, studies on reasoning skills in mathematics teaching in Turkey are discussed and it is suggested that future studies can be conducted on different types of reasoning. In addition, in

terms of the development of reasoning skills, teachers can use such sample applications in classroom environments appropriate to student readiness and the nature of the subject to be taught. As stated before, since there are few studies on some types of reasoning, it is recommended that researchers design studies based on these types of reasoning to close the gaps in the literature.

Acknowledgement

Due to the scope and method of the study, ethics committee permission was not required.

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APPENDIX-1

Studies Examined in Order of Transfer to Electronic Media

1. Çoban, H. (2019). *The effect of differentiated instructional design on students' mathematical reasoning skills, levels of using metacognitive learning strategies and problem solving skills* (Doctoral Dissertation). Retrieved from the Thesis Center of the Higher Education Institution. (Thesis Number: 580371)
2. Eryaman, Z. (2009). *A study on sixth grade students' spatial reasoning regarding 2D representations of 3D objects* (Master's Thesis). Retrieved from the Thesis Center of the Higher Education Institution. (Thesis Number: 250710)
3. Belin, M. (2016). *Prospective mathematics teachers' quantitative reasoning on the development of decimal representation of real numbers and its effect on their comprehension of a related Proof* (Master's Thesis). Retrieved from the Thesis Center of the Higher Education Institution. (Thesis Number: 459452)
4. Tum, A. (2019). *The effect of enriched learning environments on mathematical reasoning and problem solving attitude in the context of learning styles* (Master's Thesis). Retrieved from the Thesis Center of the Higher Education Institution. (Thesis Number: 583517)
5. Aydoğdu, G. (2023). *Investigation of proff processes of secondary school students through argumentation and determination of their reasoning errors* (Master's Thesis). Retrieved from the Thesis Center of the Higher Education Institution. (Thesis Number: 782200)
6. Turan-Kurudirek, P. (2023). *Examination of middle school students' quantitative reasoning skills in STEM activities: A teaching experiment* (Doctoral Dissertation). Retrieved from the Thesis Center of the Higher Education Institution. (Thesis Number: 794228)
7. Uyguç, A. (2023). *Middle school students' quantitative reasoning in pictorial, symbolic and iconographic problems* (Master's Thesis). Retrieved from the Thesis Center of the Higher Education Institution. (Thesis Number: 778157)
8. Alphayta, B. (2022). *Examining the relationship between geometric reasoning skills and self-efficacy perceptions of 8th grade students* (Master's Thesis). Retrieved from the Thesis Center of the Higher Education Institution. (Thesis Number: 715667)
9. Akdemir, M. (2022).*Investigation of secondary school students' geometrical reasoning on the polygons* (Doctoral Dissertation). Retrieved from the Thesis Center of the Higher Education Institution. (Thesis Number: 753433)
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Abstract

The digital world, emerging in the age of technology, presents both positive and negative aspects for every user. However, it is widely recognized that child users represent the most vulnerable group due to their ongoing cognitive and psychological development. This underscores the significance of parents acquiring digital parenting skills. This qualitative study assesses the perspectives of parents and teachers regarding digital parenting skills. Through semi-structured interview forms prepared by the researcher, interviews were conducted with 25 parents and 25 teachers whose children attend primary or secondary schools affiliated with the Ministry of National Education in the Central district of Bartın province. The data collected were analyzed using the content analysis method. The majority of both parents and teachers defined digital parenting as safeguarding children from the potential risks of the digital world. Protective measures included examples such as children not possessing their personal digital devices, imposing time limitations, parental monitoring of online activities, and open conversations with children about potential dangers. Fewer respondents acknowledged the digital world's capacity to enhance experiences and diversify learning. It was evident that parents and teachers had limited knowledge of digital parenting skills, with a notable emphasis on potential risks. The majority recognized their need for training and educational resources to enhance their capabilities. This study underscores the need for tailored training and media support designed to address adult learning needs, enabling them to serve as role models, navigate digital technologies effectively, establish connections with children, and facilitate effective communication.

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Research Article

Evaluation of Parents' and Teachers' Views on Digital Parenting Skills *

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Abstract

The digital world, emerging in the age of technology, presents both positive and negative aspects for every user. However, it is widely recognized that child users represent the most vulnerable group due to their ongoing cognitive and psychological development. This underscores the significance of parents acquiring digital parenting skills. This qualitative study assesses the perspectives of parents and teachers regarding digital parenting skills. Through semi-structured interview forms prepared by the researcher, interviews were conducted with 25 parents and 25 teachers whose children attend primary or secondary schools affiliated with the Ministry of National Education in the Central district of Bartın province. The data collected were analyzed using the content analysis method. The majority of both parents and teachers defined digital parenting as safeguarding children from the potential risks of the digital world. Protective measures included examples such as children not possessing their personal digital devices, imposing time limitations, parental monitoring of online activities, and open conversations with children about potential dangers. Fewer respondents acknowledged the digital world's capacity to enhance experiences and diversify learning. It was evident that parents and teachers had limited knowledge of digital parenting skills, with a notable emphasis on potential risks. The majority recognized their need for training and educational resources to enhance their capabilities. This study underscores the need for tailored training and media support designed to address adult learning needs, enabling them to serve as role models, navigate digital technologies effectively, establish connections with children, and facilitate effective communication.

Keywords: Digital parenting, lifelong learning, adult education

1. INTRODUCTION

With the rapid digitalization of our age, the internet is seen as among the indispensables of the individual's daily life. 59% of the world's population is an active internet user and uses the internet for an average of 7 hours a day. According to the same report, 77.7% of Turkey's population is active internet users, the average daily usage time is 7 hours and 57 minutes, and the number of active internet users has increased by 3.7 million compared to 2020, (Kemp, 2021). In addition to making it cheaper and easier for users to communicate with each other, the use of the internet has become widespread in education, business life, shopping, entertainment, gaming, and health services (Güler, et al., 2016). Due to the wide range of uses, internet usage rates are expected to increase in Turkey and worldwide every year. Kaşıkçı et al. (2014) According to the findings obtained within the scope of the European Online Children Project in Turkey, the rate of children between the ages of 7-10 is 45.9%, and the rate of children between 11-14 is 21.2%. Since internet use is increasing rapidly, it is believed that the rate of starting to use the internet at a young age will increase in 2021. According to the latest TÜİK (2021) data the rate of internet use of children between the ages of 6-15 in Turkey has increased by 31.9% in the last 8 years and reached 82.7%. This increase is thought to be due to children not going to school during the Covid-19 pandemic and have received distance education supported by

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technology and internet. Participation in online lessons ranks first in the purposes of children's internet use. However, it is observed that there is also an increase in the use of social media, playing digital games, and the use of digital technologies for information, communication and entertainment purposes in children. It is seen that these situations make children active users of the digital world.

The children's age is the most important factor in the conflicts between children and their parents regarding the purposes and frequency of using digital technologies. Conflicts are low in young age groups, and their behavior to follow the rules is high. As the child grows older, it becomes difficult to provide control and guidance as a parent (Livingstone et al., 2018). Based on this situation, it can be said that it is important to create a sense of trust and communication in families with solid foundations from a young age and to raise awareness in the face of the digital world from a young age.

Technology is a main factor that triggers social change (Akbaş & Dursun, 2020). According to Muslu and Bolışık (2009), technological advances are a sign of social development. However, in addition to facilitating the life of the individual, it also contains serious dangers due to misuse and abuse. Especially the fact that child users are unsupervised online makes them more open to risks. In their study, Kaşıkçı et al. (2024) listed the main risks faced by children as addiction due to excessive internet use, encountering sexually themed content, being cyberbullied, receiving and sending sexually explicit messages, and meeting new people. In addition, risks such as incorrect or misuse or abuse of private information arising from ignorance about social media accounts may occur. In today's conditions, staying away from the internet and information technologies is impossible. It is also not right to prevent children from using information technologies in order to cope with risks (Canbek & Sağıroğlu, 2007). Prohibiting technology is not only a long-lasting solution for children, but also preventing them from recognizing the risks Goodwin, 2018). In addition, according to Mertala (2017), depriving children of digital opportunities reveals the educational inequality between them and their peers who use digital education resources efficiently. For these reasons, it is very important to learn to cope instead of avoiding risks. With digitalization, concepts such as digital native, digital immigrant, digital literate, digital parent have emerged. Digital literacy can be expressed as developing skills to use digital tools and equipment in accordance with its purpose. Ng (2012) defines the word indigenous as the place or environment where a person is born. According to Prensky (2001) individuals born into the digital world can be defined as digital natives since the times when personal computers increased and the internet was used for personal purposes in the 1990s. Generations born in previous years are considered as digital immigrants. In this context, we can accept today's child internet users as digital natives and the vast majority of parents as digital immigrants. Ng (2012) states that digital natives easily accept technological developments but need control and awareness about digital literacy skills. Studies show that the role of parents is important in guidance and supervision (Babaoğlan et al., 2018; Erden & Uslupehlivan, 2021; Kaya et al., 2018; Yurdakul et al., 2013).

This rapid development in information and communication technologies also affects traditional parental roles. In addition to traditional parent roles, having digital literacy is also very important in terms of raising conscious children in a safe environment. In this context, parents should now adopt the role of digital parent. Digital parenting requires being aware of the possibilities and risks of the digital world. In the virtual environment, it is seen that digital parents have important duties in solving the risks faced by children and guiding them. However, according to studies, parents do not have enough information to protect their children from risks. However, studies with parents show that parents are not aware that they do not have sufficient knowledge and skills (Kaşıkçı et al., 2014; Konaş, 2021). Studies in the literature showhat parents consider themselves competent in internet use and safety (Acar, 2015).

Research on the digital competence of parents in our country draws attention to the importance of the role of digital parenting (Yurdakul et al., 2013). At the same time, it is thought that parents who are accepted as digital immigrants are lagging behind the digital natives in terms of keeping up with

technological developments and easily accepting them, and they need to improve themselves and be educated. According to Goodwin (2018) it is a huge mistake to throw our children into a digital river and wait for them to swim on their own. Even if the children of the modern age can use every new technology skillfully, they need guidance to use it most safely and beneficially for themselves. On the other hand, parents need to constantly update their knowledge on how to keep their children safe, adapt to the digital world and teach their rules to guide them. This situation requires acting with the philosophy of lifelong learning.

Lifelong learning can be seen as both an opportunity and a necessity, especially for adult individuals who are out of school age and have entered into responsibilities such as profession, family, social environment, and parenting. It is thought that adults who need to learn the role of digital parents need lifelong learning. When the studies and training in Turkey are examined, it is possible to access various adult education programs, website content, video contents, workshops, and printed or digital books. Although various and rich content has been accessed on digital parenting, scientific studies conducted in recent years show that the digital parenting skills of families have not become widespread.

When the studies are examined, studies have been found on scale studies on parents' digital parenting roles (Durak, 2019; Manap, 2020; Yaman, 2018), quantitative studies on the effect levels of various factors affecting digital parenting skills such as age, parental role, economic status, education level, number of children, and gender of the child (Arslan, 2022; Coşkunalp, 2022; Türkel, 2021; Vural Şenel, 2020), and measuring the effect of specified educational activities on digital parenting skills (Clarkson & Zierl, 2018; Şahin-Konaş, 2021; Pekyürek, 2022). No qualitative research includes the opinions of parents and their teachers, who play an important role in their children's education, on digital parenting. In the context of "What are the opinions of parents and teachers about digital parenting skills?" it is believed that making a qualitative evaluation based on the question will enable parents to obtain in-depth information on the concept and skills of digital parenting. It is thought that this study will contribute to the literature.

The general purpose of this study is to evaluate the views of parents and teachers with children in primary and secondary schools on "Digital Parenting Skills". For this purpose, answers to the following questions will be sought:

a) What are the parents' views on digital parenting?
b) What are teachers' views on digital parenting?
c) According to teachers, what are the digital parenting skills of parents?

2. METHOD

2.1. Research Model

In this research, phenomenology pattern, one of the qualitative research methods, was used. Qualitative research method is defined as collecting information about the thoughts and behaviors of individuals through techniques such as observation and face-to-face interviews (Yıldırım & Şimşek, 2004). The research design is designed as a case study so that the data of an existing situation in the real environment can be examined and defined in depth. Creswell (2007) describes the case study as being able to examine a situation in detail and collect in-depth information with data collection methods such as observation, interview, and face-to-face communication.

2.2. Study Group

The study group was conducted in schools affiliated to the Ministry of National Education in the Central district of Bartın province in the Western Black Sea Region in Turkey, with parents whose children attended primary or secondary school in the first semester of the 2022-2023 academic year and volunteered to participate in the study. In the study, the opinions of a total of 50 people, 25 parents selected by purposive sampling and 25 teachers selected by criterion sampling, are included.

Participants who volunteered from their parents were selected by purposeful sampling method. Purposeful sampling is the selection of participants who are thought to have sufficient knowledge about the subject (who can use a smartphone, tablet, computer at a basic level) and whose opinions are thought to be useful in exploring the cases (Yıldırım & Şimşek, 2018). The demographic information table of the participants consisting of parents is given in Table 1.

Table 1. Demographic information of parents

Code	Parentig Role	Education Level	Occupation	Age Range	Number of Children	Years of Internet Usage	Daily Internet Usage Time	Income Status
1	other	PhD	Academician	5-45	1	16 years +	5-7 hours	20,000 +
2	ather	Bachelor's	Inspector	5-35	1	16 years +	1-3 hours	20,000 +
3	other	High School	Housewife	5-45	1	6-10 years	1-3 hours	20,000 +
4	ather	Bachelor's	Officer	5-35	1	16 years +	1-3 hours	10,000 - 14,999 TL
5	other	Master's	Biologist	5-45	1	16 years +	3-5 hours	0 - 5,999 TL
6	other	Bachelor's	Teacher	5-35	1	6 years +	3-5 hours	6,000 - 9,999 TL
7	ather	Bachelor's	Teacher	5-55	2	16 years +	1-3 hours	10,000 - 14,999 TL
8	other	Bachelor's	Nurse	5-35	2	6-10 years	1-3 hours	15,000 - 19,999 TL
9	other	High School	Housewife	5-35	2	0-5 years	1 hour	6,000 - 9,999 TL
10	ather	High School	Security Guard	5-35	3	11-15 years	3-5 hours	6,000 - 9,999 TL
11	ather	Bachelor's	Officer	5-55	-	6-10 years	1-3 hours	10,000 - 14,999 TL
12	ather	Master's	School Principal	5-45	1	11-15 years	more than 7 hours	15,000 - 19,999 TL
13	other	Bachelor's	Accountant	5-45	1	16 years +	3-5 hours	20,000 +
14	other	Master's	Officer	5-35	2	6-10 years	1-3 hours	6,000 - 9,999 TL
15	ather	Bachelor's	Lawyer	5-45	3	16 years +	3-5 hours	15,000 - 19,999 TL
16	other	Bachelor's	Housewife	5-45	2	11-15 years	3-5 hours	15,000 - 19,999 TL
17	ather	High School	Servant	5-55	3	6-10 years	1 hour	6,000 - 9,999 TL
18	other	Bachelor's	Teacher	5-45	3	16 years +	1 hour	10,000 - 14,999 TL
19	other	Associate Degree	Photographer	5-45	1	16 years +	1-3 hours	0 - 5,999 TL
20	ather	Associate Degree	Pharm. Tech.	5-45	1	16 years +	3-5 hours	6,000 - 9,999 TL
21	other	High School	Worker	5-35	2	6-10 years	5-7 hours	10,000 - 14,999 TL
22	ather	High School	Worker	5-45	2	11-15 years	1-3 hours	10,000 - 14,999 TL
23	other	High School	Housewife	5-55	3	6-10 years	1-3 hours	6,000 – 9,999 TL
24	ather	Associate Degree	Worker	5-35	2	6-10 years	1-3 hours	6,000 - 9,999 TL
25	ather	PhD	Academician	5-45	2	11-15 years	1-3 hours	15,000 - 19,999 TL

According to Table 1, when the parenting roles of the participants are examined, it is seen that 13 they are mothers and 12 fathers. Participants have 4 secondary school, 3 high school, 3 associate degrees, 10 bachelor's degree, 3 master's degree and 2 doctorate degree. When examined in terms of their professions, there are 2 academicians, 1 lawyers, 1 biologists, 1 pharmacy technicians, 4 housewives, 1 photographers,1 security guards, 1 nurses, 1 servants, 3 workers, 3 civil servants, 1 accountants, 1 inspectors, 1 school principals and 3 teachers. When examined according to age ranges, there are 9 participants between the ages of 25-35, 12 between the ages of 35-45, and 4 between the ages of 45-55. According to the number of children in the family, there are 10 participants with 1 child, 10 with 2 children and 5 with 3 children, 1 of the participants have been using the internet for 0-

5 years, 8 for 6-10 years, 5 for 11-15 years, and 11 for 16 years or more. When the monthly income status is examined, there are participants in the range of 0-5.999 liras 2, 6.000-9.999 liras 8, 10.000-14.999 liras 6, 15.000-19.999 liras 5 and 20.000 and above liras 4).

Criterion sampling method was used to select the study group among the teachers. The fact that the participants meet certain criteria set out before is defined as the criterion sampling method (Baltacı, 2018). The researcher determined criteria that are important for the research. These criteria are that the children of the selected parents have entered any of the class teacher courses for primary school and branch courses for secondary school. The demographic information table of the participants consisting of teachers is given in Table 2.

Table 2. Demographic information of teachers

Code	Level	Branch
T1	Primary	Class
T2	Primary	Class
T3	Middle	Visual Arts
T4	Primary	Class
T5	Middle	Music
T6	Primary	Class
T7	Primary	Class
T8	Primary	Class
T9	Middle	Visual Arts
T10	Primary	Class
T11	Middle	Information Technology
T12	Middle	Information Technology
T13	Primary	Class
T14	Middle	Mathematics
T15	Primary	Class
T16	Primary	Class
T17	Middle	Religious and Moral Education
T18	Middle	Social Studies
T19	Middle	Turkish
T20	Middle	Mathematics
T21	Middle	Social Studies
T22	Middle	Information Technology
T23	Primary	Class
T24	Middle	Religious and Moral Education
T25	Primary	Class

When Table 2 is examined, it is seen that the participating teachers are 12 primary school teachers and 13 secondary school teachers according to their levels. The distribution of secondary school teacher participants according to their branches is as follows; 3 Information Technologies, 2 Religious Culture and Moral Knowledge, 2 Visual Arts, 2 Mathematics, 1 Music, 2 Social Studies and 1 Turkish.

2.3. Data Collection Tools

Research data were collected through semi-structured interview forms used in qualitative research methods. The researcher prepared two different interview forms for the participants, consisting of parents and the participants consisting of teachers. In order to increase internal validity and check its methodological and technical suitability, four expert opinions were consulted, one in the field of measurement and evaluation, one in the field of lifelong learning and adult education, and two in the educational sciences. In addition, a pilot interview was conducted with a parent and a teacher. Following the opinions and interviews, the questions were turned into separate question items in order to obtain parents' views on digital parenting skills in more detail. Questions that may lead to short answers such as yes and no were arranged and finalized so that the participant could put forward his/her ideas. The semi-structured interview form created for the participants consisting of parents consists of two parts. In the first part, there are questions about the role of parents, education level,

occupation, age, number of children in the family, how many years they have been using the internet, daily internet usage time and economic level. The second part asks questions about the participants' views on digital parenting and determining their digital parenting skills.

1- What are parents' views on digital parenting?
2- What are parents' views on the risks of digital technologies and the internet for children?
3- What are parents' views on the negative situations their children take as examples in using digital technologies and the internet?
4- What are parents' views on ethical behavior on the internet?
5- What are the digital technologies that parents provide to their children and the precautions they take to make the internet environment safe?
6- What are parents' views on how their children follow digital technologies and internet usage habits?

The semi-structured interview form created for the participants consisting of teachers also consists of two parts. In the first part, the level and branch of the teacher were asked. In the second part, teachers' views on digital parenting and their views on the digital parenting skills of parents compared to teachers were asked.

1- What are teachers' views on the concept of digital parenting?
2- What are teachers' views on digital parenting skills?
3- What are the opinions of teachers regarding the development of parents' guidance to their children in the correct use of digital technologies and the internet?

2.4. Data Collection Process

Interviews with the designated parents were conducted using the face-to-face interview technique. During the interview the interviews were recorded with the participants' permission and transcribed by the researcher. The interviews lasted an average of 12 minutes. Interviews with the designated teachers were conducted using the face-to-face interview technique. During the interview, the interviews were recorded with the participants' permission and transcribed by the researcher. The interviews lasted an average of 10 minutes. A focus group interview was held with 4 volunteer participants on the questions in the evaluation forum, and then it was written down by the researcher using an audio recording. For both groups, audio recordings were listened to and the researcher transcribed the raw forms of the interviews in the word editing program (Microsoft Office Word). Its accuracy was checked by repeatedly listening. Then, the interview questions were written in the tabulation program; the parent participants were listed as V1, V2, and V3, and the teacher participants were listed as S1, S2, and S3, and the answers they gave were transferred to two separate tables.

2.5. Data Analysis

Qualitative data obtained through face-to-face interviews and textual edits made by the researcher were analyzed using the content analysis method. Baltacı (2019) defines content analysis as the effort to transform the data obtained from the research problem into systematic structures and to reveal the relationships between them. The main goal here is to reveal the concepts at the root of the data and the significant relationship between them (Yıldırım & Şimşek, 2018).

The data collected in the content analysis method are analyzed in four stages. The first stage is coding the data obtained by qualitative methods such as hand observation, interview, and examination of documents by the researcher. The researcher subtly divides the data into meaningful sections. The chapters correspond to a frequently repeated word or phrase in the data, and the researcher codes these. In the second stage, the researcher combines the codes according to their differences and similar characteristics and creates the themes. It is essential for the researcher to ensure that the themes they create can effectively elucidate the research data meaningfully. In the third stage, the researcher systematizes his/her themes and goes to coding and editing themes when necessary. At this stage, preliminary findings are revealed using scientific language and arranged in a way the reader can

understand. In the fourth and last stage, the researcher interprets the findings by establishing a cause-effect relationship between the findings and including his/her own opinions and experiences (Baltacı, 2018).

In this study, the recorded data, converted into text before the analysis process, were transferred to the table editing program. Then, the researcher determined and coded the common points of the answers given by the participants to the questions. The coded data are themed within the framework of their relationships regarding their similarities and differences. The codes and themes obtained were organized by returning to the data frequently in the process. While editing the themes, expert evaluation was applied, and a comparison was made. Finally, the findings obtained were tabulated, explanations about the tables were arranged, and the findings section of the study was formed. After each finding, direct quotations were included in order to convey the experiences and opinions of the participants as they are. Coding was used to keep the identity information of the participants consulted in the study confidential. In order to convey the effect of the results obtained on the research's importance, the researcher's experience and inferences are also included for each finding. For the reliability of the research, each stage of the process is explained in detail in the study. In order to increase the researcher's mastery of the process, various scientific studies on qualitative research methods and books on scientific research were examined. For validity, the transcribed records of the interviews were delivered to the participants, the direct statements of the participants were included in the findings, and an expert evaluated the edited codes and themes. In order to ensure the compliance of the research with the ethical principles; permission documents were obtained from the necessary institutions and organizations, and a participant consent certificate was obtained from the participants who voluntarily participated in the study, and the participant's code was used in the directly conveyed opinions, and the expressions were tried to be conveyed exactly by adhering to the subject framework as much as possible. Both the raw versions of the interview texts and the final versions that emerged with the editing of the researcher were sent to the participants by e-mail or message, and their approvals were obtained.

3. FINDINGS

3.1. Findings Regarding Parents' Views on Digital Parenting

In the interviews, 9 participants said they had never encountered the concept of digital parenting, and 16 participants said they had heard it before. Twenty people answered this question. The participants' opinions on digital parenting are presented in Table 3.

Table 3. Parents' views on digital parenting

Opinions	Contacts	n
Controlling your child in the digital world	V1, V7, V8, V12, V16, V17, V18, V21, V25	9
Taking protective measures for your child in the digital world	V1, V6, V9, V13, V14, V18, V19, V25	8
Guide your child in the digital world	V1, V2, V6, V12, V18, V20, V22, V25	8
Knowing the disadvantages of the advantage	V1, V2, V15, V18, V22, V24, V25	7
Using digital technologies	V1, V2, V10, V18, V25	5
Adapting to the developmental characteristics of the child		3

As stated in Table 3, parents' views on digital parenting were analyzed in 6 codes. Controlling your child in the digital world (9) is the most frequently recurring code. Then, the codes of taking protective measures for the child in the digital world (8), guiding the child in the digital world (8), knowing the disadvantages (7), using digital technologies (5) and making it suitable for the developmental characteristics of the child (3) were expressed. A participant's view on controlling their child in the digital world is as follows;

"It is to guide and follow children's internet use" (V12). A parent regarding taking protective measures for their child in the digital world;

"Digital parenting is about ensuring that our child uses the internet safely, taking measures to provide safe access to the data they want to access" (V6). He says. An opinion about guiding your child in the digital world is as follows;

"To teach my child to learn useful information and to do research on the net"(V22). Regarding knowing the advantages and disadvantages, a parent should also;

"It is our duty to provide our children with the positive functional effects provided by the internet, to know the possible negativities and to protect our children" (V15). According to an opinion on using digital technologies;

"To learn to use technological tools and to use the internet correctly in order to protect my child from harmful content on the internet" (V2). A parent about adapting his/her child to his/her developmental characteristics;

"Digital parenting is to use the advantages of digital technologies in accordance with the age and development level of the child, to provide him/her with that opportunity, and at the same time to create a barrier against the damages that may come with these technologies" (V1), he explained. When the participants' opinions are evaluated in general, it is seen that most parents have heard the concept of digital parenting before. Although he had never heard of it, some participants had an opinion. This situation can be associated with the universally widespread use of digital technology and the internet. It is seen that the answers given are concentrated in the codes of controlling your child in the digital world and protecting him/her from risks. It can be thought that parents exhibit a protective attitude due to the excessive physical and mental damage they cause. However, few participants pay attention to adapting their children to their developmental characteristics and focus on the advantages of the digital world. It is thought that this situation may be related to the parents' low awareness of the digital world and the high risk of being negatively affected, especially in young age groups. When the answers given by the parents are examined according to their demographic characteristics, the factors of age and education level attract attention. Participants in the 45-55 age group had difficulty expressing their opinions compared to other participants, and it was seen that their opinions focused only on controlling their children in the digital world. In the examinations made in the education levels criterion, it was observed that as the education level increased, the ideas on the concept of digital parenting enriched in general.

3.2. Findings Regarding Parents' Own Digital Parenting Skills

Findings regarding parents' views on digital technologies and the risks of the internet for children are presented in Table 4.

Table 4. Findings of parents' views on digital technologies and the risks of the internet for children

Opinions	Contacts	
Dependency	V2, V5, V6, V7, V8, V9, V11, V13, V15, V16, V17, V18, V19, V21, V23, V24, V25	17
Harmful – Incorrect Contents	V1, V2, V3, V5, V6, V8, V15, V20, V21, V22, V23, V24	12
Psychological Damages	V1, V4, V6, V7, V8, V12, V13, V14, V16, V18, V19, V25	12
Ingredients Not Suitable for Developmental Properties	V1, V3, V4, V5, V10, V14, V15, V20, V22	9
Cyberbullying – Negative Interaction	V1, V7, V9, V10, V12, V16, V20, V21	8
Bodily Harm	V6, V7, V8, V13, V14, V15, V25	7
Decrease in Course Success	V2, V17, V21, V22	4
Fraud	V10, V24	2

When Table 4 is examined, the codes of addiction (17), harmful false content (12), mental harms (12), content that is not suitable for developmental characteristics (9), cyberbullying-negative interaction (8), bodily harms (7), decrease in course success (4) and fraud (2) were analyzed in the opinions of the parents about the risks of digital technologies and the internet for the child. One participant's view on addiction is as follows;

"I think it's addictive. It doesn't matter how many hours you play if you don't take it away" (V9). A participant's opinion on harmful-inaccurate contents is as follows;

"The internet is full of people who do not comply with our culture and customs, which will adversely affect the development of my child. There are YouTubers, there are too many harmful things on TikTok or Youtube. He envies them. It affects his clothes, his clothes, his speech badly " (V22). A participant's opinion on mental harm is as follows;

"They may get too caught up in games or social media in particular. In these environments, they may be exposed to cyberbullying, pedophilia. Because of social media, it was filled with children who did not like themselves. He/she may be afraid, stressed, lonely" (V7). A participant's opinion on the contents that do not comply with the development characteristics is as follows;

"They come across things on websites that aren't age-appropriate" (V10). A participant's view on cyberbullying-negative interaction is as follows;

"Although you try to protect your child, parents who do not show this care in the interaction environment expose children. My child Mona does not know games like Among Us, but she hears them at school. There were times when he heard these things from his friends and was afraid, unable to sleep" (V1). A participant's opinion on bodily harm is as follows;

"Physically, there may be pain in the neck and eyes, diseases. I think these will negatively affect body development" (V14). A parent regarding the decrease in course success;

"The fact that he plays a lot affects his lessons. Either homework is not done or do your homework and then play does not emulate homework" (V17). A participant's opinion on fraud is as follows;

"*Malicious people who are friendly can be both scammers and malicious. it is easier to deceive children through rewards and get private information from them"(V10).* When the participants' opinions are evaluated in general, parents think that digital technologies and the internet have various risks for children. It is understood that when children spend a lot of time with digital technologies and the internet, this gradually turns into an addiction and scares parents. In addition, even if their children want to use the internet in a time-controlled manner, they may encounter inaccurate and harmful content that is not suitable for their developmental characteristics or may be adversely affected by cyberbullying or their peers. Parents think that when all these come together, physical and psychological damage may occur in their children. It is understood that parents should be informed about safe internet packages. In order to combat addiction, parents can be reliable, controlled and open to communication in their relationships with their children. In addition to trying to create and protect a safe space for their children, parents should also ensure that they are informed about the dangers that may occur to the child. Thus, it is thought that the effects of risks such as cyberbullying, negative interaction, and fraud can be reduced.

3.3. Findings Regarding the Opinions of Parents Regarding the Negative Situations that Parents Take as Examples in Digital Technologies and Internet Use of their Children

The findings regarding the parents' views on the negative situations that parents take as an example in their children's use of digital technologies and the internet are presented in Table 5.

Table 5. Findings regarding parents' views on adverse situations in which parents take as examples in digital technologies and internet use of their children

Opinions	Contacts	n
Spending a lot of time online	V1, V2, V4, V11, V15, V19, V22, V25	8
Being constantly on the phone	V9, V11, V14, V19, V21	5
Using social media	V2, V4, V16, V19	4
Playing games	V5, V24	2
Being in constant communication	V10	1

When Table 5 is examined, the codes of spending a lot of time on the internet (8), being constantly on the phone (5), using social media (4), playing games (2) and being in constant communication (1) were analyzed in the opinions of parents regarding the negative situations that their children's parents take as an example in digital technologies and internet use. In addition, there are (9) participants who think that they do not constitute a negative example. Regarding spending a lot of time on the Internet, one participant's opinion is as follows;

"When I take it in my hand in the evening, it comes to me. He says he'll take a look at it. Either I quit, or he's watching a video with me" (V11). A participant's opinion on being constantly on the phone is as follows;

"When I spend too much time on the phone, I observe that it stays on the screen for a long time" (V15). A participant's opinion on using social media is as follows;

"My child has a song group page and says I don't share my own photo. He kills time there whenever he gets the chance. I can't be angry either because I spend time on social media and my child is doing his/her lessons" (V4). A participant's opinion on gaming is as follows;

"I don't, but I think my child likes to play games because his father loves playing games a lot" (V5). One participant's opinion regarding being constantly in communication is as follows;

"I don't make too many phone calls. He also makes video calls a lot of sending messages from Whatsapp" (V10). When the answers given by the participants were evaluated in general, spending a lot of time on the internet was seen as the most frequent code. Based on the participants' opinions, it is thought that other examples of negative situations are based on digital technologies and spending more time on the internet, especially when in the same environment with children. Contrary to the answers, some participants think there is no negative example. Considering the opinions and attitudes of the participants who think so, it is thought that some parents are sensitive about digital technology and internet use and avoid environments where they will set a negative example for their children. However, in general, it is thought that children's compliance with the rules set by the age group and the lack of their own digital tools do not create an environment of conflict within the family.

3.4. Findings Regarding Parents' Views on Ethical Behaviors on the Internet

Findings regarding parents' views on ethical behaviors on the internet are presented in Table 6.

Table 6. Parents' views on ethical behaviors on the internet

Opinions	Contacts	
Respect for personal rights	V1, V3, V5, V6, V7, V8, V9, V10, V12, V13, V14, V15, V16, V18, V19, V20, V23	7
Compliance with social ethics	V2, V3, V4, V6, V7, V8, V10, V11, V12, V16, V20, V22, V24, V25	4
Not sharing false information	V1, V5, V7, V14, V15, V16, V17, V21, V23, V25	0
Not doing illegal things	V9, V15, V16, V19, V20	
Avoiding discriminatory discourses	V1, V25	
Non-sharing of private information	V13, V15	

When Table 6 is examined, the codes of respect for personal rights (16), compliance with social moral rules (14), not sharing false information (10), not doing illegal things (5), avoiding discrimination discourses (2) and not sharing private information (2) were analyzed in the views of parents on ethical behaviors on the internet. Two participants' views on respect for personal rights are as follows;

"Not allowing cyberbullying in the games they play online" (V1).

"When people comment on each other's posts or something, they should be kind, polite, decent, decent, like in real life. They should not make fun of anyone's image or what they write" (V3). A participant's view on compliance with social moral rules is as follows;

"They should share content that is in line with our social morals. Pages and content that are not in line with our moral values are available to everyone. I think this also needs to be supervised more strictly" (V14). A participant's view on not sharing false information is as follows;

"Getting the news right, not fooling people" (V17). Regarding not doing illegal things, two participants' views are as follows;

"Although respect for personal rights comes first when it comes to ethical behaviors, it is also important to avoid illegal behaviors and not to share information that is not sure of its accuracy. the concept of illegal also includes someone else's word, content, digital product, and software produced. there is a tendency towards piracy due to charging, and it should be known that this is not ethical" (V15).

"Not copying someone's photo without asking them" (V16). A participant's view on avoiding discrimination discourses is as follows;

"The absence of content used by words that discriminate against people" (V25). A participant's opinion on not sharing private information is as follows;

"It is necessary to avoid sharing private information such as identity number, home address or someone else's address, phone number" (V13). When the participants' opinions are evaluated in general, it is thought that parents have rights in internet environments and believe that moral values should be adhered to while leaving a digital mark. Opinions such as confidentiality of private information, not using illegal means, avoiding discourses such as discrimination and racism were mostly expressed by mothers. Mothers are thought to be more sensitive about following their children. In general, it is thought that the participants may have little knowledge about internet ethics.

3.5. Findings Regarding the Opinions on the Digital Technologies Provided by Parents to Their Children and the Measures Taken to Secure the Internet Environment

Findings regarding the digital technologies provided by parents to their children and their views on the measures taken to secure the internet environment are presented in Table 7.

Table 7. Findings regarding the opinions on the digital technologies provided by parents to their children and the measures taken to secure the internet environment

Opinions	Contacts	n
Putting a time restriction	V1, V2, V3, V4, V5, V6, V7, V8, V9, V10, V11, V12, V13, V14, V15, V16, V17, V18, V19, V20,V21, V22, V23, V24, V25	25
Lack of a personal digital tool	V1, V3, V4, V5, V6, V7, V8, V9, V11, V12,V13, V14, V16, V17, V18, V19, V20, V21, V23, V24, V25	21
Checking digital traces	V1, V2, V5, V6, V7, V8, V12, V14, V16, V18, V19, V23, V25	13
Using protective-blocking programs	V1, V2, V4, V5, V6, V8, V12, V16, V18, V20, V25	11
Providing an environment of mutual trust	V1, V3, V5, V8, V15, V16, V19, V20, V25	9
Prohibit	V9, V10, V17, V22	4

When Table 7 is examined, the opinions of parents about the digital technologies they provide to their children and the measures they take to secure the internet environment are analyzed as follows; time restriction (25), lack of a personal digital tool (21), checking digital traces (13), using protective-blocking programs (11), providing an environment of mutual trust (9) and prohibiting (4). A participant's view on setting a time restriction is as follows;

"He uses my old phone when he goes online or plays games, but of course I take it from him when his time is up" (V23). Another participant's opinion on the lack of a personal digital tool is as follows;

"Since he uses my phone, it is easy to follow. I look at what you're watching, what you're playing" (V14). According to an opinion on controlling digital traces;

"Do not follow the videos you watch and the games you play"(V12) . A participant's view on using protective-inhibitory programs is as follows;

"I use protective, blocking programs. Thus, no advertisement is displayed while playing games. In the videos, if we encounter a problem, we block the channel on Youtube Kids"(V2). An opinion on providing an environment of mutual trust is as follows;

"I talk to him about troublesome issues that may or may not happen. Let him know the good and the bad, anything can happen to him, share it with me all the time, we are with you"(V15). A parent about banning;

"I prohibit games or videos that are not suitable for him. He knows he can play with the phone when he follows the rules"(V9), she said. When the opinions of the participants are evaluated in general, it is seen that all parents take measures by imposing time restrictions on their children. It is thought that the fact that the vast majority of children do not have their own digital tools makes it easier to control the time and follow their digital tracks. Based on the opinions, it can be said that the vast majority of parents who strive to provide an environment of mutual trust choose to trust their children by using protective-blocker programs and following their digital traces. It can be thought that parents who prohibit apply stricter and clearer rules instead of long communication channels.

3.6. Findings Regarding the Views of Parents on How Their Children Follow Digital Technologies and Internet Use Habits

Findings on how parents follow their children's digital technologies and internet usage habits are presented in Table 8.

Table 8. Findings regarding parents' views on how their children follow digital technologies and internet use habits

Opinions	Contacts	n
Setting time limits	V1, V2, V3, V4, V5, V6, V7, V8, V9, V10, V11, V12, V13, V14, V15, V16, V17, V18, V19, V20, V21, V22, V23, V24, V25	25
Lack of personal digital tool	V1, V3, V4, V5, V6, V7, V8, V9, V11, V12, V13, V14, V16, V17, V18, V19, V20, V21, V23, V24, V25	21
Checking digital traces	V1, V2, V5, V6, V7, V8, V12, V14, V15, V16, V18, V19, V23, V25	14
Observation - communication	V1, V3, V7, V9, V10, V11, V13, V14, V18, V20, V21, V23, V24, V25	14
Accompanying	V4, V10, V17	3

When Table 8 is examined, the views of parents on how their children follow digital technologies and internet use habits are analyzed as (25) by determining the duration, (21) by not having a personal digital tool, (14) by checking their digital traces, (14) by observing-communicating and accompanying (3) codes. A participant's view on setting a time restriction is as follows;

"There is 1 hour a day. If it is expired or if it has a lesson, it cannot take the phone" (V9). An opinion on the lack of a personal digital tool is as follows;

"He doesn't have his own phone or tablet. He takes my phone in the evenings when he needs it. Or there is a laptop at home, there are games he plays from there, EBA is looking at his homework from the computer or something. Since the vehicles do not belong to him, my wife and I can easily follow him" (V18). A parent in relation to checking their digital trail;

"I'm already with you after school, I'm not working. She is looking at the phone next to me, even if she is in her room, I turn up the volume of the phone. I don't really understand, but she has an older sister at

home. I'm telling him, look what he's playing, follow him. My daughter dried up You tube Kids and stuff. He's following" (V23). Observation – in relation to communicating r;

"I look at what he's looking at when he's playing games or watching videos. I'm asking questions about the things he's dealing with" (V11). A teacher's view on escorting is as follows;

"I warn the lady that I am working. I say stand next to him when he has a computer lesson. Or whatever he's playing, whatever he's watching, I want you to hear his voice" (V17). When the answers given by the teachers were evaluated in general, it was seen that all parents made a time determination. The vast majority of children do not have their own digital tools, and this is thought to facilitate the follow-up of parents. In the opinions, it was observed that the education level of parents who stated that they followed their children's digital traces was generally higher than the education level of parents who stated that they followed their children through observation. Based on this, it is believed that the increase in the level of education has a positive effect on digital literacy skills. It was observed that all of the participants who stated that their children were accompanied in the use of digital technologies were working fathers. The fathers stated that they were not accompanied by themselves, but by the people at home with the child. In general, it is believed that it will be beneficial for parents to improve their digital literacy skills in the follow-up of their children.

3.7. Findings Regarding Teachers' Views on Digital Parenting

In the interviews, various questions were asked in order to obtain findings about teachers' views on digital parenting. They were evaluated for their answers to these questions.

Table 9.Teachers' opinions on the concept of digital parenting

Opinions	Contacts	n
Controlling your child in the digital world	T1, T2, T4, T6, T7, T8, T9, T10, T11, T12, T13, T14, T15, T16, T18, T19, T20, T21, T22, T24, T25	21
Taking protective measures for your child in the digital world	T1, T2, T3, T4, T6, T8, T10, T12, T13, T16, T17, T18, T20, T22, T23, T25	16
Guide your child in the digital world	T3, T4, T5, T6, T10, T11, T12, T13, T14, T17, T18, T20, T21, T22, T23, T24	16
Knowing the disadvantages of the advantage	T3, T4, T6, T10, T11, T12, T13, T14, T18, T19, T22, T24	12
Using digital technologies	T1, T3, T4, T10, T11, T12, T13, T18, T19, T21, T22	11
Adapting to his/her child's developmental characteristics	T4, T12, T13, T18, T19, T22, T23	7

Teachers' opinions on digital parenting have been analyzed in 6 topic, as stated in Table 9. "Controlling their child in the digital world (21)" is the most frequently mentioned topic. This is followed by "Taking protective measures for their child in the digital world (16)," "Guiding their child in the digital world (16)," "Knowing the advantages and disadvantages (12)," "Using digital technologies (11)," and "Adapting to their child's developmental characteristics (7). Regarding the opinion related to Controlling their child in the digital world, one view is that:

"Having the skills to follow how the parent spends time with their children using the internet and what they do"(T15), is important. Regarding taking protective measures for your child in the digital world;

"Protecting children from their dangers to ensure they benefit positively from the internet" (T20). A teacher's opinion about guiding her child in the digital world is as follows;

"*Guiding their children correctly in the use of digital technology and the internet by parents" (T11).* A person to know the disadvantages of the advantage;

"While using tools such as smartphones and tablets or surfing the internet, parents should have the knowledge to protect their children and know the benefits and harms of the digital world at a level that can guide them" (T22) . A teacher's opinion on using digital technologies is as follows;

"Parents need to use technology actively to try to find out what their child is interested in and what they are doing. That means digital parenting" (T19). A teacher in relation to adapting his/her child to his/her developmental characteristics;

"It is the parenting task that is aware of the digital opportunities that can be offered for the needs of the child (age-appropriate educational video, etc.) and presents the opportunities in accordance with the child" (T13). When the answers given by the participants were evaluated in general, it was seen that all teachers had knowledge about the concept of digital parenting. The focus in the answers given is mostly on controlling your child in the digital world. It can be said that teachers expect parents to protect their children against the dangers of the digital world and to take the necessary measures. However, it has been observed that teachers, like parents, mention the benefits of the digital world less. In this context, it is believed that increasing teachers' knowledge of digital technologies and the use of the internet for useful purposes will prevent the digital world from being seen only as a threat.

3.8. Findings Regarding Teachers' Views on Digital Parenting Skills

Teachers' opinions on digital parenting skills are presented in Table 10.

Table 10. Findings regarding teachers' views on digital parenting skills

Opinions	Contacts	n
To control in the digital world	T1, T2, T4, T5, T6, T7, T8, T9, T10, T11, T12, T13, T14, T15, T16, T18, T19, T20, T21, T22, T24, T25	22
Being in communication - Guiding in the digital world	T1, T2, T3, T4, T5, T6, T7, T10, T11, T12, T13, T14, T17, T18, T20, T22, T23, T24, T25	19
Taking protective measures for your child in the digital world	T1, T2, T3, T4, T6, T7, T8, T10, T11, T12, T13, T16, T17, T18, T20, T21, T22, T23	18
Knowing the disadvantages of advantages	T1, T3, T4, T6, T10, T11, T12, T13, T14, T15, T17, T18, T19, T21, T22, T23, T24	17
Using digital technologies	T1, T2, T3, T4, T6, T7, T10, T11, T12, T13, T18, T19, T22, T24	14
Adapting to the developmental characteristics of the child	T4, T8, T11, T12, T13, T18, T19, T22, T23	9
Complying with internet ethical values	T11, T12, T17, T22	4

As stated in Table 10, teachers' views on digital parenting skills were analyzed in 7 codes. Ensuring control in the digital world (22) is the most frequently repeated code. Then, it was analyzed with the codes of being in communication - being able to guide your child in the digital world (19), taking protective measures in the digital world (18), knowing the disadvantages (17), using digital technologies (14), adapting to the developmental characteristics of your child (9) and complying with internet ethical values (4). An opinion on maintaining control in the digital world is as follows;

"Keeping control by monitoring your child's internet usage. In other words, it may be to determine the duration, to follow the phone he/she will use, to look at the sites he/she enters, to follow the games he/she plays or the videos he/she has watched" (S24). A teacher about taking protective measures for her child in the digital world;

"Being a good media literate and recognizing the negative aspects and thus providing a safe internet environment to the child" (T6). He says. An opinion on knowing the disadvantages of the advantage is as follows;

"Parents should know internet ethics. He/she should tell his/her child that he/she should be respectful and tolerant when using the internet, that it is a crime to reproduce or steal pirated publications, and that he/she should set an example in this regard" (T22). When the answers given by the teachers are evaluated in general, it is seen that providing control in the digital world comes first. Teachers stated that parents should monitor and control their children's internet usage times, which sites they

visit and what they do on the internet, and the people they communicate with. The vast majority of classroom teachers express the answers to ensuring control in the digital world, protecting the child and guiding the child. The fact that children are much younger at the primary school level and need more family control is considered to be the reason for this situation. In addition, it was observed that the majority of the participants who expressed their opinions about complying with the ethical values of the internet were teachers in the Information Technologies branch. It is believed that this may be due to their professional knowledge. Compliance with ethical and moral values in internet use is thought to be as important as other digital parenting skills. For this reason, it is believed that teachers from all branches should recognize digital parenting skills. Thus, they are expected to develop professionally and guide their parents.

3.9. According to Teachers, Findings Regarding Parents' Development of Guidance for Their Children in the Proper Use of Digital Technologies and the Internet

According to the teachers' opinions, the findings regarding the development of guidance provided by parents to their children in the correct use of digital technologies and the internet are presented in Table 11.

Table 11. Findings regarding parents' development of guidance for their children in the proper use of digital technologies and the internet according to teachers' opinions

Opinions	Contacts	n
He/she should receive training	T1, T2, T3, T4, T5, T6, T7, T8, T9, T10, T11, T12, T13, T14, T15, T16, T17, T18, T19, T20, T21, T22, T23, T24, T25	25
He/she should communicate well with his/her child	T5, T7, T18, T19, T24, T25	6

When the teacher suggestions in Table 11 on improving the guidance of parents to their children on the correct use of digital technologies and the internet were examined, it was observed that all participants should receive training to continue to improve themselves, regardless of the parents' qualifications. There are (6) participants who said that this should be dealt with for the parent to communicate well with their child. Some of the participant opinions stating that parents should receive training in order to continue to improve themselves regardless of their qualifications are as follows;

"Regardless of the educational status of the parents, they should develop and educate themselves for both themselves and their children. Participation in seminars and courses on this subject should be ensured, and even parenting courses can be opened and made compulsory. As a policy, the state should work more effectively on this issue. There are trainings, but most of the society is unaware of this. Families are not aware of the shortcomings in themselves"(S3).

"Adult education should be planned. If it is like a course or optional, I am sure that the relevant parents will join it again. Pill information on the importance of digital parenting can be given through television, attention can be drawn and then they can be subjected to compulsory education. And my wish is that no teacher would give it to me. My branch is Information Technologies, but as I told the children, I cannot tell the parents. Their responsibilities, professions, and expectations from life are different. I believe there is a need for real experts" (T22). The opinions of the two participants who stated that parents should have good communication with their children are as follows;

"They should keep their communication with their children strong so that the child can share the negativities he/she experiences in using the internet or technology with his/her family. Let the parent act as an example so that the child is aware that it is wrong to bully or fraud. Focus on the beneficial aspects. The family needs to find effective ways to realize this. If you ask me, the most effective weapon of our society is television. He should be given the task of the right training tool" (T19). When the answers given by the participants are evaluated in general, it is noteworthy that parents should be caring and communicative parents

towards their children. All teachers believe that every parent, regardless of education level, should continue improving themselves in digital parenting. Thereupon, it was observed that the suggestions they made were based on the provision of training that was suitable for adult education methods and techniques, based on practice and case studies, experts in the field could give that and that could be compulsory. In addition, it is believed that digital parenting awareness in parents can be increased by increasing media support in many views.

4. DISCUSSION and CONCLUSION

In this study, the opinions of parents and teachers with children in primary and secondary schools on "Digital Parenting Skills" were evaluated. When the results obtained are evaluated in general, it is understood that parents have a protective and controlling attitude towards the risks of the digital world in the use of digital technology and internet. According to the study of Manap (2020), the sub-dimension of protecting the child from risks has a high rate in the answers given by the parents. It was seen that Türkel (2021) reached a similar conclusion in his study. Bostancı and Çakır (2022) concluded in their study that parents' digital parenting awareness levels were above average, yet they argued that parents should continue to improve themselves. The results support this research. In a study that does not support this study, Guven (2018) concluded that parents are inadequate in digital parenting awareness. As parents' awareness increases, their children's digital skills will be positively affected (Kaya et al., 2018). It is believed that parents' recognition of the possibilities and risks of the digital world will facilitate their roles. Although they have certain qualifications in this process, it is important that they are open to digital development and related to their child's development.

In this study, it was concluded that parents' high level of education had a positive effect on digital parenting skills. In similar studies, Yaman (2018) concluded that as parents' education level increases, their perceptions of digital parenting self-efficacy increase, and Kopuz et al. (2022) concluded that young parents' digital parenting attitudes are high. In his study, Durak (2019) concluded that digital parenting awareness is a significant difference between the education level of parents; while parents at primary school education level have the lowest score, parents at secondary school education level have higher scores than those at high school, associate degree, undergraduate and graduate level. However, Manap (2020), Arslan (2022) concluded in their study that parental education level did not affect digital parenting awareness. According to the research of Coşkunalp (2022), the educational status of the parents does not affect their digital parenting self-efficacy scores. In this study, it was concluded that the parents' education level had a positive effect on digital parenting skills. Both of the results that it affects or does not affect are included in the literature. It is believed that having different research results is related to the positive effect of parents being conscious parents about their children and raising children on digital parenting awareness rather than their education levels.

This study determined that mothers behave more consciously than fathers in terms of being role models for their children within the scope of digital parenting skills. It is known that role models of parents positively and negatively affect children's use of digital technology (Konok et al., 2020). Manap (2020) also concluded in his research that the level of being a negative model of fathers is higher than that of mothers. Similarly, the study of Şahin-Konaş (2021) concluded that the mothers' digital parenting attitude scores were higher than fathers. Some studies concluded that digital parenting self-efficacy does not change according to the gender of the parent (Coşkunalp, 2022). In the study of Bostancı and Çakır (2022), it was concluded that the level of mothers being negative models in early childhood was higher than fathers, and the researcher shows that the reason for this may be that mothers spend more time with their children and use digital tools to distract their children in this process.

The study concluded that parents can improve their digital parenting skills with training in accordance with adult teaching-learning methods and techniques. Pekyürek (2022) and Şahin-Konaş (2021) also concluded that various educational contents on digital parenting for parents positively affect learning. Especially in digital technologies, it is important for them to realize their own skills and deficiencies and apply to education at the points they need in terms of development (Erden & Uslupehlivan, 2021). According to this research, although families consider themselves competent in protection and taking precautions, they have superficial knowledge about advantages and opportunities. It is believed that they need to get information to improve themselves first in order to be able to promote opportunities as much as they are protective. Clarkson and Zierl's (2018) study, which started with the idea that the negative effects of the digital world are focused on and digital parenting skills are incomplete, and informs parents about the positive use of digital technology and the internet with e-mails, supports this conclusion that digital parenting skills have also improved in terms of advantages. However, Livingstone et al. (2018) concluded that parents feel inadequate in the face of the risks their children may face in the digital world. In this study, it was observed that there were participants who thought that the measures to be taken when their children grew up and their own protection skills might be insufficient.

It has been understood that increasing parents' digital parenting awareness will increase children's use of digital technologies and the advantages of the internet. Kopuz et al. (2022) also state that parents should have sufficient digital parenting skills in the face of advantages and risks in order to support their children's cognitive and behavioral development. Parents should be the first guide for children to develop their skills related to their digital literacy, and for this reason, parents should educate and develop themselves (Acar, 2015). A child's connection to the digital world is the responsibility of their parents. Parents should not prohibit or release but act consciously (Erden & Uslupehlivan, 2021). The study concluded that good relationships within the family would be more successful in digital parenting skills of parents who are sufficiently interested in their children. This situation coincides with Kay's (2022) conclusion that healthy communication between parents and children will protect the child from the risks of digital technology and the internet.

According to the results obtained from the teachers' views on digital parenting, it was seen that it is important to maintain control in the digital world, that parents think that they should control their children's internet usage times, what they do on the internet, and the people they communicate with, and that they should protect their children and guide their children. It was concluded that teachers had knowledge about the concept of digital parenting. It was concluded that it is important for teachers to control children to protect them from the dangers of the digital world and that parents expect them to take the necessary measures. In a study supporting this result, Karaboğa (2019) stated that it is important for children to gain digital media literacy awareness by teachers at school and parents at home. Teachers, like parents, refer less to the benefits of the digital world. Teachers think that they need their parents to develop their guidance. While some of the parents provide a safe and controlled internet environment, some cannot control it. Teachers think that parents should continue to improve themselves in the context of the digital world and be role models for their children, and their differences in digital parenting should be increased with media support, public service announcements, and free training. According to teachers, the increase in education level positively affects digital parenting skills. In the study of Acar (2015), the digital literacy skills of parents also increase as their education levels increase. However, although they know the details, such as high education level, using digital tools or disadvantages, suitability of the content for the child, he/she thinks that the parents who can fulfill the role of digital parents are interested parents. For these reasons, it was stated that trainings should be provided for family communication and digital parenting skills. It is noteworthy that the economic situation does not affect digital parenting skills. However, since the low economic situation will reduce digital opportunities, there are two different ideas: children will be

protected from risks, and as the economic situation increases, the family experiences will increase with digital opportunities. Considering the two groups' views together, it can be said that it will be the most important variable for parents to be conscious parents who can take care of their children adequately. All teachers believe that every parent, regardless of education level, should continue improving themselves in digital parenting. In a study supporting this result, Kopuz et al. (2022) emphasize that parents should receive training in order to protect their children from risks and at the same time to be a guide in beneficial uses. According to a study supporting this result, it is a necessity for parents to receive training on digital media literacy in order to be a successful role model for their children from an early age. Among the suggestions, there should be trainings that are suitable for adult education methods and techniques, based on practice and case studies, that will be given by experts in the field, that can be made compulsory, and that digital parenting awareness can be increased in parents with media support. Teachers are aware of the education, practices and resources on digital parenting. However, the teacher's branch is effective in this regard. It is believed that teachers who are interested in family and student guidance have a better command of the subject. Teachers need to receive training in digital parenting skills and adult education skills, both for personal development and to benefit their students.

Recommendations for Implementation

Training can be provided to parents and teachers in the field of digital technologies.

Information Technology classes in schools can be open to the public in the evening or on holidays.Studies on digital parenting skills can be planned for parents of children of all age groups.

Research can be planned to include children's opinions on digital parenting skills.

Experimental studies can be planned to thoroughly identify the problems that arise during the digital parenting role responsibilities of parents. Age, education level, economic status, etc., which are thought to affect digital parenting skills. Effect levels can be examined by increasing variables such as.

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Abstract

An individual who has the ability to speak from birth continues the development of this skill in education and training environments after the family. In this regard, teachers have great responsibilities for the speaking skills to be acquired in educational environments. Teachers are expected to know about the development of children's speaking skills in order to transfer these skills to students. In addition, having a high level of knowledge about speaking skills is an indispensable element of effective teaching. Elementary school teachers, who spend the most time with students in the classroom, have a key role in helping students develop their speaking skills and easily transfer what they have learned to daily life skills. The study aims to determine the knowledge levels of elementary school teachers regarding speaking skills. The study was carried out with the survey model, one of the quantitative research methods. The study group of the research consists of 302 elementary school teachers. The data were collected with the "Knowledge Level Test on Speaking Skills" and analyzed with descriptive statistics, Independent Samples t-Test, One-way ANOVA. According to the results of the research, the arithmetic average of the elementary school teachers' knowledge of speaking skills was found to be 13.74 out of 18 total questions. In addition, while elementary school teachers' knowledge of speaking skills did not differ significantly according to the variables of gender, graduation, and location of the school, it showed a significant difference according to the professional experience variable.

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Research Article

Speaking Skills Knowledge Levels of Elementary School Teachers *

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Abstract

An individual who has the ability to speak from birth continues the development of this skill in education and training environments after the family. In this regard, teachers have great responsibilities for the speaking skills to be acquired in educational environments. Teachers are expected to know about the development of children's speaking skills in order to transfer these skills to students. In addition, having a high level of knowledge about speaking skills is an indispensable element of effective teaching. Elementary school teachers, who spend the most time with students in the classroom, have a key role in helping students develop their speaking skills and easily transfer what they have learned to daily life skills. The study aims to determine the knowledge levels of elementary school teachers regarding speaking skills. The study was carried out with the survey model, one of the quantitative research methods. The study group of the research consists of 302 elementary school teachers. The data were collected with the "Knowledge Level Test on Speaking Skills" and analyzed with descriptive statistics, Independent Samples t-Test, One-way ANOVA. According to the results of the research, the arithmetic average of the elementary school teachers' knowledge of speaking skills was found to be 13.74 out of 18 total questions. In addition, while elementary school teachers' knowledge of speaking skills did not differ significantly according to the variables of gender, graduation, and location of the school, it showed a significant difference according to the professional experience variable.

Keywords: Speaking skills, classroom teacher, knowledge level, speaking skill training.

1. INTRODUCTION

The main feature that distinguishes humans from other living creatures is that they can think. The individual who thinks in this direction feels the need to understand, be understood, and communicate. Communication is indispensable for the individual to continue life in the current environment and to meet various material and spiritual needs.

The concept of communication is to flow information by creating a common behavioral system between the sender and the receiver (Amadi & Paul, 2017) and to transmit any information from one source to a different source (Salamondra, 2021). Communication is the basis of all actions taken consciously or unconsciously in daily life. Babatunde (2015) stated that communication is a very important lifeline of all environments. Communicating is one of the ultimate purposes of being able to speak a language (Possú, 2021). Language is an important and powerful tool for the development and change of the world. To use this powerful tool effectively, it is necessary to develop mental skills well (Kemiksiz & Güneş, 2017). Communication is one of the indispensable key elements of human life and is the basis of the activities we carry out.

According to Güneş (2016), communication is the process of transforming thoughts into a form that everyone can understand and consists of verbal and non-verbal skills. There are many means of communication, and one of them is speech. Expressing the thoughts during communication aloud occurs through the act of speaking. Speaking is one of the important factors of daily interaction, and

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the first impression about a person is often made dependent on his speech (Bahadorfar & Omidvar, 2014).

Speech is a social, physical, mental, and emotional process that starts from the lungs and continues in the speech organs, occurs within the framework of certain rules, and is expressed with words (Altunkaya, 2017). Sound is produced when the air coming out of the lungs passes through the vocal cords in the larynx, and this sound turns into speech with the coordinated work of organs such as the mouth, nose, teeth, tongue, palate, and lips, including the mind (Altunkaya, 2017). Speaking is a skill that has very serious functions in expressing people's feelings and thoughts, meeting their needs, and gaining social acceptance. There are four language skills in the 2019 Turkish Course Curriculum: listening, speaking, reading, and writing (Ministry of National Education [MoNE], 2019).

Since listening and speaking skills are skills that an individual acquires through biological predisposition before or after birth, they are acquired earlier than reading and writing skills. For this reason, it is primarily aimed to provide school-age students with reading and writing skills (MoNE, 2020). Speaking, the most used skill after listening develops naturally through imitation, primarily in the family environment (Mermi, 2021). However, speaking skills are thought to be a more neglected skill compared to other skills (Potur & Yıldız, 2016). The reason may be due to the fact that speaking and listening skills are acquired, albeit to a small extent, before entering educational environments (Kesici, 2021). The speaking skills that children acquire at home are as much as they learn with the biological predisposition factor, without requiring any extra work. It is said that this critical period lasts until the age of 12-13 due to the flexible structure of the brain (Demirezen, 2003). The speaking skills acquired by the child in his natural environment cannot go beyond meeting a limited number of needs in daily life.

Speaking skills, one of the most important communication skills, are greatly needed in education and training environments. The child's self-expression, meeting his needs, social acceptance, evaluation, and all similar situations are situations that occur with the act of speech. In primary school education environments, elementary school teachers are the ones who will consciously help children acquire and develop speaking skills. Primary school children tend to learn by taking role models in line with the developmental characteristics of their period. The person they will take as role models in school environments is undoubtedly their elementary school teachers. Elementary school teachers need to be aware of the seriousness of the situation, review their own knowledge accordingly, and try to correct any deficiencies. Teachers' awareness of their own self-efficacy in speaking skills will shed light on their students by shaping the activities they will do in the lesson (Demirkol & Aytaş, 2023).

Not paying attention to speaking skills as much as other skills will result in reduced classroom interaction and students not being able to convey themselves and their experiences effectively (Kasa-Ayten & Hatipoğlu, 2021). The information taught about speaking skills should be practiced extensively in classroom environments to gain various experiences. Various objectives have been added to the curriculum to help students acquire speaking skills effectively and efficiently. In order to effectively achieve the gains in speaking skills set out in the program, teachers must have knowledge about speaking skills and use them effectively in the classroom. Teachers, who are aware that speaking ability is innate, but speaking accurately and effectively is a skill that requires training, should approach this issue sensitively (Kavruk & Yıldırım, 2021).

Students will use the speaking skills they acquire effectively in the school environment in every aspect of their lives. Language skills used in the act of communication do not consist only of speaking skills. To fully master a language, it is necessary to use other language skills correctly (MoNE, 2019). Since basic language skills are interrelated, the development of one skill positively affects the development of other language skills (MoNE, 2020).

When the literature is examined, there are generally studies aimed at improving students' speaking skills (Anggraini, 2021; Fussalam, 2019; Halawa, 2022; Nasution, 2020; Supraba, 2020). In

addition, in the literature, there are studies on improving foreign language speaking skills (Kusmaryani et al., 2019; Leong & Ahmadi, 2017; Riadil, 2020), and studies on speaking skills with teachers and teacher candidates (Akongoh, 2021; Çerçi, 2015). When the studies in the literature were examined, it was seen that there were studies aimed at improving speaking skills. However, there is no study measuring the knowledge levels of elementary school teachers about speaking skills. To eliminate this deficiency, answers were sought to the following questions.

1) How is the level of teachers' knowledge of speaking skills?

2) Is there a significant difference in the knowledge levels of elementary school teachers regarding speaking skills according to the gender variable?

3) Is there a significant difference in the knowledge levels of elementary school teachers regarding speaking skills according to the graduation variable?

4) Is there a significant difference in the knowledge levels of elementary school teachers regarding speaking skills according to the professional experience variable?

5) Is there a significant difference in the knowledge levels of elementary school teachers regarding speaking skills depending on the location of the school?

2. METHOD

2.1. Research Design

This study, which was developed to determine the knowledge levels of elementary school teachers regarding speaking skills, was carried out with the survey model, one of the quantitative research methods.

The survey model is a study that aims to detect a situation that existed in the past or today, as it is, and does not aim to make any changes to the subject, individual, or object that is the subject of the research (Karasar, 2020).

2.2. Working Group

The study group of the research consists of 302 teachers working as elementary school teachers throughout Turkey. The test created online was shared in various teacher groups across the country and on social media environments where teachers can reach, and the study group was reached.

Information on the demographic characteristics of the participants is included in Table 1.

Table 1. Demographic characteristics of participants

Variables		Number (n)	Per Cent(%)
Gender	Female	219	72.5
	Male	83	27.5
	Total	302	100
Graduation	Associate	5	1.7
	Bachelor D.	199	65.9
	Master D.	94	31.1
	Doctorate	4	1.3
	Total	302	100
Prof. Experience	1-5 Year	50	16.6
	6-10 Year	85	28.1
	11-15 Year	61	20.2
	16-20 Year	52	17.2
	20 Years and More	54	17.9
	Total	302	100
Location of school	Village	58	19.2
	Town	25	8.3
	City Center	219	72.5
	Total	302	100

When the demographic characteristics of the participants in Table 1 are examined, 219 of the 302 teachers participating in the research across Turkey are women, while 83 are male teachers. While the rate of participating female teachers is 72.5%, the rate of male teachers is 27.5%. When the graduation rates of the participants are examined, most participants are at the bachelor's degree level with 65.9%, while the least participants are at the doctorate level with 1.3%. This is followed by associate degree with 1.7% and master's degree with 31.1%. When the ratio of participants in terms of professional experience is examined, the highest number of participants are teachers with 6-10 years of experience with 28.1%, while the least participants are teachers with 1-5 years of professional experience with 16.6%. This is followed by teachers with 16-20 years of professional experience with 17.2%, teachers with 20 years or more of professional experience with 17.9%, and finally teachers with 11-15 years of professional experience with 20.2%. When examined in terms of location of the school, the highest number of teachers who participated in the research was from the city center with 72.5%, and the least teachers from the town with 8.3%. The rate of teachers joining from the village is 19.2%.

2.3. Data Collection and Data Collection Tool

The data collection tool was developed by the authors as a multiple-choice knowledge test. The data was collected online, and 2 control questions were added for the reliability of the data. The tests of participants who answered these control questions incorrectly were considered invalid. In order to collect complete data, transitioning from one question to the next without answering was prevented; therefore, all questions were answered. Additionally, care was taken to ensure that answering the test questions did not take too much time.

Multiple-choice tests are among the most preferred measurement and evaluation tools at various levels, from classroom assessments to national exams (Atılgan et al., 2013). "Knowledge Level Test on Speaking Skills" developed by the researchers was used to determine the knowledge level of elementary school teachers regarding speaking skills.

2.3.1. Knowledge level test on speaking skills

The created test's content validity rates in line with expert opinions were calculated using the Lawshe Technique. Lawshe Technique was developed by a person named Lawshe, and between 5 and 40 expert opinions are needed to apply the technique (Alisinanoğlu & Şimşek, 2012). In the Lawshe Technique, for each item there are explanations such as "the item measures the targeted structure", "the item does not measure the targeted structure" and "the item is related to the targeted structure but is unnecessary" (Lawshe, 1975). Items that did not provide content validity in line with the Lawshe technique were not included in the data collection tool. By removing the items, the data collection tool was made ready for pilot application. Lawshe technique calculation formula is shown below.

CVR in Lawshe technique: Content Validity Ratio; NG=The number of experts who say an item is necessary/Item measures the structure; N=refers to the number of experts from whom information is collected about the substance.

CVR=N CVR= $[NG \div (N \div 2)] - 1$

In line with the specified formula, if more than half of the experts did not say "Necessary", CVR<0, if half of the experts said "Necessary", CVR=0, if more than half of the experts said "Necessary", CVR>0, if all of the experts said "Necessary", CVR=1 (Yurdagül, 2005).

The minimum values required for the Content Validity Ratio are shown in the table below.

Table 2. Minimum values for content validity rates

Number of Experts	Minimum Value	Number of Experts	Minimum Value
5	0.99	13	0.54
6	0.99	14	0.51
7	0.99	15	0.49
8	0.78	20	0.42
9	0.75	25	0.37
10	0.62	30	0.33
11	0.59	35	0.31
12	0.56	40	0.29

Minimum and maximum content validity rates are given according to the number of experts participating in the study. According to this formula, when opinions were taken from 13 experts, the minimum value to be reached was calculated as .54 (Lawshe, 1975).

Table 3. Content validity rates (CVR) of the articles

Item No	Number of Experts Saying Item Measures Structure	Number of Experts from whom Data was Collected	CVR
1	13	13	1.00
2	12	13	0.85
3	10	13	0.54
4	10	10	1.00
5	12	13	0.84
6	11	13	0.69
7	11	13	1.00
8	13	13	1.00
9	4	13	-0.39
10	10	13	0.54
11	12	13	0.85
12	12	13	0.85
13	12	13	0.85
14	13	13	1.00
15	12	13	0.85
16	12	13	0.85
17	13	13	1.00
18	13	13	1.00
19	9	10	0.80
20	12	13	0.85
21	7	9	0.56
22	9	13	0.39
23	10	10	1.00
24	13	13	1.00
25	12	12	1.00
26	7	11	0.27
27	9	13	0.39
28	12	13	0.85
29	10	13	0.54
30	13	13	1.00
31	11	13	0.69
32	7	13	0.08
33	13	13	1.00
34	10	13	0.54
35	13	13	1.00

Experts did not express their opinions on some questions. In this case, the number of experts on that question was changed and the minimum value determined accordingly was sought. According to

these values, 4 items (9-21-26-27) that did not provide content validity were removed from the data collection tool. A pilot study was conducted to study the validity and reliability of the temporary form prepared after the items were removed. The pilot study was applied to 160 people with 31 items. The data obtained after the pilot application of the created test was analyzed with TAP (Test Analysis Program). By analyzing the pilot study data, reliability (KR-20), item difficulty, and item discrimination analyses were carried out. As a result of the analyses, 4 items were removed from the test because they reduced reliability. 9 items were removed because they reduced discrimination. The main application was carried out with a total of 18 items. As a result of the statistics, the reliability coefficient of KR-20 was found to be 0.65. This is expressed as medium-level reliability in achievement tests in the literature (Kızılcık & Tan, 2007; Tan, 2009). Sample questions related to the developed multiple-choice test are given below:

- Which of the following is not one of the vocal characteristics of a good speech?
- The process of the brain, nervous system, lungs, vocal cords, small tongue, large tongue, palate, lips and teeth in a balanced harmony with the co-operation of organs such as the brain, nervous system, lungs, vocal cords, small tongue, large tongue, palate, lips and teeth constitutes which quality of speech?
- What is the branch of science that analyses the formation of the sounds of a language, the forms of speech, the evolution of sounds and the functioning of speech organs?

2.4. Data Analysis

Normality analysis of the "Knowledge Level Test on Speaking Skills" answered by 302 teachers was carried out. Normality analyses are shown in Table 4.

Table 4. Findings regarding normality distribution of variables

Variables	Normality Tests	
	Skewness	Kurtosis
Gender	1.014	-.979
Graduation	.687	-.013
Professional Experience	.184	-1.186
Location of the School	-1.259	-.233

When the findings of the distribution normality analysis for the variables included in the study are examined, it is seen that Skewness values are between -2 and +2, and Kurtosis values are between -7 and +7. In the studies in the literature, the fact that the Skewness value is between -2 and +2 and the Kurtosis value is between -7 and +7 shows that the data are considered normal (Hair et al., 2010). Since the data shows a normal distribution, parametric tests can be applied. In this context, a t-test for independent samples was used in the analysis of the "Gender" variable, and a single-factor/one-way analysis of variance was used in the analysis of the "Graduation", "Professional Experience", and "Location of School" variables.

3. FINDINGS

Table 5. Arithmetic mean scores of elementary school teachers' knowledge levels regarding speaking skills

Knowledge Levels Regarding Speaking Skills	n	$\bar{x}$	Ss
	302	13.76	2.15

When the knowledge levels of elementary school teachers regarding speaking skills were examined, it was determined that their arithmetic average score was 13.76. The minimum score that can be obtained from the relevant data collection tool is determined as 0 and the maximum score is 18.

Table 6. t-test findings for independent samples regarding the differentiation of elementary school teachers' knowledge levels regarding speaking skills according to the gender variable

Rating Scale	Gender	n	$\bar{x}$	Ss	Sd	t	p
Knowledge Level Test on Speaking Skills	Female	219	13.87	2.07	300	1.41	.159
	Male	83	13.48	2.32			

When Table 6 is examined, no statistically significant difference was found in the gender variable dimension of elementary school teachers' speaking skill knowledge levels. It can be stated that the gender variable does not have any effect on speaking skill knowledge levels.

Table 7. One-Way analysis of variance findings regarding the differentiation of elementary school teachers' knowledge levels regarding speaking skills according to the graduation variable

Rating Scale	Graduation	n	$\bar{x}$	Ss	VK	KT	Sd	KO	F	p
Knowledge Level Test on Speaking Skills	Associate	5	11.60	1.82	In Group	24.391	3	8.130	1.776	.152
	Bachelor's Degree	199	13.82	2.19	Inter Group	1363.917	298	4.577		
	Master Degree	94	13.74	2.05	Total	1388.308	301			
	Doctorate	4	14.00	1.83						

When the information in Table 7 is examined, it is seen that the knowledge levels of elementary school teachers regarding speaking skills do not make a significant difference according to the graduation variable ($F_{(3-298)}$=1.176;.152>.05). Accordingly, it can be stated that whether elementary school teachers have an associate's degree, bachelor's degree, master's degree or doctorate degree has no effect on their speaking skill knowledge levels.

Table 8. One-Way analysis of variance findings regarding the differentiation of elementary school teachers' knowledge levels regarding speaking skills according to the professional experience variable

Rating Scale	Professional experience	n	$\bar{x}$	Ss	VK	KT	Sd	KO	F	p
Knowledge Level Test on Speaking Skills	1-5 Years	50	14.34	2.02	In Group	45.275	4	11.319	2.503	.042
	6-10 Years	85	14.09	1.81	Inter Group	1343.033	297	4.522		
	11-15 Years	61	13.48	2.30	Total	1388.308	301			
	16-20 Years	52	13.40	2.44	**Source of Difference (LSD)**					
	20 Years and More	54	13.39	2.17	1-5 Years >11-15 Years;16-20 Years; 20 Years and more					

When the information in Table 8 is examined, it is seen that the knowledge levels of elementary school teachers regarding speaking skills create a significant difference according to the professional experience variable ($F_{(4-297)}$=2.503;.042≤.05). Accordingly, the knowledge level of teachers with 1-5 years of professional experience regarding speaking skills is higher than teachers with 11-15 years, 16-20 years, 20 years and more professional experience.

Table 9. One-way analysis of variance findings regarding the differentiation of elementary school teachers' knowledge levels regarding speaking skills according to the variable of location of school

Rating Scale	Location of School	n	$\bar{x}$	Ss	VK	KT	Sd	KO	F	p
Knowledge Level Test on Speaking Skills	Village	58	13.6897	2.51457	In-Group	2.867	2	1.433	.309	.734
	Town	25	14.0800	1.84662	Inter Group	1385.441	299	4.634		
	City Center	219	13.7489	2.08004	Total	1388.308	301			

When the information in Table 9 is examined, it is seen that the knowledge levels of elementary school teachers regarding speaking skills do not differ significantly depending on the location of the school ($F_{(2-299)}$=.309;.734>.05). Accordingly, it can be said that the fact that elementary school teachers work in a village, town or city center does not have any effect on their speaking skill knowledge levels.

4. DISCUSSION and CONCLUSION

This study was carried out to determine the knowledge levels of elementary school teachers regarding speaking skills. As a result of the literature review, it was found that there was no study on the speaking skill knowledge levels of elementary school teachers.

Some of the questions in the prepared scale were taken from the speaking skill gains in the 2019 Turkish Language Teaching Program. The other half consists of speaking skill information that elementary school teachers should know as a result of the literature review. Therefore, teachers are expected to answer all questions correctly. However, as a result of the statistical analysis, in the knowledge level test consisting of 18 questions to measure speaking skills, the teachers' arithmetic average regarding speaking skills was 13.74. This corresponds to a rate of 76.3%. While elementary school teachers, who are responsible for teaching and developing speaking skills, were expected to have a 100% success rate by correctly answering all questions in this achievement test, this rate was found to be 76.3%. The underlying reasons why teachers do not receive the expected score from this achievement test are that elementary school teachers did not receive training on speaking skills in their pre-service training, that they were not subjected to any exams on speaking skills before starting teaching, and that they did not attend seminars on speaking skills after starting their job. It may also be that they are young or have attended a limited number of seminars.

If the elementary school teachers' speaking skill knowledge levels are not at the expected level, this will directly affect the speaking skills of the students. Because for a teacher to fully help students acquire a skill, he or she must also have that skill properly. When relevant studies are examined, the general opinion is that teachers should be aware of the self-efficacy they need to have regarding speaking skills and do what is necessary in this direction (Demirkol & Aytaş, 2023). Kurudayıoğlu (2013) stated that there should be a compulsory course called "Speaking Skills" for teachers to acquire the achievements in the curriculum.

In their study, Adem and Berkessa (2022) stated that the language skill that teachers see as the weakest in students is speaking skills and those students are pessimistic about learning to speak. Kemiksiz (2022) stated that teachers, in addition to being an example for students in speaking, are also responsible for providing students with basic knowledge and skills. The teacher who fulfills this responsibility must have sufficient knowledge of speaking skills. Deniz et al. (2019) stated that in the curriculum, achievements related to speaking skills are not included regularly and are chosen randomly, and no order is followed. Cömert (2017) stated that speaking skill gains are insufficient to reflect speaking behavior, and Leong and Ahmadi (2017) stated that speaking skill is an ignored skill. When these situations are added to the fact that teachers' knowledge of speaking skills is not at the expected level, unfortunately, it is normal for students to have low speaking skills. In his study with prospective teachers, Alan (2021) stated that the speaking self-efficacy perceptions of the prospective teachers were at a medium level rather than the expected level. Akkaya (2012) stated that the prospective teachers had various problems with their speaking skills. Akongoh (2021) stated that teachers are inadequate in measuring speaking skills and that they should receive pre-service or in-service training in this field. Oğuz (2009) examined the self-efficacy perceptions of pre-service teachers regarding their oral and written expression skills. In his study, pre-service teachers stated that they saw their oral communication skills as inadequate, and the reasons for this were that they spoke

without following the rules of speech and did not engage in speaking-related practices. İşcan et al. (2017) stated that teacher candidates found themselves more than adequate in speaking skills.

When the knowledge levels of elementary school teachers regarding speaking skills were examined according to the gender variable, no significant difference was found between genders. The knowledge levels of female teachers and male teachers regarding speaking skills were at similar levels. The reason may be due to the fact that the education received before starting the profession and the in-service training while practicing the profession is general for everyone, and no different training is given according to gender. Baki (2018), in his study examining the speaking self-efficacy of Turkish teacher candidates, and Alan (2021), in his study with teacher candidates, stated that gender did not have a significant effect on speaking skills. Alptekin and Demir (2022) in their study with students and Balbağ and Yenilmez (2019) in their study with Science and Primary Mathematics teacher candidates, concluded that the gender variable did not have a significant effect on speaking. Some studies do not show similar results to the research. Hayran (2020) and Tunagür (2021) concluded that gender has a significant effect on speaking skill self-efficacy perceptions and that female teachers' speaking skill self-efficacy perceptions are higher. Ürün-Karahan (2015), in their study examining the attitudes of Turkish teacher candidates towards speaking education, found a significant difference according to gender and stated that female teacher candidates' attitudes towards speaking were higher.

When the knowledge levels of elementary school teachers regarding speaking skills were examined according to the graduation variable, no significant difference was found between graduations. The fact that elementary school teachers graduated from associate, bachelor's, master's, and doctoral education programs did not cause a significant difference in their speaking skill knowledge levels. The reason may be due to the fact that the parts of the curriculum that the teachers graduated from are similar to speaking skills, or that they have not received any extra training on speaking skills. In their study by Aydın and Uçgun (2023), all of the Turkish teachers who participated in the study stated that their speaking skills should be evaluated. Only some of them stated that they carried out evaluation studies. It can be thought that the underlying reasons for this are due to their lack of knowledge of speaking skills or not knowing how to measure this skill.

When the knowledge levels of elementary school teachers regarding speaking skills were examined according to the professional experience variable, significant differences were detected between the elementary school teachers' knowledge levels of speaking skills according to their professional experience. Accordingly, the knowledge levels of teachers with 0-5 years of professional seniority were higher compared to those with 11-15 years, 16-20 years, 21 years, and more of professional seniority.

It can be thought that the reason for this is that teachers who are new to the profession attach more importance to their professional development and want to improve themselves and that they have taken the oral interview exam before starting teaching. All teachers, regardless of their professional experience, need to be aware of the seriousness of the situation. In particular, elementary school teachers should follow the student's skill development in the classroom and prepare plans accordingly in order to instill that self-confidence in students (Hatipoğlu, 2022). In their study, Adem and Berkessa (2022) found that experienced teachers' optimism about speaking was higher. In their study, Kaya and Bozkurt (2019) stated that most teachers, regardless of their professional experience, felt inadequate in speaking skills, and this situation was related to the undergraduate period.

When the knowledge levels of elementary school teachers regarding speaking skills were examined according to the variable of the location of the school, it was concluded that the fact that elementary school teachers worked in villages, towns and city centers did not have a significant effect on their knowledge levels of speaking skills. However, some studies have stated that the physical environment and conditions are very effective in speaking skill training. Tosun and Aydın (2013) stated that a large number of students, unfavorable physical environment, audibility of the voice, its

resonance and similar factors have an impact on speaking skills. Assuming that the essence of the speech act is sound, it is obvious that physical and environmental factors have an impact on speaking skills (Çerçi, 2015). Factors such as whether the school is in a village, town, or city center, whether schools are properly equipped or not, and the number of lesson hours are also effective factors in improving the teacher's level of knowledge about speaking skills. Because if essential physical needs are not met, teachers will have to focus on different problems rather than educational problems (Arhan, 2007).

Generally speaking, there are studies in national and international studies literature aimed at improving students' speaking skills. This is due to students' shortcomings in this regard. Because there is a need for improvement in an area that is deemed deficient. Unfortunately, this situation is thought to be due to the fact that the people who will provide speaking skill training are not equipped at the expected level. This deficiency should be recognized as soon as possible and serious steps should be taken.

The following recommendations are made as a result of the study:

-Organizing practices and training which will increase teachers' knowledge of speaking skills,

-Devoting more time to speaking skills in schools,

-Organizing activities to increase teachers' knowledge levels in evaluating speaking skills,

-Including courses such as voice training, diction, and speaking training before their service at schools.

Ethics Committee Decision

This research was carried out with the permission of Niğde Ömer Halisdemir University Publication Ethics Board with the decision numbered 411154 dated 19.09.2023.

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Abstract

The research utilized the descriptive survey model, a quantitative research method, with a study group consisting of 172 social studies teacher candidates (131 females, 41 males). As data collection tools in the study, the Cyberculture Adoption/Development Level Scale developed by Koçak (2019) and the global citizenship scale (Global Citizenship Scale – GCS) developed by Morais and Ogden in 2010 were used. The Turkish adaptation, validity, and reliability study of the global citizenship scale was conducted by Tutkun (2019). In addition, a personal information form prepared by the researcher was used. The data analysis involved the use of the Independent Samples t-test, to determine the relationship between participants' scores on the cyber culture adoption level scale and the global citizenship level scale concerning the gender variable. For situations where differentiation was observed based on class, social media usage purpose and internet usage frequency, the One-Way ANOVA was employed for unrelated Samples. The findings of the research indicate that there is no statistically significant difference in the levels of cyberculture adoption and global citizenship among teacher candidates concerning gender and class variables. When examining the variable of social media usage purpose, a statistically significant difference is observed in the global citizenship levels of teacher candidates. In contrast, no statistically significant difference is found in the levels of cyberculture adoption. Regarding the daily internet usage duration variable, no impact is observed on the global citizenship levels of teacher candidates. In contrast, a statistically significant difference is found in the levels of cyberculture adoption.

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Research Article

A Study on the Levels of Adoption of Cyberculture and Global Citizenship among Social Studies Teacher Candidates *

Şükran GEÇGEL [1]

Abstract

The research utilized the descriptive survey model, a quantitative research method, with a study group consisting of 172 social studies teacher candidates (131 females, 41 males). As data collection tools in the study, the Cyberculture Adoption/Development Level Scale developed by Koçak (2019) and the global citizenship scale (Global Citizenship Scale –GCS) developed by Morais and Ogden in 2010 were used. The Turkish adaptation, validity, and reliability study of the global citizenship scale was conducted by Tutkun (2019). In addition, a personal information form prepared by the researcher was used. The data analysis involved the use of the Independent Samples t-test, to determine the relationship between participants' scores on the cyber culture adoption level scale and the global citizenship level scale concerning the gender variable. For situations where differentiation was observed based on class, social media usage purpose and internet usage frequency, the One-Way ANOVA was employed for unrelated Samples. The findings of the research indicate that there is no statistically significant difference in the levels of cyberculture adoption and global citizenship among teacher candidates concerning gender and class variables. When examining the variable of social media usage purpose, a statistically significant difference is observed in the global citizenship levels of teacher candidates. In contrast, no statistically significant difference is found in the levels of cyberculture adoption. Regarding the daily internet usage duration variable, no impact is observed on the global citizenship levels of teacher candidates. In contrast, a statistically significant difference is found in the levels of cyberculture adoption.

Keywords: Social studies, teacher candidates, cyber, global

1. INTRODUCTION

The rapid spread of digital technologies changes individuals' lifestyles, ways of doing business, communication tools and social life experiences and in this process of change, a technology-based life becomes inevitable for individuals. In particular, the use of other digital technologies such as computers, internet and smart devices affects individuals' values, behaviors and beliefs. Also, it creates a new culture with its own ethical rules in the virtual world. This culture, which is referred to as cyberculture, also appears in the literature as cyberspace, digital culture or internet culture (Benedikt, 1991; Çetin & Uslu, 2022; Gündüzalp, 2021; Mackinnon, 1997). The foundations of cyberculture as a concept and research field were developed at the Massachusetts Institute of Technology in the 1960s (Schmidt, 2020).

William Gibson (1984), who popularized the concept of cyberculture as cyberspace, describes the area where people interact through the internet and digital technologies as cyberspace in his novel Neuromancer (Bell, 2007). The concept of cyberspace covers most technologies such as fiber optics, mobile connections, the internet and artificial intelligence. Developing cyberspatial technologies does more than transfer people's interactions electronically. It also changes their interests, symbols and community characters (Eid, 2008).

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The concept of cyberculture, which expresses the relationship of individuals with all technological tools they interact with, covers the whole of beliefs, values, behavior, attitudes and cultural formations established in social networks, computer networks or online communication areas (Akdemir & Tuncer, 2021). New media, in other words, the internet-based form of communication, which has gained importance after the 2000s, has created a network society that includes cyberculture, thus the relationship between the individual and society has become digital (Aydemir, 2020). Relationships within cyberculture include an abstract structure that transcends time, based on virtual spaces. In addition, in interactions that take place in virtual environments, individuals have social experiences regardless of factors such as age, gender and race (Bostancı-Ege, 2012). In their cultural development model, Vygotsky and Luria (1994) state that cyberculture is an important factor in the cultural development of people who communicate in digital environments, both in communicative and behavioral dimensions, regardless of human-human interaction (Macfadyen, 2006). According to the view expressed by Gunkel (1998), cyberspace opens the doors of a freer global society, without individuals being exposed to phenomena such as prejudice, exclusion and inequality arising from sociocultural limitations. From another perspective, cyberspace makes the concepts of reality and identity more flexible, allowing people to have new experiences in the virtual world (Güzel, 2016).

Cyberculture introduces a new culture that offers individuals the opportunity to express themselves through digital platforms such as digital communication technologies and the internet. This situation adds more value to social life and also leads to the opening of new areas of innovation.

Many factors such as the increase in economic, social, cultural and political interactions around the world, the decrease in borders between countries and the rapid spread of information technologies increase the importance of globalization. In the new world order that has emerged with globalization, the dimensions of citizenship are also changing. In the literature, global citizenship is defined as a universal personality that takes responsibility not only for his/her country but also for the world in which he/she lives and leaves a sustainable world to future generations (Kan, 2009). The roots of the idea of global citizenship, in other words, universal citizenship, are based on Stoic philosophy and the Enlightenment period in modern times (Zolo, 2007). It can be said that Stoic philosophy reveals a universal understanding of world citizenship and that global citizenship reflects the universal and cosmopolitan perspective on the citizenship of Ancient Greek and Roman cultures centered on Western Civilization (Çolak et al., 2019). At this point today, global citizenship is seen as the basis of the era of human rights and responsibility (McIntyre-Mills, 2000).

Oxfam (2006), states that global citizenship is a process that allows the development of the knowledge, skills and values necessary for a sustainable world. In addition, being a global citizen is also important in terms of equality, social justice, empathy, valuing differences, responsibility, sustainable development, respect, concern for the environment, identity, self-esteem and beliefs, values and attitudes that people can make differences (Aktaş & Ayaydın, 2023).

Global citizenship, which emerged as a world citizenship under the influence of globalization is evaluated from different perspectives. While at the first stage, it is perceived as a threat from world governments from a nationalist perspective, according to a different view, it refers to citizens who are aware of global issues and have respect for different cultures (Kaya & Kaya, 2012). There are different definitions of both the concept of global citizenship and global citizenship education. It is also stated that there are common points in many of these definitions (Uslu & Çetin, 2022). When the common point of the definitions found in the literature is summarized, individuals who expand their personality/self-definitions beyond geographical boundaries and are aware of the impact of events occurring anywhere in the world are defined as global citizens (Kavuşan, 2023).

Morais and Ogden (2011) developed a global citizenship model consisting of three dimensions: social responsibility, global competence and global civic participation. The social responsibility dimension includes social commitment to society and the environment. In the global competence

dimension, cultural values are activated and include skills such as interacting with the environment, communicating and being open-minded. In the civil participation dimension, there are sub-dimensions of awareness of local and global problems, activism and social participation. Global citizenship enables students to gain knowledge, skills and responsibilities at a global level in a broad perspective.
It is aimed to examine the cyberculture adoption levels and global citizenship levels of social studies teacher candidates. In this regard, answers to the following questions were sought.

1. Do social studies teacher candidates' cyberculture adoption levels and global citizenship levels differ according to gender?
2. Do social studies teacher candidates' cyberculture adoption levels and global citizenship levels differ depending on the class variable?
3. Do social studies teacher candidates' cyberculture adoption levels and global citizenship levels differ according to the purpose of social media use variable?
4. Do social studies teacher candidates' cyberculture adoption levels and global citizenship levels differ according to the internet usage frequency variable?

2. METHOD

2.1. Model of the Research

In this research, a descriptive survey model, one of the quantitative research methods was used. Descriptive research, one of the most widely used research methods in the field of education, aims to reveal the existing situation along with the current situations, features and conditions (Çoban & Oral, 2020). Although descriptive research aims to reveal a situation clearly, the researcher has no control over the variables and only describes what exists (Büyüköztürk et al., 2019).

2.2. Study Group

The study group of research consists of 172 (131 female, 41 male) social studies teacher candidates who continue their education in the Department of Social Studies Education, Turkish and Social Sciences Education Department of Niğde Ömer Halisdemir University Faculty of Education in Turkey. Frequency information for the study group is given in Table 1.

Table 1. Demographic information about the study group

Demographic Information		Number (n)	Percent (%)
Gender	Woman	131	76.2
	Male	41	23.8
	Total	**172**	**100**
Grade Level	1. Class	26	15.1
	2. Class	44	25.6
	3. Class	43	25.0
	4. Grade	59	34.3
	Total	**314**	**100**
Purpose of Social Media Use	Entertainment	70	40.7
	Communication	13	7.6
	Following the Agenda	43	25.0
	Other	46	26.7
	Total	**172**	**100**
Internet Usage Frequency	Between 1-5 Hours Daily	87	50.6
	Between 6-11 Hours Daily	68	39.5
	12 Hours and Above	17	9.9
	Total	**172**	**100**

When the findings regarding the demographic characteristics of the participants are examined. it is seen that 76.2% of the participants are female and 23.8% are male teacher candidates. It was determined that they mostly use social media for entertainment purposes (40.7%). and half of the participants spend 1-5 hours on the internet per day (50.6%).

2.3. Data Collection Tools

As data collection tools in the study, the Cyberculture Adoption/Development Level Scale developed by Koçak (2019) and the global citizenship scale (Global Citizenship Scale-GCS) developed by Morais and Ogden in 2010 were used. The Turkish adaptation, validity and reliability study of the global citizenship scale was conducted by Tutkun (2019). In addition, a personal information form prepared by the researcher was used. The cyberculture adoption/development level scale consists of 22 one-dimensional items and the internal consistency coefficient was calculated as .96. The global citizenship scale consists of 30 items and three sub-dimensions: social responsibility global competence and global civic participation. The internal consistency coefficient of the scale was calculated as .86. The results of the reliability analysis are given in Table 2 below. The personal information form encompasses details through which the researcher arranges information about social studies teacher candidates, including their gender, grade, purpose for using social media and frequency of internet usage.

Table 2. Reliability analysis results for data collection tools

Data Collection Tools	Cronbach's Alpha	Number of Items
Global Citizenship Scale	.89	30
Cyber Culture Adoption/Development Level Scale	.91	22

When the findings regarding the reliability analysis of the data collection tools were examined, the Cronbach Alpha value calculated for the global citizenship scale was found to be .89. The Cronbach Alpha value of the global citizenship scale adapted to Turkish by Tutkun (2019) was calculated as .86.

The Cronbach Alpha value calculated for the Cyber Culture Adoption/Development Level Scale was calculated as .91. and the Cronbach Alpha value of the cyberculture adoption/development level scale developed by Koçak (2019) was calculated as .96. The fact that the values of the data collection tools are between 80 and 1.00 shows that the scale has high reliability (Karaca, 2021). In this context, it can be said that the data collection tools have a high level of reliability.

2.4. Analysis of Data

The differences in the scores of the participants from the cyberculture adoption level scale and the global citizenship level scale according to the gender variable were calculated with the Independent Samples t-Test. The differences according to grade, social media usage purpose and internet usage frequency were tried to be determined by one-way analysis of variance (One-Way ANOVA) for unrelated samples. Information regarding the normality tests of the variables used in the research is given in Table 3.

Table 3. Normality analysis findings for variables

Variables	Normality Tests		
Gender	Skewness	1.239	.185
	Kurtosis	-.471	.368
Grade Level	Skewness	-.296	.185
	Kurtosis	-1.224	.368
Purpose of Social Media Use	Skewness	.393	.185
	Kurtosis	-1.387	.368
Internet Usage Frequency	Skewness	.681	.185
	Kurtosis	-.592	.368

When Table 3, which includes the normality analysis results for the variables included in the research is examined. it is seen that Skewness values are between -2 and +2 and Kurtosis values are between -7 and +7. In the relevant literature, it has been stated that the Skewness value being in the -2/+2 range and the Kurtosis value being in the -7/+7 range is appropriate in terms of distribution normality (Byrne, 2010). As a result of the normal distribution of the data. it was concluded that parametric tests would be used in the analysis of the variables. In this context, "T-Test for Independent Samples" was used in the analysis of the "Gender" variable and "One-Way Analysis of Variance" was used in the analysis of the "Grade Level", "Purpose of Social Media Use" and "Frequency of Internet Use" variables. In a one-way analysis of variance, Levene's test was used to determine the homogeneity of the groups and it was determined that the groups were homogeneously distributed. Based on the finding that the groups were homogeneously distributed, the Gabriel multiple comparison test was used to reveal the statistical differences between the group averages. Gabriel, a multiple comparison test that is frequently preferred to determine differences between groups in one-way analysis of variance, allows strong results to be used in cases where there are small differences between group sizes (Field, 2012). Although the Gabriel multiple comparison test reveals similar features to the Hochberg GT2 test, it is emphasized that it produces stronger results in cases where there are differences between the numbers of groups (Koca, 2013).

3. FINDINGS

In this part of the research, the findings obtained from the answers given by social studies teacher candidates to the cyberculture adoption level scale, global citizenship level scale and personal information form are included.

Table 4. Independent sample t-test results regarding the differentiation of teacher candidates' global citizenship levels and cyber culture adoption/development levels according to gender variable

Data Collection Tools	Gender	n	$\bar{x}$	SD	df	t	p
Global Citizenship	Woman	131	2.72	.57	170	.30	.77
	Male	41	2.75	.60			
Cyber Culture Adoption/Development Level Scale	Woman	131	3.38	1.09	170	.50	.49
	Male	41	3.52	1.15			

It was determined that there was no statistically significant difference between the gender status of the teacher candidates and their global citizenship ($t_{(170)}$=.30;p=.77>.05) and cyberculture adoption/development levels ($t_{(170)}$=.50;p=.49>.05). It can be stated that the gender status of teacher candidates does not have any effect on both their global citizenship and their level of adoption of Cyberculture.

Table 5. One-Way analysis of variance results regarding the differentiation of teacher candidates' global citizenship levels and cyber culture adoption/development levels according to the class level variable

Data Collection Tools	Grade	n	$\bar{x}$	SD	SV	Ss	df	ms	F	p
Global Citizenship	1	26	2.79	.50	In-Group	1.419	3	.473	1.43	.24
	2	44	2.66	.43	Inter Group	55.480	168	.330		
	3	43	2.62	.65	Total	56.899	171			
	4	59	2.83	.64						
Cyber Culture Adoption/ Development Level Scale	1	26	3.43	1.05	In-Group	1.621	3	.540	.44	.72
	2	44	3.29	.85	Inter Group	206.363	168	1.228		
	3	43	3.56	1.21	Total	207.984	171			
	4	59	3.40	1.22						

It was determined that there was no statistically significant difference between the grade levels of the teacher candidates and their global citizenship ($F_{(3-168)=}1.43;p=.24>0.5$) and cyberculture adoption/development levels ($F_{(3-168)}=.44;p=.72>.05$). It can be said that teacher candidates' grade levels do not have an impact on both their global citizenship levels and cyberculture adoption/development levels.

Table 6. One-Way analysis of variance results regarding the differentiation of teacher candidates' global citizenship levels and cyber culture adoption/development levels according to the purpose of social media use variable

Data Collection Tools	Purpose of Social Media Use	n	$\bar{x}$	SD	SV	Ss	df	ms	F	p
Global Citizenship	Entertainment	70	2.79	.50	In-group	3.671	3	1.224	3.86	**.01***
	Communication	13	2.66	.43	Intergroup	53.228	168	.317		
	Following the Agenda	43	2.62	.65	Total	56.899	171			
	Other	46	2.83	.64	**The Source of the Difference (Gabriel)** Following the Agenda>Entertainment					
Cyber Culture Adoption/ Development Level Scale	Entertainment	70	3.43	1.05	In-group	6.716	3	2.239	1.87	.14
	Communication	13	3.29	.85	Intergroup	201.267	168	1.198		
	Following the Agenda	43	3.56	1.21	Total	207.984	171			
	Other	46	3.40	1.22						

*p≤.05

When Table 6, which contains the statistical analysis regarding the social media usage purpose variable of social studies teacher candidates' global citizenship and cyberculture adoption/development levels, is observed, it is seen that the social studies teacher candidates' global citizenship levels create a statistically significant difference ($F_{(3-168)}=3.86;p=.01\leq.05$) according to the purpose of social media use. It is seen that there is no statistically significant difference ($F_{(3-168)}=1.87;p=.14>.05$) in the levels of adoption of cyberculture. It has been determined that the global citizenship levels of teacher candidates who use social media to follow the current agenda are higher than those who use social media for entertainment purposes. In line with the findings, it can be stated that the purposes of teacher candidates' use of social media do not have an impact on their level of adoption of cyberculture.

Table 7. One-Way analysis of variance results regarding teacher candidates' global citizenship levels and cyber culture adoption/development levels differentiating according to daily average ınternet usage time variable

Data Collection Tools	Daily Internet Usage Time	n	$\bar{x}$	SD	SV	Ss	df	ms	F	p
Global Citizenship	1-5 Hours	87	2.72	.56	In-group	.369	2	.184	.55	.58
	6-11 Hours	68	2.70	.57	Intergroup	56.530	169	.334		
	12 hours and more	17	2.86	.71	Total	56.899	171			
Cyber Culture Adoption/Development Level Scale	1-5 Hours	87	3.08	.90	In-group	45.465	2	22.732	23.64	**.00***
	6-11 Hours	68	3.49	1.05	Intergroup	162.519	169	.962		
	12 hours and more	17	4.86	1.08	Total	207.984	171			
					The Source of the Difference (Gabriel) 6-11 Hours>1-5 Hours 12 hours and more >1-5 Hours; 6-11 Hours					

*p≤.05

When Table 7, which includes the statistical analysis of the daily internet usage time variable of social studies teacher candidates' global citizenship levels and cyberculture adoption levels is examined, it is seen that the social studies teacher candidates' global citizenship levels do not create a statistically significant difference ($F_{(2-169)}$=.55;p=.58>.05) compared to the average daily internet usage time. It is seen that there is a statistically significant difference ($F_{(2-169)}$=23.64;p=.00≤.05) in the levels of adoption of cyberculture. It has been determined that teacher candidates who use the internet for an average of 6-11 hours a day have a higher level of adoption of cyberculture compared to teacher candidates who use the internet for 1-5 hours a day. It has been determined that the cyberculture adoption levels of teacher candidates who use the internet for an average of 12 hours or more per day are higher than the teacher candidates who use the internet for an average of 1-5 hours and 6-11 hours per day. In line with this finding, it can be stated that the increase in the average daily time spent on the internet has caused an increase in the level of prospective teachers' adoption of cyberculture. On the other hand, it can be said that the average daily internet usage time does not have an impact on global citizenship levels.

4. DISCUSSION and CONCLUSION

The objective of this study was to assess the levels of cyberculture adoption and global citizenship among social studies teacher candidates, considering variables such as gender, grade, social media usage purpose and daily internet usage time. The findings of the research are presented below.

Upon investigating the cyberculture adoption levels of social studies teacher candidates concerning gender variables, no statistically significant difference was observed. It is conjectured that this lack of distinction may be attributed to the swift proliferation of cyber environments and cyberculture, which manifests diverse effects irrespective of gender. Koçak's (2019) research, however, yielded contrasting results, indicating a noteworthy gender-based difference in the level of cyberculture adoption among university students, favoring male students. Notably, the outcomes of this research diverge from those of other studies.

Upon examining the global citizenship levels of teacher candidates in relation to gender variables, no statistical difference was identified. Consistently, Öksüzoğlu's (2022) research revealed that the global citizenship levels of teacher candidates exhibited no statistical variance based on gender. This finding aligns with the results obtained by Özdemir-Özden and Karadağ (2021), who concluded that there was no significant difference in the global citizenship levels of teacher candidates when analyzed in terms of gender variables. Similarly, Çoban and Karaca (2015) determined that no significant difference existed when evaluating the global citizenship levels of teacher candidates based on gender variables. Additionally, a study by Çakmak et al. (2015) found no statistical difference in the global citizenship levels of teacher candidates with respect to the gender variable. Furthermore, Göl's (2013) research established that there was no statistical difference in the global citizenship attitude levels of social studies teacher candidates when examined in terms of gender variables. However, in Gül's (2020) research, an examination of the global citizenship levels of university students based on the gender variable led to the conclusion that a significant difference existed, favoring female students. Similarly, in Durmuş's (2017) study, an analysis of the global citizenship attitudes of teacher candidates resulted in the determination of a significant difference, favoring female teacher candidates.

Upon scrutinizing the cyberculture adoption levels of social studies teacher candidates with consideration given to the grade level variable, no statistically significant difference was identified. It can be inferred that the grade level factor does not exert a notable impact on the cyberculture adoption levels of teacher candidates. Similarly, an examination of the global citizenship levels of teacher candidates concerning the grade level variable revealed no statistical differences. This aligns with the conclusions drawn by Öksüzoğlu (2022), who determined that the global citizenship levels of teacher

candidates were not a decisive factor when assessed in relation to the grade level variable. Additionally, Koçar's (2022) research indicated that the grade levels of teacher candidates do not exhibit a significant difference in their global citizenship status. Consistent with these findings, Özdemir-Özden and Karadağ (2021) observed that the global citizenship levels of teacher candidates remain consistent regardless of the grade level they are enrolled in, Gül's (2020) research on university students also substantiates this, suggesting that global citizenship levels do not significantly change with variations in grade level. In a related context, Durmuş (2017) found that prospective teachers' global citizenship attitude levels do not exhibit a significant difference at the classroom level. However, there is some divergence in findings, as indicated by the research conducted by Çoban and Karaca (2015) which suggested that prospective teachers' global citizenship attitude levels differ statistically concerning the class variable. Additionally, Göl's (2013) research found no significant difference in the global citizenship attitudes of teacher candidates based on grade levels.

When social studies teacher candidates' cyberculture adoption levels were examined in terms of the social media usage purpose variable, the findings showed that teacher candidates' social media usage status did not affect their cyberculture adoption levels. Entertainment, which is one of the purposes of teacher candidates' use of social media, affects their global citizenship levels. It can be expressed that this situation is due to the fact that social media has a global impact in the world, turning individuals and their citizenship status within society into global citizens as a world citizenship.

When social studies teacher candidates' cyberculture adoption levels were examined in terms of the daily internet usage time variable, the results showed that increasing internet usage time highly affects the cyberculture adoption levels of teacher candidates. This situation can be thought to be due to the fact that cyber environments create a world that directly belongs to internet culture. It was concluded that the daily internet usage time did not affect the global citizenship levels of teacher candidates. Global citizenship encompasses an understanding of citizenship that expresses the responsibility of individuals toward the problems in the world. At this point, although the internet is considered a tool that supports global citizenship duties, it can be stated that the duration of daily internet usage does not affect the global citizenship level of teacher candidates because global citizenship exists independently.

Suggestions

In order to ensure that teacher candidates and students act consciously and safely on cyberculture issues, it may be recommended to organize training on digital training, data privacy, social media management and ethical behavior in digital environments.

It may be suggested that cyberculture education should be comprehensively addressed in the social studies curriculum and that simulations and interactive games on cyberculture should be developed for students.

It may be recommended that teacher candidates and students be encouraged to participate in social responsibility projects and contribute to social responsibility projects around the world in order to develop global citizenship awareness.

Ethics Committee Decision

This research was carried out with the permission of Niğde Ömer HalisDemir University Publication Ethics Board with the decision numbered 165350 dated 01.02.2022.

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Abstract

The whole, consisting of interconnected and interacting parts that come together for a purpose, is called a system. Every system has subsystems, vitally connected to each other and interacting. However, each of them forms a whole within itself. Generally, entities in nature are grouped into three main categories: natural systems, mechanical systems, and social systems. Institutions established by people form the social system and together with culture, they form the social structure. Educational institutions, one of the basic institutions of society, are in relationship with both the material and spiritual elements of culture, just like other institutions. In this context, education and culture appear as two separate concepts that are interdependent and mutually affecting each other. In our age where social and cultural changes are experienced, the relationship between culture and education holds an important place. One of the significant factors affecting the education systems of societies is their culture. Education is also what enables the transfer of cultures to future generations. Culture is influential at every level of education and education serves as a significant tool for the transmission of culture. Therefore, it is important to consider cultural factors for understanding and developing the Turkish Education System. The study focuses on examining and discussing the relationship between education and culture in a sociological context. The primary method of the study is literature review. The relationship between education and culture, the influence of education on societies, the education systems of societies with different cultures and histories and multiculturalism are discussed to form a whole. Today, the Turkish education system continues to be shaped by the influence of culture. Examples illustrating how culture has shaped the Turkish Education System are provided within the study, discussing the impact of culture on the education system and concluding that the Turkish Education System is influenced by the cultural activities of the past of society.

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Review Article

The Impact of Culture on the Education System*

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Abstract

The whole, consisting of interconnected and interacting parts that come together for a purpose, is called a system. Every system has subsystems, vitally connected to each other and interacting. However, each of them forms a whole within itself. Generally, entities in nature are grouped into three main categories: natural systems, mechanical systems, and social systems. Institutions established by people form the social system and together with culture, they form the social structure. Educational institutions, one of the basic institutions of society, are in relationship with both the material and spiritual elements of culture, just like other institutions. In this context, education and culture appear as two separate concepts that are interdependent and mutually affecting each other. In our age where social and cultural changes are experienced, the relationship between culture and education holds an important place. One of the significant factors affecting the education systems of societies is their culture. Education is also what enables the transfer of cultures to future generations. Culture is influential at every level of education and education serves as a significant tool for the transmission of culture. Therefore, it is important to consider cultural factors for understanding and developing the Turkish Education System. The study focuses on examining and discussing the relationship between education and culture in a sociological context. The primary method of the study is literature review. The relationship between education and culture, the influence of education on societies, the education systems of societies with different cultures and histories and multiculturalism are discussed to form a whole. Today, the Turkish education system continues to be shaped by the influence of culture. Examples illustrating how culture has shaped the Turkish Education System are provided within the study, discussing the impact of culture on the education system and concluding that the Turkish Education System is influenced by the cultural activities of the past of society.

Keywords: Culture, education system, education, learning, social structure

1. INTRODUCTION

Culture is one of the most important variables that covers the entire social life and distinguishes societies from each other. Furthermore, culture changes geographically and takes various forms according to each society. It is learned and transmitted to the next generations in this manner. Learning can be defined as a permanent change in behavior resulting from repetition and experience. Education, on the other hand, is a process of acculturation and adaptation to the environment (Schein, 1990). The transfer of cultural values from generation to generation and the provision of permanent behaviors that society requires are achieved through education. In comparative education systems, the impact of cultural differences between societies on the change and development of education is evident (Çoban, 2020: p.386).

The transfer of culture from generation to generation occurs through social institutions, with the most important being the family and educational institutions. The state fulfills these duties through formal and non-formal educational institutions. Scientific and contemporary education provided in schools, which are the lowest units of the education system, aims to benefit both the individual and

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society simultaneously. While the individual improves themselves, they also need to ensure they are useful to society, propel society forward and contribute to its development. In this context, education and culture are two intertwined concepts. While cultural values are transferred from generation to generation through education, they also shape the goals of the education system. To better understand the relationship between culture and education, the concepts of culture and education are briefly discussed. Following the discussion of the interaction between culture and education, emphasis is placed on the role of education in society, the shaping of education systems in different societies and multiculturalism.

The aim of the research is to examine the impact of the concept of culture on education systems in different societies, using the Turkish Education System as an example. In this context, the study conducted within the scope of the review revealed perspectives on culture, education, the interaction between culture and education, education in traditional societies and education in multicultural societies.

1.1. Culture

Culture, which means to cultivate and build, is derived from the word "cultura." Marx defines culture as "everything created by human beings as opposed to what nature creates," while Tylor defines culture or civilization as a complex whole that includes knowledge, art, traditions, customs and similar abilities, skills and habits that human beings learn as members of a society (Stocking Jr, 1965). In our language, the concept of culture is used in four different meanings: culture (civilization) in the scientific field; in the human field (as the product of the educational process); in the aesthetic sense (as fine arts) and in the material (technological) and biological field (production) (Güvenç, 1979:p.102).

According to Karasüleymanoğlu (2002), culture is defined as all the material and spiritual values that emerge in the process of socialization and the impact that humans create on the environment while applying them, as well as all the tools that show the extent of their sovereignty (Karasüleymanoğlu, 2002, as cited in Coşkun, 2009:p.18). When we look at the characteristics of culture in general, it is social, historical, both learned, taught and has relative continuity.

Culture possesses several fundamental characteristics. When examining the various layers of culture within society, it becomes evident that it comprises basic assumptions underlying observable works, values and ideas (Schein, 1990:p.111). Culture influences both social and individual behavior and shapes the interpretation of these behaviors, thereby adding a distinctive perspective to behavior. Hofstede (1991:p.8) notes that although certain aspects of culture may be physically observable, their meaning and ultimate purpose remain unclear. Examples of this ambiguity include gestures, facial expressions and hand gestures, each of which carries different meanings in various societies. Culture originates from social emotions rather than human genes. While the relationship between human nature, personality and culture sparks debate in social circles, it's crucial to separate culture from individual characteristics. Ancient scientists and philosophers often attributed cultural characteristics to heredity, yet the stable transmission of cultural traits from generation to generation was not considered a significant explanation (Hofstede, 1994:pp.5-6).

Additionally, culture exerts an influence on biological processes. It shapes a person's ideas and mindset, leading individuals whose mindset is affected to physically react to relevant thoughts and eventually accept this physical reaction as behavior. An illustrative example of this phenomenon is the evolutionary changes in individuals' eating habits, which vary across different societies. While each society consumes the meat of different animals, the digestive system adapts biologically to these dietary preferences.

Culture is shared and cultivated by at least two or more people. For an idea, thing, or behavior to be considered cultural, it must be shared by some form of social group or society (Ferraro, 1998: p.16). Individual differences in culture can be observed among people in the degree to which they adopt and participate in the attitudes, values, beliefs and behaviors that collectively constitute their

culture. If an individual behaves in accordance with those values or behaviors, they become integrated into that culture; if they do not share these values or behaviors, it indicates a lack of adoption of that culture. Culture is learned through socialization and interaction with the society we live in (Lustig & Koester, 1999:pp. 31-32).

Societies have historically interacted with each other, even in times without advanced technology, due to factors such as migrations, wars and trade. They have shared environments, leading to the exchange and creation of common cultures. Anthropological accounts of any society's culture represent a snapshot of a particular time. If an ethnographer were to revisit a few years after completing a cultural study, they would find that cultures evolve over time and the exact situation may no longer exist.

As evidenced by these features, culture is a phenomenon learned and acquired through education. Therefore, it must adhere to the rules, laws, and principles of learning. This learning process is continuous and social. The primary social institutions where cultural values are passed down from generation to generation are the family and educational institutions. Schools, as sub-units of the education system, serve as social systems where this transmission takes place.

1.2. Education

The word education is derived from the Latin words educare and educatum. Educare means "to educate" and educatum means "learning activity." According to Tylor (1950:p.4), education is the process of changing a person's behavioral patterns (Tylor, 1950, p.4 as cited in Celep, 2007:p.8). In general terms, education is the process of raising individuals in line with the demands and needs of society. Education is divided into formal and informal education. Formal education is consciously purposeful, programmed and aims to instill positive behavior in the individual. Informal education can be defined as unprogrammed education that includes both positive and negative behaviors learned through interaction with the environment, often without conscious awareness (Türkoğlu & Uça, 2011:p.50).

Although different definitions of education exist, the following basic features appear in all definitions:

- The object of education is human.
- The current condition of this object is considered inadequate.
- It is important to change the behavior of the object in the desired direction.
- The educational process needs to be adjusted.
- It is necessary to evaluate whether the object acquires the desired behaviors (Sönmez, 2002:p.32).

Education comprises five basic elements: purpose, behavior, experience, process and desire. To achieve education at the highest level, programs must be prepared for a specific purpose and individuals must naturally be suited to undergo behavioral changes, the environment must be conducive and they must possess the knowledge and skills necessary for this. Experience refers to the effects and changes that occur in individuals due to environmental influences as they interact with their surroundings (Fraiser, 1956: p.46). This also encompasses the impact of family structure, subcultural influences within the family and the influence of other family members, relatives, close circles and friend groups on the individual. In this context, education at school aims to rectify undesirable behaviors acquired outside and minimize undesirable environmental influences as much as possible. The process in education involves transitioning the individual from one situation to another under specific conditions and within a certain timeframe to effect behavioral change. Being desirable requires possessing the desired characteristics under the desired conditions (Celep, 2007:pp.11-12).

Education and society are intertwined, mutually influencing each other. Socialization occurs through the process of education, with each society establishing and utilizing its own educational system. This process contributes to socialization both formally and informally. Socialization is not only the training of the individual for society but also the reshaping of society through education. Therefore, the quality of society and its individual members are interdependent. In this context, the educational institution within the social system appears as an institution that interacts with economic, political and other social structures to achieve their goals.

1.3. Interaction Process of Culture and Education

It is important to briefly examine the history of Turkish education to better understand the relationship between education and culture as two concepts that influence each other and to reveal the social and cultural changes in the Turkish education system. In this context, the history of education among Turks before and after Islam, the arrival of Turks in Anatolia and the educational history of the Ottoman Empire are discussed. Subsequently, events in education from the declaration of the republic to recent history are presented in a historical process (Çelik, 2014: p. 125).

Eastern societies are recognized as the cradles of civilization. Many elements originating from the East reached the West centuries later. Civilizations in ancient China and ancient India date back to 2000 BC. Since then, education has been systematically conducted according to religious beliefs. Egyptian and Mesopotamian civilizations, dating back more than 2000 BC, are known for their advanced educational practices. The East is also renowned as the birthplace and dissemination hub of religions. With the spread of Islam in the East, education remained under its influence for many years. Consequently, education in the East was heavily intertwined with religious teachings. The principal Turkish states during these periods were the Huns, Gokturks and Uyghurs. Experiences acquired from living conditions in these times were transmitted to younger generations through education. Children and youth were socialized through educational practices. The Orkhon inscriptions, the oldest written monuments of Turkish history, were also crafted during this period. Although Turks contributed to the development and dissemination of education through their alphabet, the absence of settled order hindered the establishment of formal educational institutions, thus perpetuating the influence of religion on education. During these eras, education was primarily provided within families or by the leading scholars or wise individuals of tribes (Demirel & Kaya, 2011: p.21).

Education became a revered pursuit supported by customs. Skills necessary for nomadic societies such as breeding domestic animals, processing furs, carpet weaving and metalworking were imparted to younger generations through a mentor-apprentice relationship. Among the Huns, education was predominantly focused on hunting and warfare, essential for their nomadic lifestyle and defense against adversaries. This transmission of skills to succeeding generations can be characterized as vocational education.

Religious beliefs were also utilized as a means of education among the Huns. Folk religion established regulations concerning people's daily lives, while state religion ensured citizens' obedience to the state. Shamanism was widespread among the Huns, Shamans and Kams assumed the role of educators. The Gokturk state, established in the 6th century AD after the downfall of the Hun state, holds a significant place in the history of education as the first written works, the Orkhon Monuments, have been attributed to them. These works discuss the interactions between the Chinese and the Turks. Subsequently, the Uyghur state, which was the first Turkish state to transition from nomadic to settled life, emerged. Influenced by Chinese culture, the Uyghurs adopted Manichaeism and employed the 14-letter Sogdian alphabet. The limited number of letters in this alphabet led to a rapid increase in literacy rates and the production of literary works. However, due to the dual influence of Turkish and Chinese cultures, the Uyghurs were unable to develop a distinct educational and cultural system during this period. Turks, who remained under the influence of Chinese culture even after embracing Islam, were also influenced by Arab and Iranian cultures (Koçer, 1980: pp. 34-67).

During the era of the Karakhanids, the first Muslim Turkish state, educational institutions known as madrasas emerged. The emergence of madrasas can be attributed to changes in religious and cultural life. Throughout the Seljuk period, madrasas persisted as formal educational institutions, alongside another educational institution called Ahilik, which catered to non-formal education. In Ahilik, education was provided through both on-the-job and off-the-job methods, with on-the-job training focusing entirely on fundamental societal behavioral patterns such as traditions and customs.

During the Ottoman period, madrasas and Ahilik retained their influence as educational institutions, alongside the establishment of various schools. Additionally, mosques, lodges and coffeehouses served as non-formal education institutions, playing pivotal roles in education within the Ottoman Empire. The changes observed in the education system were shaped by the social needs of the time. Generally, the aim of education and training during the Ottoman period was to ensure individuals acquired necessary knowledge, skills and cultural values (Sağlam, 2013:pp.131-179).

The field of education appears to have become more institutionalized alongside the changing social structure. The most significant development in education during this period was the adoption of the Tevhid-i Tedrisat Law on March 3, 1924. This law centralized all educational institutions under the Ministry of National Education, resulting in the closure of madrasas. The Republican era saw further developments in the institutionalization of education, laying the foundations of the Turkish education system as envisioned by Atatürk, by consolidating all educational institutions under a single authority. This initiative led to the establishment of a modern organizational structure in education. Additionally, with the adoption of the new Turkish alphabet, education became more accessible to the public. Furthermore, education was emancipated from the influence of religion with the implementation of secularism. Consequently, the religious influence on education, which had been prevalent since the early Turkish states, was eradicated, ushering in a modern approach (Sağlam, 2013: pp. 285-320).

In this context, the aim of education shifted towards nurturing individuals who uphold the integrity of social existence, safeguard their country and preserve their cultural values based on Atatürk's principles, thereby striving for self-improvement and societal advancement.

Village Institutes hold a significant place in the Republic of Turkey, shaping culture and facilitating the development of the education system. These institutes not only trained students as teachers but also prepared them to represent the state in rural areas. Village Institutes have actively contributed to the dissemination of modern educational approaches nationwide and the education of individuals within the framework of cultural values.

1.4. The Change Mission of Education in Traditional Societies

Educational sociologists ask: "Do schools change society, or does society change schools?" and have taken this question as the subject of research. Education clearly influences the course of social development and schools always reflect the influence of the social context in which they exist. In some countries, there has been a period of schooling where reformers believed that education could easily solve social problems and a large part of their time and energy was devoted to improving the situation through education (Rury, 2012:p.21). By examining the basic steps in the development of the current school system, it is possible to see some of the ways education today relates to larger patterns of social change.

Social change is a complex concept. Change in society occurs across various channels. Studying history is important to see how society has developed over time and to understand how social change is influenced by events, conditions and people. Although history can never provide a formula for resolving a particular dilemma, it can help individuals and groups understand how they arrived at their current circumstances. At its best, history provides a point of comparison to better interpret and understand a people's circumstances.

On one hand, education is a complex human experience of individual growth and development, a process encountered in daily life (Dewey, 1938: p.121). In other respects, it is also a social and institutional activity for the transmission of knowledge and values from one generation to the next. It is a process that involves large segments of society and recently, involves billions of dollars. Education, in its institutional form, has also become a means of acquiring and certifying the knowledge and skills necessary for the well-being of society, making it a subject of great public interest. Due to its various purposes and functions, education has often been closely linked to historical processes of social development.

The educational process itself has also changed greatly over the years and is affected by changes in the economy, political system and other aspects of social structure. Today, schools have a very different structure than those in the past and their purposes change from time to time. Education can therefore be said to be on both sides of social change: both as a causal agent and as an aspect of life that changes due to other social forces. The most relevant social science ideas are those that describe broad processes of change that express impacts on a large historical scale (Rury, 2012:p.38). The most important example of this is industrialization. Industrialization left a profound impact on the people who experienced it directly and had a lasting impact on the organization of society (Ashton, 1948). As schools tried to prepare students for a rapidly changing world, this also had important consequences for education (Rabb & Rotberg, 1981:p.161). Since, with industrialization, new forms of knowledge and skills come into play, it can be said that such changes have significant impacts on the development of education. This has also had important consequences for education, as schools are called upon to meet the needs of rapidly changing social roles (Cowan, 1997: p.23).

The changing system and society have made education important over time as a way to certify a person's knowledge, abilities and even moral character. For example, if it is impossible to know a man's past and do research by asking others about him, using credentials such as diplomas and degrees can document at least some success. With urbanization, more different professions and business groups were needed. The way to specialize in these professions is through some kind of training.

In order for societies to keep up with the changing world, it is important to place education in an important position and to train knowledgeable manpower in every field. In societies that do not include education within the framework of the plan, problems such as occupational accumulation, unemployment and a decrease in quality arise after a certain period of time. Considering the effort to "keep up with the times," schools must also catch up with this change process and actively participate in the change of society. The fact that changes have an impact that will shape society, starting at school, is directly related to every profession and qualified manpower. The impact of school and education on society is an important issue not only for the workforce but also for political ideologies, the idea of society, the memory of society and for keeping the culture of society alive. The school should educate individuals to be proactive, prepared, solve problems and see the future in the face of the problems they will encounter.

1.5. Views of Education from Different Societies

It is observed that education generally affects society by socializing individuals. An opposing view has emerged, claiming that education is a system that brings success to some and failure to others (Meyer, 1977:p.57). Comparative education and experimental research provide insight into the way's education is implemented in different societies and its effects. Additionally, educational studies in different societies are important for establishing a connection with the culture of the society.

When the Turkish Education System is examined, the understanding of education is based on the educational philosophy of the Republican Era and the dissemination of the innovations made in that period through education is adopted (Şenkaloğlu, 2021:p.34). While there is no problem in this regard, the education system has not kept up to date and education policies have been changed frequently, with stability in the changes not being achieved. In the process, while equality of

opportunity in education reduced the quality of the workforce, the application of a completely western system without adapting it to the culture of the society caused the formation of an intellectual environment disconnected from the public. Although these events were problems of that period, today's lack of merit in education management, inability to manage the education economy and unqualified education programs and contents are indicators that the situation is not improving.

The Japanese Education System has been a subject of curiosity and research for education researchers and education administrators in Turkey, especially with its similar features and aspects that need to be learned. After the Second World War, which Japan experienced painfully starting in the 19th century, the rapid socio-cultural and economic change and development process is seen as the "Japanese miracle" (Özşen, 2020:p.40). At this point, the 10 articles of the Basic Law of Education, which integrated the Japanese Education System into the 21st century, offered an important perspective on purpose, vision-strategy and the relationship between politics and religion in education. Japanese society has made educational decisions a part of daily life in order to ensure that education becomes qualified and the quality does not decrease (Ekinci, 2010:p.47).

The Israeli Education System is generally rigorous; the process of societal cohesion and state formation is reflected in education, focusing on illuminating the weaknesses of the individual. It has made significant progress in many areas, especially advancing educational programs and conditions for specially talented individuals (Çoban, 2018:p.22). From the perspective of education economics, it has developed a policy that allocates special budgets to different levels of education. According to the results of the research, while the success of students increased, it was revealed that there was a positive effect on the success of teachers at their educational levels (Blass, 2018: p.16). In the system, teachers are frequently evaluated with incentives and appreciation in various ways, making the education system stronger.

Since Iran is Turkey's border neighbor and has a deep-rooted historical past, it attracts the attention of researchers from different countries and Turkey on education and other issues. Just as the history of Iran is discussed in two parts, before and after the Islamic revolution, this is also valid for the Iranian Education System. After the Islamic Revolution in Iran, every aspect of life was Islamized and it was aimed to raise citizens who would respond to the needs of the new regime and remain loyal to it (Kendirci, 2006: p.78). In the Iranian Education System, the rate of co-education in preschool is highest and decreases in primary education and subsequent levels. When it comes to the university level, there are state universities where men and women receive separate education (Özlük, 2017: p.754).

British Education System, despite the deep-rooted history of England, many laws have been enacted that have changed the structure of the education system. Before the 19th century, the state believed that educational reforms and all educational affairs should not be under the control of the state. After 1833, this situation changed and reform movements in education began (Hyams, 1998: pp.8-9). The UK Education System is based on the National Programme, which provides substances that are true to social values, social structure, social values and focuses on personality, relationships, society and environment (National Curriculum, 1999).

In this context, the importance of culture in societies, the desire to protect and maintain values, and the political, cultural affect education and force change. When examined in more depth apart from these examples, it can be said that education systems are under the influence of wars, political conflicts, religious elements, coups and natural disasters. While these issues create social memory and social culture, they are also directly related to education.

1.6. Multicultural Education

Multiculturalism first appeared in England in 1941 (Doytcheva, 2013: pp.98-101) and then began to be used in countries that received significant immigration from diverse cultures, such as Australia, Canada, the USA, Great Britain and New Zealand. Change was rapid in immigrant

societies, leading to the emergence of social levels (Appadurai, 1996 as cited in Akçaoğlu, 2017:p.22). Over the past decade, an increasing number of minority groups around the world have come into the spotlight: Lapps in Sweden, Basques in Spain, Bretons and Corsicans in France, Moluccans in the Netherlands, Somalis and Eritreans in Ethiopia and Chinese in Southeast Asia. In many cases, demands for political recognition and demands for education are closely related. Since many multicultural societies in Africa and Asia owe many of their problems, especially regarding race and language, to the influence of colonialism, it is ironic that some of these countries benefit from the legacy of colonialism (for example, the British recruitment of temporary workers from India). The stability of British, French and Dutch rule in East Africa, Seychelles, Mauritius, the Pacific Islands, Ceylon and Malaya and South East Asia led to a large influx of Chinese migrant workers in the late nineteenth and early twentieth centuries (Watson, 1979: p.17). There is relocation not only for work but also for reasons such as escaping war, famine, or religious and ideological oppression. For these reasons, educational opportunities and changes in education provided in increasingly multicultural societies also come to the fore.

When examining education policies in multicultural societies, countries that do not have to adapt to a sudden influx of immigrants but have had various ethnic, religious, linguistic and cultural minorities among them for centuries are more easily classified. Although each situation is fundamentally different, policies tend to be quite similar for these societies (Nieto, 1992:p.84). Every individual has the right to receive education. In order to obtain this right, multicultural societies must design the education system by taking individual differences and culture into consideration. Multicultural education aims to organize educational activities to enable different racial, linguistic, religious and cultural groups to learn (Banks & Banks, 2019: p.88).

Multicultural education is based on ensuring that all student groups achieve academic success by taking into account cultural values, planning educational reforms that will address pluralism and determining a tolerant and humanist approach that is respectful of different lifestyles and philosophical views, committed to justice and human rights (Gay, 1994: p.43). The emphasis of multicultural education on creating equal opportunities for all students and ensuring that all students achieve similar academic success has been accepted (Morrison, 2018: p. 120).

However, studies, regulations and educational reforms do not indicate that multicultural education has achieved a high level of success today and that the systems are on track. In addition to the lack of academic research, one of the most important problems is teacher training, peer bullying, resistance to change and racism (Gay & Howard, 2000: pp.95-99). Racism and other forms of discrimination are based on the assumption that one ethnic group, class, gender, or language is superior to others. Discrimination based on perceived superiority in education is part of the structure of schools, the curriculum, the training teachers receive and the interactions between teachers, students and society. But discrimination is not just an individual prejudice; it is primarily a systemic issue. Individually confronting racism and other negative prejudices that arise due to institutional practices is not enough.

When creating multicultural education programs and approaches, it is necessary to determine the approaches related to the learning styles of various cultural and ethnic groups and plan the change by taking them into account. Failure to actively apply uniform teaching methods and learning-teaching methods and techniques in lessons will reduce academic success and may also lead to cultural deprivation and disconnection from academic success for minority students. A pedagogical approach based on equality believes that every difference brings strength and as diversity increases, classes will become stronger (Banks, 2009: p.46).

2. CONCLUSION

Culture, as a concept that is both learned and taught, is a social process, not a hereditary one. Culture consists of the behaviors and habits that each individual acquires during their life after birth. In this context, culture is intertwined with education because it is a phenomenon learned and gained through education. Each state has its own unique social and cultural structure shaped by its past experiences. Within this sociocultural structure, each state determines its goals and principles for raising its own generations and endeavors to instill desired behaviors in the generations it educates through its schools.

Every education system is designed for predetermined purposes. The expected outcome from education systems is the production of skilled human resources. The quality of these skilled human resources can be defined by cognitive abilities such as creativity, knowledge, comprehension, etc.; affective characteristics such as interest, attitude, etc.; and psychomotor skills such as perception, sensation, and behavior.

Each country has its own set of values that it prioritizes. These values determine the goals and direction of education. The education system engages in activities to achieve these goals. The goals indicate the competencies (behaviors) that students are expected to acquire through education. Once the goals are set, the content of the program, the methods to be followed, and the assessment tools are developed.

Education is among the most important institutions that transmit culture from generation to generation. Each society's education system is unique, tailored to its socio-cultural, economic, and political characteristics. It is established, shaped, and developed based on the prevailing values of that society. The system fulfills the tasks expected by the society. The cultural history of nations is intertwined with their educational history. The relationship between education and culture is clearly evident in the history of Turkish education. The structure of Turkish society, from pre-Islamic times to the present day, has also influenced the education system. While education was shaped by the family institution before Islam, it was shaped by religion after Islam. With the Republic, the understanding of modern democratic and secular society was also reflected in education.

Culture has evolved within societies from the past to the present due to factors such as trade, migration, war and natural events. Consequently, certain social principles have shaped culture from nomadic societies to settled ones. People have been and will continue to be involved in different countries, societies and cultures, affecting and being affected by the culture of the societies they inhabit. Education is the most powerful tool to ensure integration between society, culture and the individual. Although education is also affected by this change, it remains indispensable, especially in multicultural societies. In societies facing immigration or multiculturalism challenges, education and particularly teacher training, is one of the key arenas where fair attitudes can be fostered and prejudices can be overcome. Education policies have often undergone various stages influenced by political and economic factors, lacking consistency or a coherent pattern.

It is universally accepted that education is a fundamental right. This stems from defining education as the process of assisting individuals in achieving their highest potential in society. While education systems facilitate the development of individuals, they also ensure the continuity of certain values and norms within societies.

Education encompasses all societal processes that prepare individuals for cultural life. Through education, individuals become members and recipients of culture to the extent that they become socialized. People and societal institutions are necessary for the individual's process of culturalization. The individual learns how to relate to them, imitating their attitudes, behaviors, and languages (Gutek, 1997: p. 4; Yılmaz & Göçen, 2015).

In conclusion, every individual is born into a society and grows up learning the culture of that society. This learning process occurs through educational institutions, highlighting the mutual

influence between culture and education; cultural values are shaped by education and education is shaped by cultural values. To ensure the welfare of individuals in society through education, schools must adapt to change during the renewal process, with a focus on culture and values and future-oriented principles. One of the most important principles is that every individual should have the right to education, regardless of their cultural background. Education should be provided by states without discrimination, regardless of war, migration, coups, political or religious reasons.

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