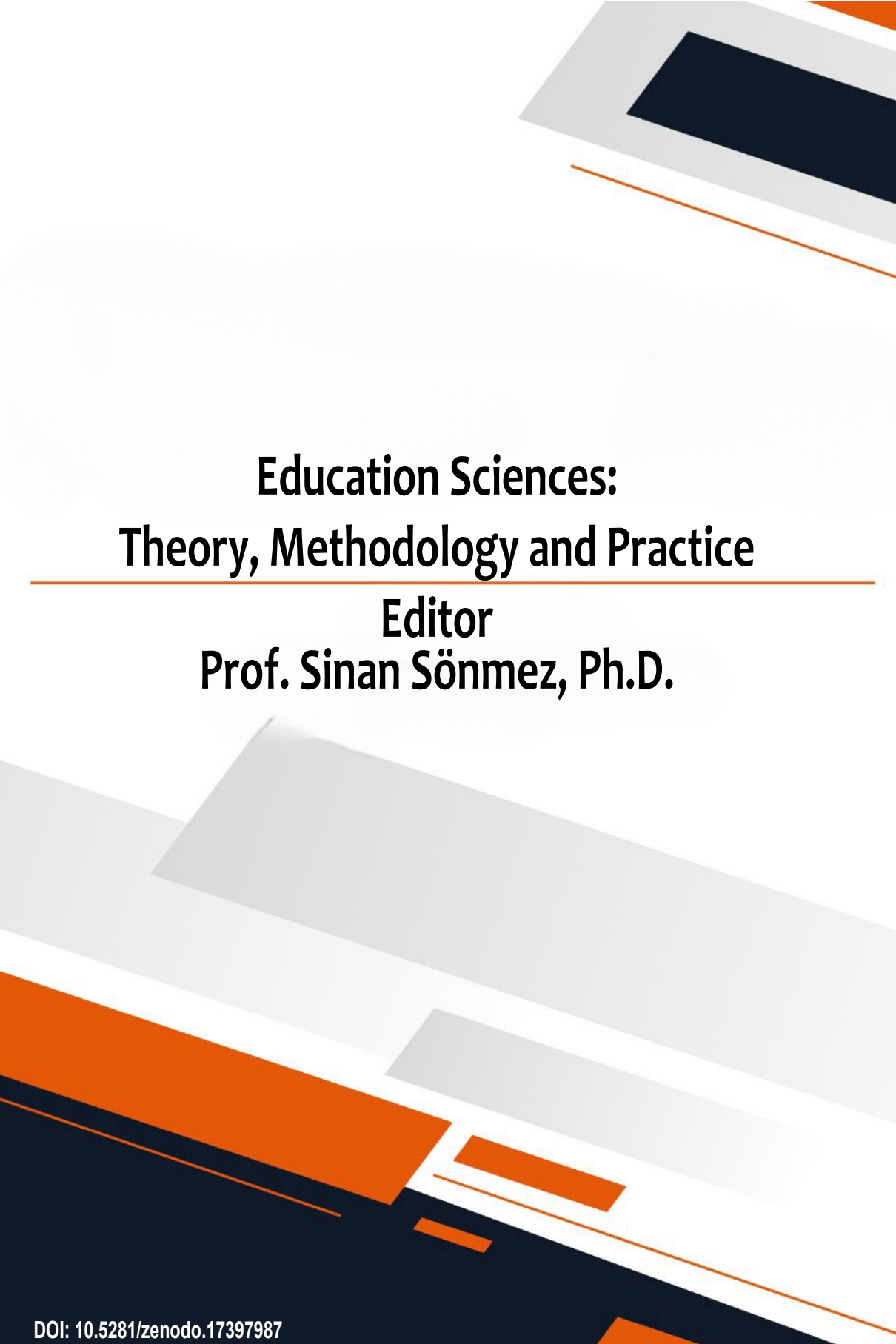




Education Sciences: Theory, Methodology and Practice

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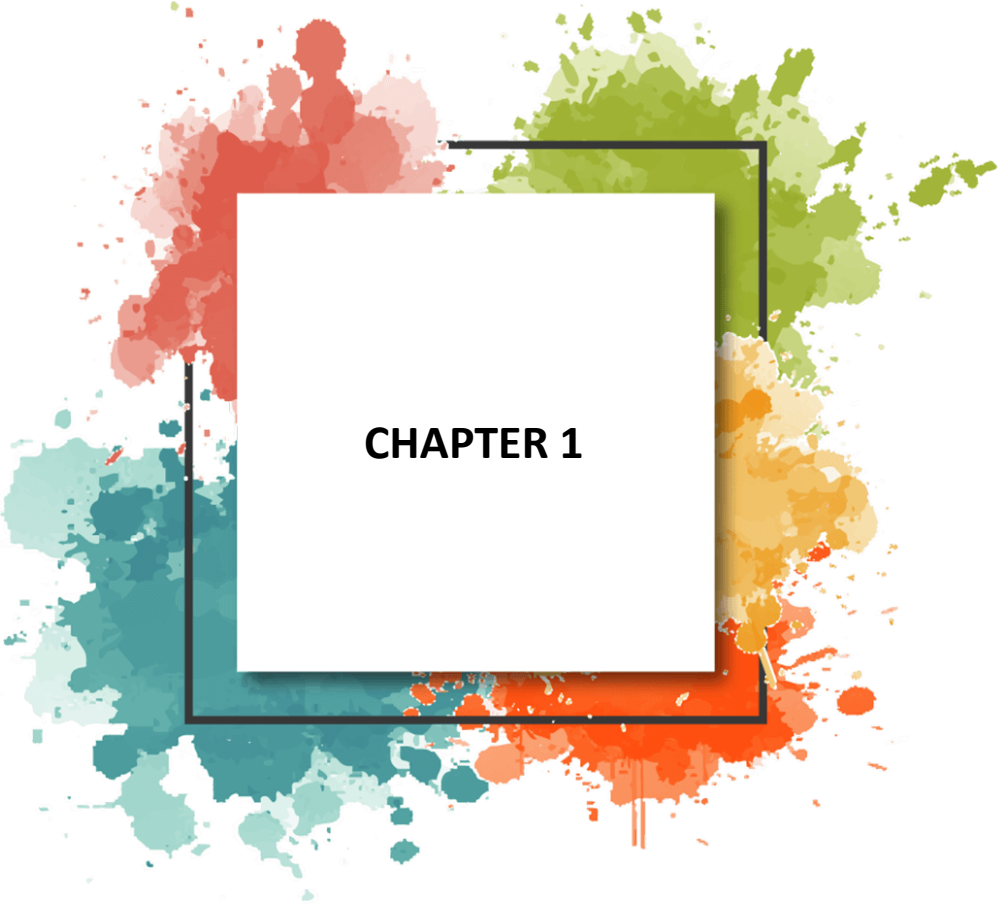
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CHAPTER 1

Investigating the Effect of a Web 2.0-Based Science Course on Fifth Grade Students' Attitudes Towards Technology

Muhammed Dođukan Balçın¹

Introduction

The rapid change in today's technology, just as it affects every field, is constantly impacting education. The impact of technology on education extends from the invention of the printing press to today's artificial intelligence-supported systems. The use of technology significantly contributes to improving the quality of education and to individual development in various areas (Can Yaşar, İnal, Uyanık & Kandır, 2012). Technology is an element we utilize at every moment of our lives, shaping our lives, schools, classrooms, and course delivery within educational activities (Akpınar, Aktamış & Ergin, 2005). Technologies integrated into the educational process improve the education system (Çağıltay, Çakırođlu, Çağıltay & Çakırođlu, 2001; Jonassen & Reeves, 1996; Means, 1994; Öksüz, Ak & Uça, 2009). Due to this impact of technology and based on societal needs, curricula are periodically updated. The relationship between science and technology, in particular, is evident both in our daily lives and in curricula. The most concrete example of this is the 2005 change in the name of the Science course to "Science and Technology," driven by the idea that technology would meet society's demands and needs. The program focused on integrating science and technology into individuals and helping them become informed and responsible citizens [Ministry of National Education (MoNE), 2006]. This update not only changed the course name but also altered the science course's vision, emphasizing its emphasis on technology. With the ongoing advancements in technology, the desired characteristics of individuals in the teaching-learning process have begun to shift, leading to new approaches to teaching methods, techniques, and strategies. In response to these needs, curriculum changes were implemented in 2013. The 2013 science curriculum aimed to develop students into scientifically literate individuals. The program emphasizes that a scientifically literate individual can conduct research and inquiry, make effective decisions, solve problems, communicate effectively, and learn lifelong with an awareness of sustainable development. This individual also possesses an understanding of the interaction between science and technology, society, and the environment (MoNE, 2013). Within this framework, technology is seen as

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important in raising scientifically literate individuals. It is thought that technology can be effective in helping individuals acquire many skills (Hsu & Lin, 2022). Individuals internalize these skills better when they acquire them at an early age (Duncan, Bell & Tanimoto, 2014). For this reason, it is thought that secondary school is important from this perspective, and that science education, which has a strong connection with technology, can be effective in acquiring these skills. With the 2018 update to the curriculum, the course name was determined as "Science." However, although the word "technology" was removed from the course name, the curriculum included the relationship between technology and science through interdisciplinary interaction. The reason for this update is the rapid and continuous transformation process taking place in the fields of economy, technology, and industry in the 21st century (MoNE, 2018). Countries competing and staying ahead in this transformation depend on the ability to train qualified individuals with certain skills. These skills that individuals must possess are described as 21st-century skills. Examples of these skills, which are described as 21st-century skills, include critical and creative thinking, problem solving, entrepreneurship, communication, collaboration, leadership, responsibility, curiosity and imagination, creativity, and innovation (Partnership for 21st Century Skills [P21], 2009). The 2018 science curriculum stated that STEM (Science-Technology- Engineering-Mathematics) education would be beneficial in acquiring these skills. In STEM education, the interaction between science and technology is emphasized with an interdisciplinary approach. The curriculum also emphasizes digital competence and digital literacy (MoNE, 2018). An examination of the current curriculum, the Türkiye Century Education Model, reveals a focus on skills. The science curriculum's objectives include developing individuals who recognize the global digital transformation and can adapt to changing technology (MoNE, 2024). In this sense, individuals must possess digital literacy skills. It is emphasized that games and digital technologies should be utilized in the measurement and evaluation of knowledge and skills, incorporating applications based on interesting problems that individuals may encounter in their daily lives or in their environment (MoNE, 2024). Chief among these digital technology tools are web 2.0 tools. With the latest revision, the Turkish Century Maarif Model has been implemented in grades 1, 5, and 9, aiming to promote a student-centered education approach. Research indicates that web 2.0 tools are compatible with current curriculums that adopt student-centered and interactive approaches (Bower, Hedberg & Kuswara, 2009; Dogan & Gogus, 2025; Franklin & Harmelen, 2007; Gündüz, 2007).

Web 2.0 tools, known as the second generation of the World Wide Web, not only enable interaction between users but also offer collaboration opportunities (Tu, Blocher & Ntoruru, 2008), while also enabling individuals to produce and share information and content online and develop their creativity (Castells, 2009;

Holland, 2019; Horzum, 2010; Hulburt, 2008; Hung & Yuen, 2010; McLoughlin & Lee, 2007; O'Reilly, 2007; Özgür, 2020; Pieri & Diamantini, 2014; Ünal & Özdiñ, 2019). In addition, they provide the opportunity for timeless and spaceless learning environments (Çelik, 2020). In addition, web 2.0 tools, which have become widely used in educational processes today (Chiou, 2011; Horzum, 2010), offer many benefits, such as increasing individuals' productivity and motivation regarding their courses, making learning fun, learning to learn, and improving learning outcomes (Byrne, 2009; Gündüzalp, 2022). In this context, web 2.0 tools have been observed to enable students to play an active role in accessing information, collaborate in different learning-teaching environments, develop creative activities, and disseminate these activities (Olea, 2019; Rhoads, Berdan & Toven Lindsey, 2013). Web 2.0 tools used in educational activities allow students to communicate effectively with their teachers and peers, engage in collaborative work, and receive feedback from their teachers (Elmas & Geban, 2012).

The effect of web 2.0 tools used in science classes, which are closely related to technology, on students' academic success (Demirezer, 2022; Gürleroğlu, 2019; Huang, Hood & Yoo, 2013; Ortaakarsu & Sülün, 2025; Özdem Köse, Bayram & Benzer, 2021; Yıldırım, 2020), their motivation (Aslan, 2025; Gürleroğlu, 2019; Ortaakarsu & Sülün, 2025; Uysal, 2020), their sense of curiosity (Yılmaz & Canbazoğlu Bilici, 2017), their attitudes towards science (Akbaba & Ertaş Kılıç, 2022; Arduç & Kahraman, 2024; Uysal, 2020), their attitudes towards the use of technology (Akbaba & Ertaş Kılıç, 2022), scientific literacy, critical thinking dispositions and decision-making skills (Arduç & Kahraman, 2024), and the water footprint and water literacy levels of 5th grade secondary school students (Köse, 2025) are seen in the literature. Today, school-age individuals they often use digital tools in their daily lives It is suggested that enriching learning environments with technological tools and implementing activities and projects appropriate to students' technological literacy levels will positively contribute to students' academic success and motivation (Conole & Alevizou, 2010). Therefore, it is thought that the use of web 2.0 tools in science classes can also be effective in changing students' attitudes towards technology. Based on this idea, the need for research was felt. The purpose of this research is to examine the effect of a web 2.0-based science course on fifth-grade students' attitudes towards technology .

Research Problem

The problem statement of the research was determined as "What is the effect of a web 2.0-based science course on fifth-grade students' attitudes towards technology?" Four sub-problems have been identified based on the research problem. These are:

First sub-problem: “Is there a significant difference between the pre-test attitude scores towards technology of the students in the control group and the experimental group?”

Second sub-problem: “Is there a significant difference between the post-test attitude scores towards technology of the students in the control group and the experimental group?”

Third sub-problem: “Is there a significant difference between the pre-test and post-test attitude scores towards technology of the students in the control group?”

Fourth sub-problem: “Is there a significant difference between the pre-test and post-test attitude scores towards technology of the students in the experimental group?”

Method

This study was designed according to the quantitative research method and utilized a pretest-posttest control group experimental design. In a pretest-posttest control group design, participants are randomly assigned to two or more intervention conditions and are administered a pretest, followed by the intervention conditions, and finally, a posttest (Christensen, Johnson & Turner, 2015).

Sample and Participants

The research was conducted with 5th grade students at a public middle school in a metropolitan district in the Marmara Region of Türkiye. The study group consisted of a control (22 students) and an experimental group (26 students). Convenience sampling was used to determine the study group. Convenience sampling was used to identify the study group. It is one of the sampling methods in which members who meet certain criteria, such as proximity to the researchers and time savings, are included in the study group (Dornyei, 2007). This sampling method was employed in the selection of the study group, as it aligned with the criteria of accessibility and proximity to the researchers. The distribution of the study groups by gender is presented in Table 1.

Table 1. *Distribution of study groups by gender*

Gender	Experiment		Control	
	N	%	N	%
Female	15	57.69	10	45.45
Male	11	42.31	12	54.55
Total	26	100.00	22	100.00

According to Table 1, it is seen that the experimental group of 26 students consisted of 57.69% female (N = 15) and 42.31% male (N = 11) students. The control group of 22 students consisted of 45.45% female (N = 10) and 54.55% male (N = 12) students. Demographic information of the study groups is presented in Table 2.

Table 2. *Demographic information of the study groups*

Demographic characteristics	Variable	Group			
		Experiment		Control	
		N	%	N	%
Computer ownership status	Yes	18	69.23	14	63.64
	No	8	30.77	8	36.36
Tablet ownership status	Yes	18	69.23	12	54.55
	No	8	30.77	10	45.45
Phone ownership status	Yes	8	30.77	7	3.81
	No	18	69.23	15	68.19
Use of web 2.0 tools	Yes	7	26.92	2	9.09
	No	19	73.08	20	90.91
Status of using technological tools	Bad	-	-	-	-
	Middle	8	30.77	13	59.10
	Good	18	69.23	9	40.90
Total		26	100.00	22	100.00

According to Table 2, it is seen that 69.23% of the students in the experimental group and 63.64% of the students in the control group owned a computer. When the study groups' tablet ownership status is examined, it is seen that 69.23% of the students in the experimental group and 36.36% of the students in the control group owned a tablet. When they were examined whether they owned a phone, it was seen that the majority did not own a phone. In additon, a large majority stated that they could not use web 2.0 tools. When the students were asked about their use of technological tools, 69.23% of the students in the experimental group stated that they had a good level, and 30.77% said that they had a moderate level, while 59.10% of the students in the control group stated that they had a moderate level, and 40.90% said that they had a good level. None of the students in either group thought that they used technology poorly.

Experimental Procedure

The research was conducted in the "World of Living Things" unit of the Science course. While the control group was taught in accordance with the current curriculum, the experimental group was subjected to a single procedure. The implementation process was conducted within the framework of the sole outcome in the unit, "Classifying living things by giving examples and based on their similarities and differences." Information regarding the implementation process for the experimental group is presented in Table 3.

Table 3. *Information regarding the implementation process of the experimental group*

Week	Class hours	The application made
1	3	Applying the pre-test to the experimental group at the same time as the control group Introducing web 2.0 tools to experimental group students and carrying out the pilot application
2	2	Turning news about harmful microscopic organisms into newspapers in "Canva" EBA [education information network of Türkiye] sharing
3	2	Creating a puzzle with a picture of one of the fungi species (yeast fungus, mold fungus, parasitic fungi, capped fungus) with "Jigsawplanet" After sharing on EBA, students make puzzles and guess which mushroom it is.
4	2	Game design on the subject of animals (vertebrates and invertebrates) with "Learningapps" After EBA sharing, students played the games both on EBA and in the classroom.
5	2	Choosing animal characters and creating characters with "Voki" for the characteristics of vertebrate and invertebrate animals, vocalizing the characteristics of the creatures themselves Students sharing information after EBA sharing
6	2	Create your own cartoons with "Writecomics" for animals and plants Students sharing information after EBA sharing
7	3	Creating stories with "StoryJumper" for plants (flowering and non-flowering plants) Students sharing information after EBA sharing The post-test was administered to the experimental group at the same time as the control group.

The implementation process for the experimental and control groups lasted 16 class hours (16 x 40 minutes). The activities performed in the experimental group included newspaper creation, puzzle creation, game design, character creation and voice-over, creation of their own cartoons, and story creation using various web 2.0 tools such as Canva, Jigsawplanet, Learningapps, Voki, Writecomics, and StoryJumper, all related to the learning outcomes. All activities were shared and interacted with by students on EBA (Educational Information Network)

platforms. Examples of the implementation activities of the experimental group students are presented in Figure 1.



Figure 1. Examples of practice activities of experimental group students

The control group's lessons were taught in accordance with the current curriculum, and paper-based activities were conducted based on textbooks. This included creating newspaper articles, creating posters, and creating puzzles. The implementation process was carried out simultaneously with the experimental group.

Data Collection Tool

In the study, the “Attitude Towards Technology Scale”, developed by Kenar and Balcı (2013), was used to measure attitudes towards the use of technological products in lessons. The scale was applied to both groups as a pre- and post-test. The scale is a 5-point Likert-type scale with 15 items and three dimensions: “Anxiety and worry,” “Satisfaction, interest and confidence” and “Technology and success.” The Cronbach Alpha Internal Consistency Coefficient (CAICC) of the scale is .86. In this research, the CAICC was calculated between .83 and .94 in the pre- and post-tests of the experimental and the control groups. Since the CAICC were above .70 in both the pre- and post-tests of both groups, it can be said that the data obtained from the scale are reliable (Sipahi, Yurtkoru, & Çinko, 2008).

Data Analysis

The SPSS 27 package program was used in data analysis. Before analyzing the obtained data, a normality test was conducted to determine the tests to be

used. The Shapiro-Wilks and Kolmogorov-Smirnov tests, determined according to group size, are two tests used to examine the compliance of the scores with normality (Büyüköztürk, 2015). In this study, because the group size was less than 50, the p significance value obtained from the Shapiro-Wilks test was examined and was determined to be less than .05. This value can be interpreted as indicating that the scores deviated excessively from a normal distribution (Büyüköztürk, 2015). In addition, the skewness and kurtosis coefficients were examined. Since the skewness and kurtosis coefficient values were outside the range of ± 2 , it was determined that the students' scale scores did not exhibit a normal distribution (George & Mallery, 2003). When the findings were evaluated, it was observed that the data did not show a normal distribution. Therefore, nonparametric tests were used in the analysis of the data.

Findings

In this research, which aimed to determine the effects of web 2.0 tools used in science classes on fifth-grade students' attitudes toward technology, the average scores obtained by the students on the “Attitude Toward Technology Scale” before and after the application were calculated. The descriptive analysis results of the students' attitudes toward technology before and after the application are presented in Table 4.

Table 4. *Pre-test and post-test descriptive statistics of students' attitudes towards technology*

Dimension	Group	Test	$\bar{X}$	Standard deviation	Min. Value	Max. Value
Anxiety and worry	Control	Pre-test	30.44	4.25	22.00	35.00
		Post-test	28.57	5.64	9.00	35.00
	Experiment	Pre-test	29.93	4.24	20.00	35.00
		Post-test	30.23	4.22	23.00	35.00
Satisfaction, interest and confidence	Control	Pre-test	20.40	4.74	5.00	25.00
		Post-test	18.51	5.24	5.00	25.00
	Experiment	Pre-test	19.06	4.34	5.00	25.00
		Post-test	21.46	2.76	16.00	25.00
Technology and success	Control	Pre-test	12.20	3.17	3.00	15.00
		Post-test	10.40	3.49	3.00	15.00
	Experiment	Pre-test	11.33	2.87	3.00	15.00
		Post-test	12.75	2.14	7.00	15.00
Total	Control	Pre-test	63.05	9.89	43.00	75.00
		Post-test	57.49	12.76	24.00	75.00
	Experiment	Pre-test	59.31	9.32	41.00	73.00
		Post-test	64.44	7.16	52.00	75.00

The study sought to answer the question, "Is there a significant difference between the pre-test attitude scores towards technology of the students in the control group and the experimental group?" In this context, the Mann-Whitney U test was used to determine the equivalence of the groups. The findings are presented in Table 5.

Table 5. *Mann-Whitney U test results regarding students' pre-test scores on attitudes towards technology*

Dimension	Group	N	Mean rank	Sum of ranks	U	p
Anxiety and worry	Experiment	26	22.08	574.00	223.000	.19
	Control	22	27.36	602.00		
Satisfaction, interest and confidence	Experiment	26	22.31	580.00	229.000	.24
	Control	22	27.09	596.00		
Technology and success	Experiment	26	22.00	572.00	221.000	.18
	Control	22	27.45	604.00		
Overall scale	Experiment	26	21.81	567.00	216.000	.15
	Control	22	27.68	609.00		

When Table 5 was examined, it was determined that there was no statistically significant difference between the pre-test scores of the experimental and control groups regarding their attitudes toward technology ($p > .05$). Consequently, it can be said that the experimental and control groups were equivalent at the beginning of the study.

The research sought to answer the question, "Is there a significant difference between the post-test attitude scores towards technology of the students in the control group and the experimental group?" In this context, a Mann-Whitney U test was conducted to determine whether there was a significant difference between the post-tests of the groups. The findings are presented in Table 6.

Table 6. Mann-Whitney U test results regarding students' post-test scores on attitudes towards technology

Dimension	Group	N	Mean rank	Sum of ranks	U	p
Anxiety and worry	Experiment	26	25.77	670.00	253.000	.49
	Control	22	23.00	506.00		
Satisfaction, interest and confidence	Experiment	26	28.17	732.50	190.500	.04*
	Control	22	20.16	443.50		
Technology and success	Experiment	26	29.25	760.50	162.500	.01*
	Control	22	18.89	415.50		
Overall scale	Experiment	26	28.15	732.00	191.000	.04*
	Control	22	20.18	444.400		

* $p < .05$

An examination of Table 6 revealed a statistically significant difference ($p < .05$) between the post-test scores of two groups regarding attitudes toward technology, and this significant difference was in favor of the experimental group. An examination of the sub-dimensions revealed a statistically significant difference ($p < .05$) between the post-test scores of two groups in the "Satisfaction, interest and confidence" and "Technology and achievement" dimensions, and this significant difference was in favor of the experimental group. On the other hand, there was no statistically significant difference between the post-test scores of the groups in the "Anxiety and worry" dimension ($p > .05$).

The study sought to answer the question, "Is there a significant difference between the pre-test and post-test attitude scores towards technology of the students in the control group?" Therefore, the Wilcoxon Signed-Rank Test was used to determine whether there was a significant difference between the pre-test and post-test scores of the control group students. The findings are presented in Table 7.

Table 7. *Wilcoxon Signed-Rank Test results regarding the pre-test and post-test scores of control group students' attitudes towards technology*

Dimension		N	Mean rank	Sum of ranks	Z	p
Anxiety and worry	Negative ranks	12	11.46	137.50	-1.216	.22
	Positive ranks	8	9.06	72.50		
	Ties	2				
Satisfaction, interest and confidence	Negative ranks	11	12.77	140.50	-1.327	.18
	Positive ranks	9	7.72	69.50		
	Ties	2				
Technology and success	Negative ranks	10	10.20	102.00	-1.761	.08
	Positive ranks	6	5.67	34.00		
	Ties	6				
Overall scale	Negative ranks	13	13.92	181.00	-1.770	.08
	Positive ranks	9	8.00	72.00		
	Ties	0				
Total		22				

According to Table 7, it is seen that there is no statistically significant difference between the pre-test and post-test scores of the control group students' attitudes towards technology ($p > .05$). Furthermore, it was determined that there was no statistically significant difference between the pre-test and post-test scores of the control group students in the sub-dimensions of the attitudes towards technology scale ($p > .05$).

The research sought to answer the question, "Is there a significant difference between the pre-test and post-test attitude scores towards technology of the students in the experimental group?" In this context, the Wilcoxon Signed-Rank Test was used to determine whether there was a significant difference between the pre-test and post-test scores of the experimental group students. The findings are presented in Table 8.

Table 8. *Wilcoxon Signed-Rank Test results regarding pre-test and post-test scores of experimental group students' attitudes towards technology*

Dimension		N	Mean rank	Sum of ranks	Z	p
Anxiety and worry	Negative ranks	5	12.30	61.50	-1.628	.10
	Positive ranks	15	9.90	148.50		
	Ties	6				
Satisfaction, interest and confidence	Negative ranks	7	6.43	45.00	-2.659	.01*
	Positive ranks	15	13.87	208.00		
	Ties	4				
Technology and success	Negative ranks	5	7.70	38.50	-2.303	.02*
	Positive ranks	14	10.82	151.50		
	Ties	7				
Overall scale	Negative ranks	8	7.88	63.00	-2.685	.01*
	Positive ranks	17	15.41	262.00		
	Ties	1				
Total		26				

* $p < .05$

An examination of Table 8 revealed a statistically significant difference ($p < .05$) between the pre-test and post-test scores of the experimental group students' attitudes toward technology, and this significant difference was in favor of the post-test. Furthermore, an examination of the sub-dimensions of the scale revealed a statistically significant difference ($p < .05$) between the pre-test and post-test scores of the "Satisfaction, interest and confidence" and "Technology and success" dimensions of the scale, in favor of the post-test. Moreover, there was no statistically significant difference between the pre-test and post-test scores of the "Anxiety and worry" dimension ($p > .05$).

Conclusion, Discussion and Recommendations

In this research examining the effects of web 2.0 tools on students' attitudes toward technology, a comparison of the post-test scores of the experimental and control groups on technology attitudes revealed that the post-test scores of the experimental group, which used web 2.0 tools in science class, were significantly higher than the post-test scores of the control group, whose science course was conducted with the current curriculum and activities. Furthermore, it was concluded that the post-test scores of the experimental group students' attitudes toward technology significantly increased their pre-test scores. Based on the findings, it can be said that web 2.0-based activities are effective in increasing the attitudes of 5th grade students toward technology. In a study conducted by Özdem Köse et al. (2021), argumentation practices supported by web 2.0 tools positively affected students' attitudes towards technology. It was determined. In a study conducted by Sarı (2019), it was concluded that the science course developed using web 2.0 applications positively affected students' attitudes

towards technology. In a study conducted by Akbaba and Ertaş Kılıç (2022), it was determined that science education carried out web 2.0 applications positively affected students' attitudes towards technology use. In this study, it was determined that the activities carried out in accordance with the 2018 science course curriculum and textbooks led to a decrease in students' attitudes towards technology. It is thought that the integration of the activities to which the science course is currently linked, both in the 2018 science course curriculum and within the scope of the 2024 education model, with technology and web 2.0 tools may increase students' attitudes towards technology. In this sense, it is recommended to conduct experimental studies designed by integrating web 2.0 tools into current curriculum activities for different grade levels and different subjects in the science course. In the context of the obtained results, a suggestion can be made that necessary updates can be made to the textbooks. When the demographic information of the student groups in the study is examined; compared to the control group, students in the experimental group were found to have more technological devices such as phones, tablets, and computers, to use web 2.0 tools, and to be more effective in using technological tools. Therefore, further survey research is recommended to examine these and similar variables.

In the study, it was concluded that the post-test scores of the students in the experimental group who conducted the science course using web 2.0 in the "Technology and success" dimension were significantly higher than the post-test scores of the students in the control group who conducted the course based on the 2018 curriculum and activities. Furthermore, when the change between the pre-test and post-test of the groups was examined, it was determined that the scores of the students in the experimental group increased significantly, while the scores of the students in the control group decreased. The use of educational technology in science courses contributes positively to increasing course success (Kenar & Balcı, 2013). Similar to the results of this research, a study conducted by Demirezer (2022) concluded that science education supported by web 2.0 tools created a significant difference in students' academic success. Özdem Köse et al. (2021) determined that argumentation practices supported by web 2.0 tools positively affected students' academic achievement. Similarly, a study by Yıldırım (2020) found that the use of web 2.0 tools in the 7th grade unit "Interaction of Light with Matter" had an impact on students' academic achievement. It was concluded that it had a positive effect. The study conducted by Gürleroğlu (2019) also concluded that teaching science with web 2.0 applications had a positive effect on students' academic achievement. The study conducted by Akkuş (2025) concluded that using the 5E learning model, in which web 2.0 tools and the project method were applied in science classes, had a positive contribution to students' academic achievement. In the study conducted by Huang et al. (2013), it was concluded that using the 5E learning model, in

which web 2.0 tools and the project method were applied, had a positive effect on students' academic achievement. Their opinions about using web 2.0 technologies were investigated and they concluded that students' learning increased. There are results that web 2.0 tools increase success in different courses at the secondary school level (Gençer & Gezer, 2022; Gündoğdu & Korucu, 2018), as well as results that web 2.0 tools increase success in science courses at different levels than the secondary school level (Can, 2024; Nazlıoğlu, 2024). In recent years, when technology is rapidly developing, it is thought that the frequent emphasis on technological literacy in updated science course curricula and the integration of technology into both courses and textbooks have an effect on increasing success. On the other hand, different tools and methods used in interaction can create difficulties for students and can negatively affect satisfaction and success (O'Toole & Absalom, 2007). In this context technology-supported learning environments should be well designed and technological tools such as web 2.0 should be integrated into the course in accordance with the students' skills and abilities. During this process, teachers who lead the course must possess sufficient technological knowledge and pedagogical knowledge to integrate content knowledge into their lessons. Therefore, they must have high levels of self-efficacy in technological pedagogical content knowledge. In this context, it is recommended that in-service training be provided by experts in this field to increase teachers' knowledge and application of web 2.0 tools. Workshops that include pedagogical-based use of web 2.0 tools are also recommended for teachers. Furthermore, experimental studies can be conducted using different web 2.0 tools at different grade levels and in different science course subjects to examine the effectiveness of web 2.0 tools. Furthermore, qualitative studies can be conducted to identify and examine in-depth any shortcomings in the process.

The study concluded that the post-test scores of the experimental group students who took the science course using web 2.0 were significantly higher in the "Satisfaction, interest and confidence" dimension than the post-test scores of the control group students who took the course based on the 2018 curriculum and activities. Furthermore, when the changes between the pre-test and post-test of the groups were examined, it was determined that the scores of the experimental group students increased significantly, while the scores of the control group students decreased. The use of educational technology in courses contributes positively to increasing interest in the course (Kenar & Balci, 2013). In the research conducted by Yıldırım (2020), it was emphasized that it is possible to bring web 2.0 applications to the classroom and laboratory as teaching tools and that individuals' interest can be increased by using web applications that they enjoy using effectively in classes. In the study conducted by Huang et al. (2013), students' opinions on using web 2.0 technologies were investigated and it was determined that students' satisfaction with the courses increased. On the other

hand, web 2.0 applications It attracts the attention of the student and ensures active participation in the lesson (Çenesiz & Özdemir, 2021; Yuen et al., 2011). Teachers are advised to integrate web 2.0 tools into their lesson plans and use various web 2.0 tools systematically and dynamically to increase students' active participation and maintain positive interest in science classes. Teachers are encouraged to ensure students understand that web 2.0 tools are easy to use, as this is believed to increase students' confidence in the technology. Furthermore, by adopting a simple-to-complex teaching approach, teachers are expected to reduce student anxiety and worry, while also increasing their interest in web 2.0 tools and the course itself. Furthermore, encouraging students to create content such as posters, animations, newspapers, banners, puzzles, and videos using various web 2.0 tools can positively contribute to both their interest and confidence.

As seen in the results of this study, web 2.0 tools increase students' satisfaction with technology; however, new technologies can cause anxiety in students. Experiencing distress and stress while using an unusable tool or device reveals technology anxiety (Oyedele & Simpson, 2006). Therefore, it is important for individuals to use technological tools or devices in the learning-teaching process. In this study, the "Anxiety and worry" sub-dimension of attitude towards technology was examined. It was determined that there was no statistically significant difference between the pre-test and post-test scores of both groups in the "Anxiety and worry" sub-dimension of attitude towards technology. It was observed that conducting the 2018 science course with the curriculum and textbook activities did not cause any change in students' anxiety and worries. It was determined that the change between the pre-test and post-tests of the experimental group, where lessons were conducted with web 2.0 tools, was not significant; however, a positive change was observed. In this context, it is believed that integrating the activities in the updated 2024 science curriculum with technology and web 2.0 tools could reduce student anxiety and worry. Furthermore, teachers should provide group work and guidance during the initial implementation to reduce individual anxiety levels. During this phase, teachers should be in a position to guide and support students. Based on the results, it can be suggested that necessary updates be made to the textbooks. Furthermore, the reasons why web 2.0 tools do not have a significant impact on anxiety and worry can be explored in depth through qualitative research.

Additionally, some general recommendations can be made based on the results obtained from the study. There are points that teachers should pay attention to during the content preparation and use process. It is recommended that teachers use different web 2.0 tools to adapt content to different learning styles. Disadvantaged students within the classroom should also be considered at

this stage. Furthermore, students' cognitive development levels and technological backgrounds should be taken into account when preparing content and selecting web 2.0 tools. Researchers are encouraged to develop projects to strengthen teachers' technological pedagogical content knowledge. Furthermore, the technical infrastructure must be provided to carry out all technology-supported processes.

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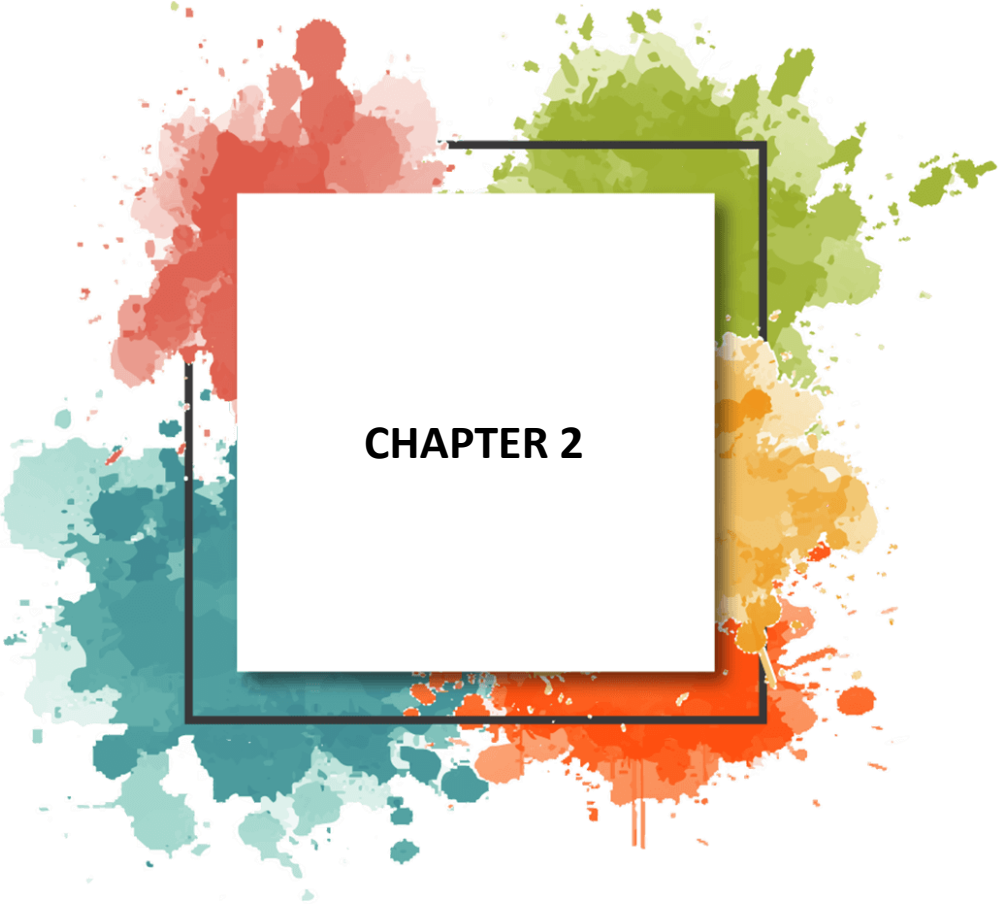
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CHAPTER 2

The Relationship Between Teachers' Commitment to the Curriculum, Their Tendencies Towards the Philosophy of Education, and Their Perceptions of Competencies in the Teaching-Learning Process*

Hasan Zöğ² & Hasan Hüseyin Şahan³

Introduction

The rapid increase in knowledge in line with scientific developments affects society and therefore the new generations, which are the most important element that constitutes the future of a society, in many ways (Helvacı, 2014). Not only the rapid increase in knowledge, but also the socio-cultural, scientific and technological developments in the world and in our country have made it necessary for future generations to be raised in a more equipped manner due to the knowledge, skills and values that students should have in the future, as well as their awareness in the process of acquiring these. In addition, the 21st century is characterized by the emergence of multiculturalism due to industrialization, urbanization, globalization and the fragmentation of the family system. The developments that emerged in this period also make it necessary for the society to adapt to changes, developments and new conditions (MEB, 2018). Since the education system is seen as a tool to develop people's cognitive qualities, tolerance and understanding in this century, it should ensure that the young generation is prepared to understand and confront the realities of globalization (Kulshrestha and Pandey, 2013).

The World that is experiencing change and development, changing the behavior of individuals and making this change permanent; ensuring that they keep up with the expectations of the age, gaining research and questioning skills and self-actualization can only be achieved through education (Anıl, 2009). In short, the most important role in providing students with the qualifications required by the age belongs to the education system (MEB, 2018). Education is

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among the most basic needs of an individual and is a process that continues throughout life (Taşpınar, 2013).

Although there is no common definition of education by educational scientists, many different definitions have been made. Moreover, this situation still continues. The most widely used definition of education is “the process of creating a desired and intentional change in the behavior of the individual through his/her own experience” (Ertürk, 2013). The desired behavior mentioned in this definition is the behaviors planned to be acquired in advance, and the intentional behaviors expressed as preventing behaviors that may occur accidentally and unknowingly (Ertürk, 2013). In this context, one of the basic elements of education, which is the most important factor in the cultural, social, political and economic progress of the society and in the self-realization of students, is the education program. The education program is “the mechanism of learning experiences provided to the learner through planned activities in and out of school” (Demirel, 2008). The arrangements made in the education system gain meaning if they are within a program (Gözütok, 2003). This is exactly where teaching programs come into play. Curriculum is “a program consisting of certain categories of knowledge and in some schools, focusing on skills and practice, aiming to provide knowledge and skills in line with the objectives of the curriculum and in a planned manner” (Varış, 1991, p.14). Curriculums are also constantly updated in line with scientific developments (Bütün and Gültepe, 2016; MEB, 2018). In other words, it can be said that curricula are constantly being improved or developed in the light of certain evaluations.

Curriculums are generally defined as a mechanism of experiences that include activities related to the teaching of a course planned to be taught to the individual at school or outside of school (Demirel, 2008). In Türkiye, curriculums are required to be prepared centrally by the Ministry of National Education and implemented throughout the country (Bümen, Çakar, & Yıldız, 2014). Teachers, who are the main implementers of the curriculums that are constantly updated in line with the changing needs of both Türkiye and the age (Bütün & Gültepe, 2016), have a central place in the implementation of the program (Binbaşıoğlu, 1994). Therefore, the role of teachers in society is of vital importance for the development of society (Kulshrestha & Pandey, 2013).

The implementation of the curriculum designed by the Ministry of National Education and presented to the education system is at least as important as its design. It is not realistic for all teachers to unconditionally accept the centrally published curriculum and apply it one-to-one in their lessons (Erman, 2016). Studies have shown that there are significant differences among teachers in the implementation of curriculum (Bümen et al., 2014; Bütün and Gültepe, 2016; Erman, 2016; Baş and Şentürk, 2019; Arslan Çelik, 2020; Aslan and Erden,

2020). Even if the curriculum prepared as a document is very well prepared, the way in which the program objectives and recommended teaching-learning processes are reflected in the lessons in the classroom may differ from teacher to teacher (Bütün and Gültepe, 2016). It should never be overlooked that curriculums come to life in the classroom through teachers (Tezci, 2016). 30oney30is reason, there may be differences between the applied and official written curriculum from time to time due to teacher practices (Kara et al., 2017). Being able to reveal what teachers think about the changes made in the curriculum as the implementers of the applied curriculum, whether they adopt the changed or newly designed curriculum or how much they stick to it, is extremely important when considered as a waste of time, labor and 30oney. Therefore, one of the subject areas of this study is to examine in depth the concept of teachers' commitment to the curriculum.

The concept of program fidelity can be defined as the similarity between the intended and implemented form of the program (Bay et al., 2017), and in the case of a curriculum, it can be defined as the implementation of the designed curriculum by teachers and other stakeholders in accordance with the written program (Bümen et al., 2014). It is very important to determine how much teachers can reflect the changes and innovations made in the curriculum to their students. Because every change that teachers do not internalize will result in nothing but a waste of time, labor and money (Bümen et al., 2014). The implementation phase of the program takes place with the participation of both teachers and students in the teaching and learning process. The degree of teachers' commitment to the program is very important in order to ensure that the desired results are achieved by the program (Palestina, Pangan, & Ancho, 2020). Demonstrating teachers' commitment to the program plays a critical role in obtaining information about how successful the curriculum is and the problems that arise when it fails (Bümen et al., 2014; Burul, 2018), as well as understanding how and why the curriculum works and how it can be improved (Superfine, Marshall, & Kelso, 2015).

Education, which plays a key role in change, is not enough on its own to ensure that society moves to the next stage, whether the teacher adheres to the curriculum or not. Every social change has its own philosophical context. One of the fields of philosophy is the philosophy of education. Educational philosophy is a discipline that includes the principles and concepts that guide education as well as the problems related to education (Büyükdüvenci, 1987). The teacher should be able to appropriate and own the philosophical context of every social change (Hesapçioğlu, 1998). In order to achieve this, teachers should examine the curriculum before it is put into practice in order to increase the applicability of the program and know the philosophy of the program, the teaching-learning

process and evaluation approaches. The teacher should also know well what the roles assigned to him in the program are, internalize the program structure and be willing to implement it (Erman, 2016).

Philosophy provides teachers with a general framework for organizing schools and classes. In addition, philosophy guides teachers in finding the meaning of schools, the value of subjects, how students learn, and which materials and methods to use (Ornstein and Hunkins, 1993). The most important aspect of a successful teacher is having a philosophy about education (Hesapçioğlu, 1998). A teacher develops his/her views on education based on scientific findings and facts. Therefore, the teacher's philosophy is not formed randomly, but through his/her long professional training and continues to develop himself/herself continuously in his/her teaching career (Başaran, 1987).

In the teaching and learning process, where theory and practice go hand in hand, teachers' thoughts about their students affect their approaches to students and the program they plan for them. Ideas about human nature determine the shape of the curriculum and the teaching process (Gutek, 2014). The effectiveness of the curriculum depends on correctly determining its goals, having an educational philosophy and having an educational approach (Coşkun, 2017). Developing and having an educational philosophy is effective in teachers' conducting the teaching and learning processes and in directing and guiding their students, whom they strive for. Teachers' having an educational philosophy is a strong belief that determines what they will teach their students, how they will teach them and why they will teach them (Magulod, 2017).

Bümen et al. (2014) emphasize that in addition to teachers' commitment to the curriculum and the educational philosophies adopted by teachers, the factors affecting curriculum implementation include the teacher's education and teacher characteristics. The quality of teaching activities depends on the factors affecting the quality of teachers' teaching-learning process. In other words, the quality of teaching is directly proportional to the qualifications of the teacher who plans and implements it (Şahan, 2011). In addition to the teacher's field knowledge, professional knowledge and skills also have an important place in terms of their qualifications (Çelikten, Şanal, & Yeni, 2005). Teachers, whose main duty is thought to be to ensure learning, should also have the necessary professional qualifications (Gür & Kobak Demir, 2019). Teachers should be able to plan and implement in-class activities with their program experiences and qualifications (Aslan & Erden, 2020).

Teacher competencies are defined as the knowledge, skills and attitudes that teachers need to have in order to be able to teach professionally effectively and efficiently (MEB, 2017). Teacher competencies are associated with having competencies such as appropriate planning of the teaching-learning process,

diversifying teaching, providing the learning environment and materials, and time management. With teachers who have teaching-learning process competencies, the curriculum reaches its goals and an effective process is ensured (Yıldırım, 2019). Thus, individuals with social values and skills can be trained (MEB, 2018).

According to the 2019 education expenditure statistics of the Turkish Statistical Institute, 11,769 TL was spent per student (TÜİK, 2020), and according to MEB data, there are 18 million 241 thousand 881 students in preschool, primary and secondary education in Türkiye. The total amount spent on education is 259 billion 200 million TL. Again, according to MEB data, the number of teachers working in official and private educational institutions was determined as 1 million 148 thousand 514 in the 2020-2021 academic year (MEB, 2021). According to the results obtained from the figures, billions of liras, the labor of approximately more than 1 million people and the future of millions of students are entrusted to the country's education system every year in Türkiye. In order for so much that has been done not to be wasted, it is essential that the education system is planned and implemented in the most efficient way. From this point of view, revealing the relationship between teachers' educational philosophies, their teaching-learning process competencies, whether they can adapt to the curriculum, and their degree of commitment is considered to be an important area of research, as it will also affect the success of the program.

In this context, the aim of the research is to reveal the relationships between teachers' commitment to the curriculum, their tendencies towards educational philosophies and their perceptions of competence in the teaching-learning process. Within the framework of this general purpose, the following questions were sought in the research:

1. What are the levels of teachers' commitment to the curriculum, their tendencies towards educational philosophies and their perception of teaching-learning process competencies?
2. Is there a relationship between teachers' commitment to the curriculum and their tendencies towards educational philosophies?
3. Is there a relationship between teachers' commitment to the curriculum and their perception of teaching-learning process competencies?
4. Is there a relationship between teachers' tendencies towards educational philosophies and their perception of teaching-learning process competencies?

5. What is the predictive power of teachers' tendencies towards educational philosophies and their perception of teaching-learning process competencies on their commitment to the curriculum?

Method

Research Design

The scanning model was chosen to collect data in accordance with economic and research purposes and to provide the necessary conditions for the analysis of the collected data. In this study, the general scanning model was used to determine the teachers' commitment to the curriculum, their tendencies towards educational philosophies and their perceptions of teaching-learning process competence. The relational scanning method was used to determine whether these listed qualities of the teachers changed together, and the predictive correlational design was used to determine the effect of the teachers' tendencies towards educational philosophies and their perceptions of teaching-learning process competences on their commitment to the curriculum.

Population and Sample

The population of the study consists of public high schools affiliated with the Ministry of National Education located in the central districts of Balıkesir province. Private schools were excluded from the study. A total of 526 teachers were sampled from the population of 1027 people by simple random sampling method from all schools within the study population. Considering that the sample for the research population would be 312 teachers according to the calculation suggested by Karasar (2004) and 384 teachers according to the calculation suggested by Krejcie and Morgan (1970), it was concluded that this research sample represents the population.

Collection of Data

The data in the study were collected using;

- Single-factor Curriculum Commitment Scale developed by the researcher to determine teachers' commitment levels to the curriculum,
- Scale for Determining Tendencies Towards Educational Philosophies consisting of perennialism, essentialism, progressivism and reconstructionism sub-dimensions developed by Uyangör et al. (2016) in order to determine their tendencies towards educational philosophies,
- Teaching Learning Process Competencies Scale consisting of teaching planning, learning environment and material, extracurricular activities, diversification of teaching and classroom management sub-dimensions

developed by Şahan and Zöğ (2017) in order to determine perceptions of teaching learning process competence.

The application of the scales was carried out by the researchers with permission from the Balıkesir Governorship. The scales are in the form of a five-point Likert scale and are graded from the most negative to the most positive as 1: Strongly Disagree, 2: Disagree, 3: Undecided, 4: Agree and 5: Strongly Agree.

Data Analysis

In order to determine the relationships between teachers' commitment to the curriculum, their tendencies towards educational philosophies and their perceptions of teaching-learning process competencies and to answer the research questions, a significance level of .05 was taken as the basis for the evaluation of the analysis of the data obtained from the scales. As a result of the examinations made on the research data, it was determined that they showed a normal distribution and that the data corresponding to each pore in the multiple comparison tests met the parametric test requirements.

In order to answer the first question, arithmetic mean and standard deviation values were used to determine teachers' commitment to curriculum, tendencies towards educational philosophies and teaching-learning process competency perception levels. Since the Curriculum Commitment Scale, Scale for Determining Tendencies Towards Educational Philosophies and Teaching-Learning Process Competency Perceptions Scale used in the study are five-point Likert-type scales, teachers' commitment to curriculum, tendencies towards educational philosophies and teaching-learning process competency levels were interpreted within the framework of the score ranges corresponding to each option [(very low between 1.00–1.80), (low between 1.81–2.60), (medium between 2.61–3.40), (high between 3.41–4.20) and (very high between 4.21–5.00)].

For the second, third and fourth questions, the Pearson correlation coefficient (r) was used to determine the significant relationships between teachers' commitment to the curriculum, their tendencies towards educational philosophies and their perceptions of competence in the teaching-learning process. The correlation coefficient is generally interpreted as high level between 1.00-0.70; as medium level between 0.70-0.30 and as low level between 0.30-0.00 (Metin, 2015).

In order to answer the fifth question, data were analyzed using stepwise regression techniques to determine the predictive power of teachers' tendencies towards educational philosophies and teaching-learning process competence perceptions on their commitment to the curriculum. R^2 statistics were used to explain the change in regression models. This statistic shows how much of the

change in the dependent variable can be explained by the independent variables and how well we can predict the dependent variable (Punch, 2005). In the regression analysis, teachers' commitment to the curriculum was determined as the dependent variable, teaching-learning process competences and educational philosophy tendencies were determined as predictive variables. Before the regression analysis, the conformity of the measurements to the normality assumption, linearity, and auto-correlation were examined (Pallant, 2005). It was checked whether the kurtosis and sharpness values of the variables were between -1 and +1. Multiple connection control was performed between the independent variables using correlation analysis. The general score averages of the teaching-learning process competences scale were not taken into account in the study. This process was carried out to prevent the problem of multiple connections that may occur between the overall scale and its sub-dimensions.

Findings and Discussion

The findings regarding the level of teachers' commitment to the curriculum are presented in Table 1.

Table 1. Teachers' Commitment Levels to Curriculum

Variables	$\bar{X}$	sd	Min	Max	Skewness	Kurtosis
Commitment to Curriculum	3.64	.39	2.78	4.89	.263	.022

N=400

There are 18 items in the curriculum commitment scale. The average score obtained from the scale is 3.64, and the standard deviation value is .39. The minimum score obtained from the scale is 2.78, and the maximum score is 4.89. According to the general average of all items in the curriculum commitment scale, it can be said that teachers' views are positive, in other words, teachers' perceptions of their commitment to the curriculum are at a high level. In this case, it can be concluded that teachers prefer to follow the official curriculum presented to them as ready-made, rather than making various changes or adaptations to the curriculum.

The findings obtained regarding the tendency levels of teachers towards educational philosophies are presented in Table 2.

Table 2. Teachers' Tendency Levels Towards Educational Philosophy

Variables	$\bar{X}$	sd	Min	Max	Skewness	Kurtosis
Perennialism	3.39	.59	1.78	5.00	-.047	.312
Essentialism	2.46	.71	1.00	4.22	.410	-.282
Progressivism	4.36	.42	3.22	5.00	-.395	-.107
Reconstructionism	4.31	.39	3.11	5.00	-.358	-.030

N=400

There are 9 items in each sub-dimension of the tendency levels scale towards educational philosophies. When the mean scores obtained from the scale are ranked from highest to lowest, it was determined that the philosophy of progressivism has the highest mean ($\bar{x}=4.36$; $sd=.42$) and this is followed by reconstructionism ($\bar{x}=4.31$; $sd=.39$), perennialism ($\bar{x}=3.39$; $sd=.59$) and essentialism ($\bar{x}=2.46$; $sd=.71$). The lowest score obtained in the perennialism sub-dimension is 1.78, the highest score is 5.00, the skewness coefficient is -.047 and the kurtosis coefficient is .312. The lowest score obtained in the essentialism sub-dimension is 1.00, the highest score is 4.22, the skewness coefficient is -.410 and the kurtosis coefficient is -.282. The lowest score obtained in the Progressivism sub-dimension is 3.22, the highest score is 5.00, the skewness coefficient is -.395 and the kurtosis coefficient is -.107. The lowest score obtained in the Reconstructionism sub-dimension is 3.11, the highest score is 5.00, the skewness coefficient is -.358 and the kurtosis coefficient is -.030.

According to the means of the sub-dimensions of the scale to determine tendencies towards educational philosophies, it can be said that teachers' views are high in the sub-dimensions of progressivism and reconstructionism, and low in the sub-dimensions of perennialism and essentialism. In other words, teachers adopt more the tendencies of the philosophy of progressivism, on which their curriculum is also based. It is thought that the high level of the two educational philosophy tendencies mentioned is due to the professional formation training teachers receive and the self-development motivation, which is higher especially in the first years of the profession.

The findings regarding teachers' perception levels of competence in the teaching-learning process are presented in Table 3.

Table 3. Teachers' Perception Levels of Proficiency in the Teaching-Learning Process

Variables	$\bar{x}$	sd	Min	Max	Skewness	Kurtosis
Planning Teaching	4.21	.51	2.63	5.00	-.268	.393
Learning Environment and Materials	4.21	.48	2.67	5.00	-.247	.406
Extracurricular Activities	4.11	.57	2.57	5.00	-.276	.040
Diversifying Teaching	4.14	.49	2.75	5.00	-.140	-.007
Classroom Management	4.25	.49	2.67	5.00	-.167	-.179
Teaching Learning Process Competencies	4.19	.45	2.78	5.00	-.239	.512

N=400

The teaching-learning process competence perception scale includes 41 items in total, 8 in the sub-dimension of planning instruction, 12 in the sub-dimension of learning environment and materials, 7 in the sub-dimension of extracurricular activities, 8 in the sub-dimension of diversifying instruction, and 6 in the sub-

dimension of classroom management. When the mean scores obtained from the scale were examined, it was determined that teachers considered themselves most competent in classroom management ($\bar{x}=4.25$; $sd=.49$), followed by the sub-dimensions of planning instruction ($\bar{x}=4.25$; $sd=.51$), learning environment and materials ($\bar{x}=4.21$; $sd=.48$), diversifying instruction ($\bar{x}=4.14$; $sd=.49$), and extracurricular activities ($\bar{x}=4.11$; $sd=.57$).

According to the general average of all items of the teaching-learning process competence perception scale, it can be said that teachers see themselves as highly competent ($\bar{x}=4.19$; $ss=.45$).

The lowest score received in the instructional planning sub-dimension was 2.63, the highest score was 5.00, the skewness coefficient was $-.268$ and the kurtosis coefficient was $.393$; the lowest score received in the learning environment and materials sub-dimension was 2.67, the highest score was 5.00, the skewness coefficient was $-.247$ and the kurtosis coefficient was $.406$; the lowest score received in the extracurricular activities sub-dimension was 2.57, the highest score was 5.00, the skewness coefficient was $-.276$ and the kurtosis coefficient was $.040$; the lowest score received in the instructional diversification sub-dimension was 2.75, the highest score was 5.00, the skewness coefficient was $-.140$ and the kurtosis coefficient was $-.007$; the lowest score received in the classroom management sub-dimension was 2.67, the highest score was 5.00, the skewness coefficient was $-.167$ and the kurtosis coefficient was $.179$; the lowest score received in the teaching-learning process competencies in general is 2.78, the highest score is 5.00, the skewness coefficient is $-.239$ and the kurtosis coefficient is $.512$.

The results of the correlation analysis conducted to determine whether there is a relationship between teachers' commitment to the curriculum, their tendencies towards educational philosophies, and their perceptions of their teaching-learning process competencies are presented in Table 4.

Table 4. Correlations between Teachers' Commitment to Curriculum, Tendencies Towards Educational Philosophy, and Perceptions of Competence in the Teaching-Learning Process

Variables	Curriculum Commitment	Perennialism	Essentialism	Progressivism	Reconstructionism
Commitment to Curriculum	1	-.272**	-.433**	.391**	.247**
Planning Instruction	.229**	.171**	-.145**	.650**	.539**
Learning Environment and Material	.265**	.199**	-.114*	.675**	.535**
Extracurricular Activities	.150**	.189**	.009	.582**	.457**
Diversifying Instruction	.231**	.199**	-.009	.667**	.468**
Classroom Management	.292**	.190**	-.085	.649**	.502**
Teaching Learning Process Competencies	.265**	.216**	-.082	.734**	.571**

* $p < .05$; ** $p < .01$

According to the analysis results, it can be said that there is a negative low ($r = -.272$; $p < .01$) significant relationship with perennialism and a negative medium ($r = -.433$; $p < .01$) significant relationship with essentialism, a positive medium ($r = .247$; $p < .01$) significant relationship with progressivism and a positive low ($r = .247$; $p < .01$) significant relationship with reconstructionism. This result can be interpreted as teachers with traditional educational philosophy tendencies are less committed to the curriculum.

When the relationship between the scores of commitment to the curriculum and the perceptions of teaching-learning process competence is considered, there is a low positive relationship ($r = .265$; $p < .01$) between the general average scores of the perceptions of teaching-learning process competence and the scores of commitment to the curriculum. The competence with the highest correlation value between the perceptions of commitment to the curriculum and teaching-learning process competence is classroom management ($r = .292$; $p < .01$), while the lowest correlation value is between the competence of extracurricular activities ($r = .150$; $p < .01$). Again, a positive low significant relationship was determined between the other sub-dimensions of the perceptions of teaching-learning process competence, namely learning environment and material ($r = .265$; $p < .01$), diversifying teaching ($r = .231$; $p < .01$), and planning teaching ($r = .229$; $p < .01$) and commitment to the curriculum. This situation may be due to the perception that

teachers can manage the teaching-learning process at a high level of competence with the help of the professional formation education they receive.

According to the correlation table values, while there are low-level positive significant relationships with perennialism ($r=.216$; $p<.01$), high-level with progressivism ($r=.734$; $p<.01$), and medium-level with reconstructionism ($r=.308$; $p<.01$) among educational philosophy tendencies, no significant relationship was found with essentialism ($r=-.082$; $p>.05$).

Among the teaching-learning process efficacy perception sub-dimensions, there was a positive and low level correlation between planning instruction and perennialism ($r=.171$; $p<.01$), a negative and low level correlation between essentialism ($r=-.145$; $p<.01$), a positive and moderate level correlation between progressivism ($r=.650$; $p<.01$) and reconstructionism ($r=.539$; $p<.01$); there was a positive and low level correlation between learning environment and material and perennialism ($r=.199$, $p<.01$), a negative and low level correlation between essentialism ($r=-.114$; $p<.05$), a positive and moderate level correlation between progressivism ($r=.675$; $p<.01$) and reconstructionism ($r=.535$; $p<.01$); There were low level significant relationships between extracurricular activities and perennialism ($r=.189$, $p<.01$), positive moderate relationships between progressivism ($r=.582$; $p<.01$) and reconstructionism ($r=.457$; $p<.01$); low level significant relationships between diversification of instruction and perennialism ($r=.199$, $p<.01$), positive moderate relationships between progressivism ($r=.667$; $p<.01$) and reconstructionism ($r=.468$; $p<.01$); low level significant relationships between classroom management and perennialism ($r=.190$, $p<.01$), positive moderate relationships between progressivism ($r=.649$; $p<.01$) and reconstructionism ($r=.502$; $p<.01$).

When these relationships were evaluated in general, positive significant relationships were obtained between perennialism, progressivism and reconstructionism educational philosophy tendencies and the general and sub-dimensions of teaching-learning process competencies. Negative significant relationships were found between essentialism and teaching planning and teaching environment and material sub-dimensions. According to this result, teachers with essentialism educational philosophy tendencies see their competencies in planning teaching, controlling the learning environment and developing materials less. This situation may be due to the fact that teachers were raised in an essentialist education system where teaching planning and teaching materials are provided centrally.

The last question of the research was determined as the power of teachers' tendencies towards educational philosophies and teaching-learning process competency perceptions to predict their commitment to the curriculum. In order to determine the power of the general score averages of teachers' teaching-

learning process competency perceptions and educational philosophy tendencies to predict their commitment to the curriculum, stepwise regression analysis was conducted. The results of the regression analysis are presented in Table 5.

Table 5. Results of Multiple Regression Analysis Regarding Teachers' Tendencies Towards Educational Philosophy and Teaching-Learning Process Competencies Predicting Their Adherence to Curriculum

Variables		B	Std. Error	β	t	p	r	Partial r
MODEL-1	Constant	2.558	.179		14.260	.000*		
	Planning Instruction	-.019	.070	-.025	-.272	.786	.229	-.014
	Learning Environment & Materials	.176	.085	.217	2.077	.038*	.265	.104
	Extracurricular Activities	-.093	.051	-.136	-1.814	.071	.150	-.091
	Diversifying Instruction	.008	.071	.010	.112	.911	.231	.006
	Classroom Management	.182	.063	.229	2.901	.004*	.292	.145
R=0.317		R ² =0.101		F(5,399)=8815			*p < .05	
MODEL-2	Constant	2.795	.217		12.875	.000*		
	Planning Instruction	-.107	.063	-.140	-1.709	.088	.229	-.086
	Learning Environment & Materials	.119	.075	.147	1.590	.113	.265	.080
	Extracurricular Activities	-.079	.045	-.116	-1.745	.082	.150	-.088
	Diversifying Instruction	.010	.065	.013	.156	.876	.231	.008
	Classroom Management	.112	.056	.141	1.997	.047*	.292	.101
	Perennialism	-.124	.039	-.188	-3.176	.002*	-.272	-.159
	Essentialism	-.132	.033	-.241	-4.019	.000*	-.433	-.199
	Progressivism	.293	.067	.317	4.373	.000*	.391	.216
	Reconstructionism	.016	.061	.016	.268	.789	.247	.014
R=0.563		R ² =0.317		F(9,399)=20089			* p< .05	

Durbin Watson d= 2.012

Multiple regression analysis for predicting teachers' commitment to the curriculum was conducted in two stages. Firstly, the first model was created by including the sub-dimensions of the teaching-learning process efficacy perception scale, namely teaching planning, learning environment and material, extracurricular activities, diversifying teaching and classroom management. The general teaching-learning process efficacy perception scores were not included in the equation to prevent linearity.

When the test results regarding the significance of the regression coefficients were examined, it was seen that the learning environment and material and

classroom management competencies were significant predictors of curriculum adherence. It was concluded that the predictive variables included in the equation, teaching planning, extracurricular activities and teaching diversification competencies were not significant predictors of curriculum adherence. When the R^2 value in the first model was examined, it was seen that the teaching-learning process competency perceptions explained approximately 10 percent of the variance in teachers' curriculum adherence ($R=0.317$, $R^2=0.101$, $p<.05$). R^2 is an indicator of how well the dependent variable can be predicted by independent variables (Punch, 2005).

The second model was created by including the educational philosophy tendencies of perennialism, essentialism, progressivism and reconstructionism together into the equation and it was seen that these variables together explained approximately 32 percent of the variance in teachers' commitment to the curriculum ($R=0.563$, $R^2=0.317$, $p<.05$). According to the standardized regression coefficient (β), progressivism, one of the predictor variables, is a more important predictor than other educational philosophy tendencies. When the test results regarding the significance of the regression coefficients were examined, it was seen that perennialism, essentialism and progressivism educational philosophy tendencies were significant predictors on commitment to the curriculum. It was concluded that the predictor variable of reconstructionism educational philosophy was not a significant predictor on commitment to the curriculum.

In other words, it can be said based on research data that 10 percent of teachers' commitment to the curriculum stems from their educational philosophy tendencies. In addition, according to research findings, when educational philosophy and teaching-learning process competencies are considered together, it can be said that they explain approximately 32 percent of teachers' commitment to the curriculum, while the remaining 68 percent stems from other factors.

Conclusions and Suggestions

According to the results obtained in the study, it was determined that teachers' commitment to the curriculum was high. Teachers are the strongest implementers of the curriculum and they determine which aspect of the curriculum will be implemented or emphasized in a classroom (Ornstein & Hunkins, 1993). However, there are many factors that affect teachers in the implementation of the curriculum. Aslan and Erden (2020) stated that high commitment to the curriculum is an expected situation, considering that decision makers and student parents expect teachers to adhere to the curriculum and complete the program in the time allocated to them.

Central exams, which will be applied to all students with the same questions at the end of the academic year, are seen as a factor that increases commitment to the curriculum. However, Bümen et al. (2014) revealed in their research that the subject scopes of the central exams were not parallel to the objectives of the program and the teaching-learning process, therefore teachers taught their lessons based on central exams and had to mostly cover the topics superficially. Therefore, they found that teachers had to run a separate program on paper and a separate program in practice. A similar assessment was made by Arslan Çelik (2020) regarding the high level of teachers' commitment to the program on paper. According to her, although the time allocated in the program was not sufficient, it was stated that teachers prepared documents in the end-of-year checks made on the class notebooks indicating that all achievements were achieved and teaching processes were organized.

At the end of each academic year, both the provincial and district National Education Directorate organizations and school principals evaluate student achievement by central exams. Teachers do not want to be responsible for the possible decrease in their success. Even on paper, teachers have the idea that they should stick to the program. In addition, the finding that teachers' commitment to the curriculum is high is consistent with the research results conducted by Burul (2018) and Baş and Şentürk (2019).

According to the results of the analysis of the levels of teachers' tendencies towards educational philosophies in the study, it was determined that the teachers had the highest tendency towards progressivism philosophy, followed by reconstructionism, perennialism and essentialism philosophies, respectively.

This situation can be considered as an indication that teachers have a very high belief in developing their students as intelligent and enlightened individuals who can play their roles in a changing society (Magulod, 2017). Curriculums are prepared according to a constructivist understanding based on pragmatism (Oğuz et al., 2014). Since the education system based on progressivism aims to educate students according to the conditions of the changing world (Demirel, 2008), it causes the idea that teachers adopt the philosophy of the curriculum to prevail. The finding that teachers tend to the progressivist education philosophy more than others is consistent with the results of research conducted in the field (Biçer et al., 2013; Oğuz et al., 2014; Magulod, 2017; Er, 2020; Şahan, 2020).

When teachers' perceptions of teaching-learning process competence are examined in general, it has been determined that teachers perceive their own competence at a high level. According to the results obtained, it has been determined that teachers see themselves as competent in classroom management the most and this competence is followed by the dimensions of planning teaching, learning environment and material, diversifying teaching and extracurricular

activities, respectively. It can be said that the competence area in which teachers are most together with students among teaching-learning process competences is classroom management. Teachers see themselves as competent in classrooms, which are the highest level of application of teaching activities. This situation may be due to the understanding that teachers are still an authority in classes in Türkiye, despite the curriculum prepared based on the constructivist approach, the high grade expectation in students and the fact that other competence areas other than classroom management are competences that increase the time teachers spend at school. The reason why other competences other than classroom management are also high may be that teachers perceive these competences as routine operations that they must do. In the research conducted by Yenen and Kılınç (2018), it has been determined that teachers perceive their own competence at a very high level in terms of planning education and training, creating learning environments and teaching-learning process competencies.

It was investigated whether there was a relationship between teachers' commitment to the curriculum and their tendencies towards educational philosophies and their perceptions of teaching-learning process competencies. According to the analyzes, a negative relationship was found between commitment to the curriculum and perennialism and essentialism, and a positive relationship was found between progressivism and reconstructionism. Ertürk (2013) stated that it is a necessity for the philosophy of education, which reflects the distant goals of education, to be consistent with the philosophy of school and practitioners. In Turkey, curriculums are prepared based on the constructivism approach based on progressivism educational philosophy tendencies. Therefore, it can be said that it is an expected situation that teachers who implement the program also have a negative relationship with traditional educational philosophy tendencies. This result is consistent with the research results conducted by Baş and Şentürk (2019).

A positive relationship was found between commitment to the curriculum and perceptions of teaching-learning process competence and all other sub-dimensions. Coşkun (2017) also stated that the effectiveness of curriculum can be achieved through teachers' teaching-learning process competence. The research findings also determined that while the highest correlation value between commitment to the curriculum and perceptions of teaching-learning process competence was for classroom management competence, the lowest correlation value was for extracurricular activities competence. It is thought that this result is due to the fact that teachers are not required to stay at school at the end of classes, and therefore cannot allocate enough time for extracurricular activities. This result is consistent with the research results conducted by Aslan and Erden (2020).

According to the research results, while there are high positive significant relationships with progressivism, moderate level with reconstructionism and low level with perennialism among the philosophy of education perceptions of teaching learning process, no significant relationship was found between essentialism and essentialism. Sönmez et al. (2000) stated that there should be different teaching competencies according to each philosophy. Therefore, it can be said that the fact that the teaching programs implemented by teachers are organized according to the constructivism understanding is an indicator of their consistency with the progressivism understanding. In the research conducted by Uyangör et al. (2016) with prospective teachers, they found negative significant relationships between teacher competencies and essentialism and positive significant relationships with progressivism and reconstructionism. Similarly, in the research conducted by Witcher et al. (2002), negative moderate relationships were found between traditional philosophy of education tendencies and general teacher competencies.

The power of teachers' tendencies towards educational philosophies and teaching-learning process competence perceptions to predict their commitment to the curriculum was investigated. According to the analysis results, it was seen that learning environment and material and classroom management competences were significant predictors of commitment to the curriculum, while instructional planning, extracurricular activities and instructional diversification competences did not have significant predictive power on commitment to the curriculum. It was seen that teaching-learning process competence perceptions explained approximately 10 percent of the variance in teachers' commitment to the curriculum.

The second model was then created by including the educational philosophy tendencies of perennialism, essentialism, progressivism and reconstructionism together into the equation, and it was seen that these variables together explained approximately 29 percent of the variance in teachers' commitment to the curriculum. It was concluded that among the predictor variables, progressivism had more predictive power on commitment to the curriculum than perennialism and essentialism educational philosophy tendencies, while reconstructionism educational philosophy did not have a significant predictive power on commitment to the curriculum. It is thought that the fact that the curriculum has been prepared according to the constructivist approach based on progressivism (MEB, 2018) may be a reason for this situation.

As a result of the research, it was determined that the teaching-learning process competencies that teachers have are an important factor in order for them to adapt the content and methods suggested in the program to their own educational philosophy tendencies. In other words, it was concluded that the

teaching-learning process competencies and educational philosophy tendencies of teachers are the factors that affect their commitment to the curriculum. It was determined that the teaching-learning process competencies and educational philosophy tendencies of teachers support this situation.

Based on the results obtained from the research, the following suggestions can be made:

- According to the research results, it was determined that teachers' perennialism and essentialism educational philosophy tendencies still continue, albeit slightly. More activity examples can be added to the EBA application, especially for teaching-learning process activities that are in line with the constructivism understanding included in the curriculum.

- Teachers' commitment to the curriculum was not very high. In order to increase teachers' commitment to the curriculum, school administrators and central administration can provide periodic inspection and guidance activities.

- In order for the curriculum to be effective, teachers who are field implementers of the programs can be provided with in-service training that will increase their teaching-learning process competencies. By providing these teachers who receive in-service training to their colleagues in the schools they work at certain intervals, it can increase the motivation of especially teachers who already consider themselves competent.

- The relationships between teachers' commitment to the curriculum, educational philosophy tendencies and teaching-learning process competencies can be repeated according to different education levels.

- Qualitative and quantitative mixed studies can be conducted to determine the factors affecting teachers' commitment to the curriculum, educational philosophy tendencies and teaching-learning process competencies.

- The comparison of teachers' philosophy of education tendencies according to various variables and their mutual relationships have been addressed in many studies and different results have been obtained (Oğuz et al., 2014). Therefore, by including this study in the studies in the literature, meta-analysis studies on teachers' philosophy of education tendencies can shed light on subsequent studies.

- It may be useful to conduct longitudinal studies to determine how the perceptions of competence of prospective teachers, intern teachers in the first year of their profession and teachers in service develop over time and to determine which factors affect teacher competence.

- This research can be expanded by comparing teachers' commitment to the curriculum with variables such as the number of classes they attend, the education level of their parents, and private and public schools.
- This research, which was conducted to determine the relationships between teachers' commitment to the curriculum, philosophy of education tendencies and teaching-learning process competence perceptions, can be repeated by adding teachers' lifelong learning tendencies.

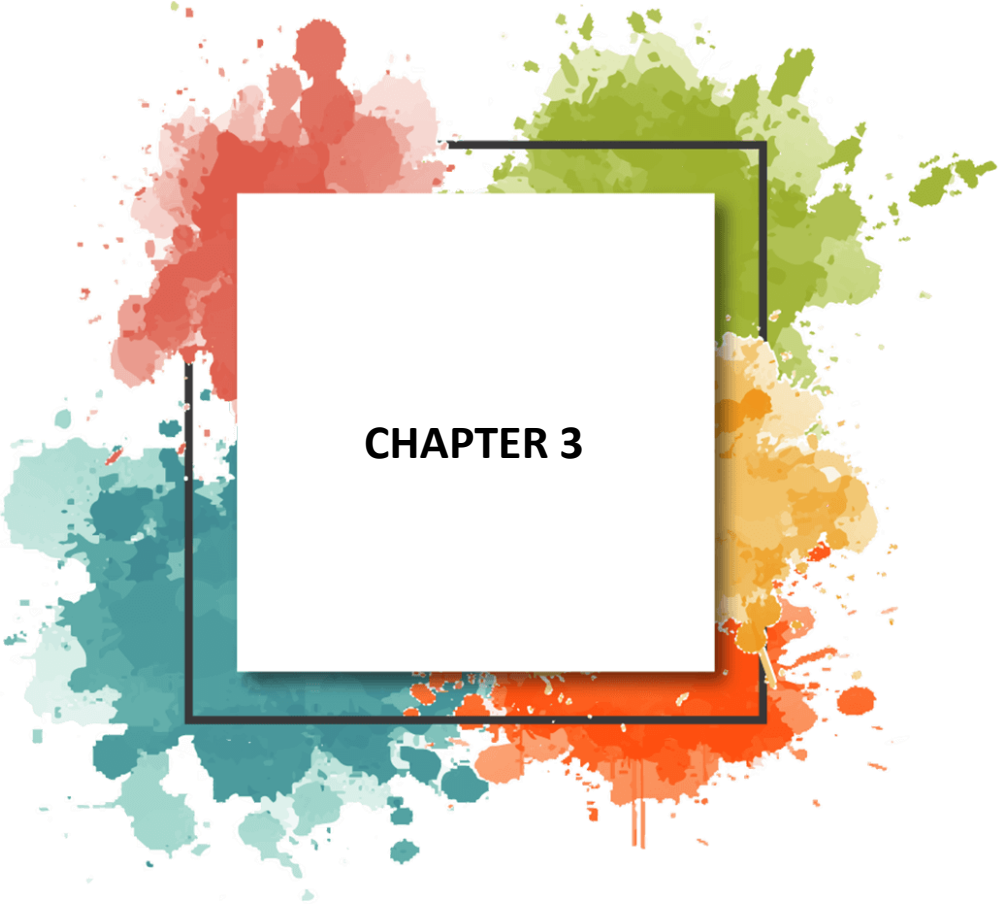
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CHAPTER 3

The Power of Integration: Interdisciplinarity in English Language Teaching for International Students

Gülden Tüm¹ & Nermin Gökel²

1. Introduction

The mobility of international students worldwide has increased for some decades. The reason for this is underlined as the desire of having higher education outside their home countries as the globalization opened path for world citizens to settle in different countries, work and have higher education. This mobility became an important factor for international universities to reconsider their strategies, programs and faculties and even reshape their curriculum so as to host these students. Among the faculties of universities, education faculties also seem to foster this mobility for their benefits and enroll international students. English Language Teaching (ELT) departments of universities are considered the most convenient ones to reschedule their programs for these students since it is considered as the global lingua franca. The report by UNESCO of 2024, also reveals the mobility number of international students worldwide is around seven million (6.9 million). To the report, English functions as the dominant medium of communication (UNESCO, 2024); therefore, the demand has globally transformed ELT into a field in which students feel comfortable and prepared for communicative competencies as well as multiple disciplines, cultures, and academic achievements. Within this manner, English becomes both a practical and survival tool (O'Connor & Thomas, 2021) to be enrolled at a university, identity formation (Le Ha, 2009), and professional development for international students. Regarding an interdisciplinary approach in ELT, international students encounter new environments, meet their linguistic needs intersect with issues of cultural adaptation, disciplinary literacy, and digital engagement in addition to their majors. For instance, a student studying medicine in an English-medium university acquires conversational fluency in addition to interpret medical documents, participate in interdisciplinary academic and professional teams, and present space in culturally appropriate ways (Hyland, 2019). In a similar vein, a student of social sciences engages with intercultural perspectives through English in addition to their theoretical and practical frameworks in disciplinary courses. From this perspective, the interdisciplinary tendency in ELT is more than a

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methodological choice; it is much more beyond a pedagogical imperative. Therefore, educators feel obliged to design curricula that go beyond grammar and vocabulary, integrating several majors such as sociology, psychology, cultural studies, history, the arts, and technology. Such integration is observed to be reflected in the 21st century skills wherein communication, collaboration, creativity, and critical thinking are inseparable from language education (Trilling & Fadel, 2009). As mentioned, interdisciplinarity creates a bridge to academic achievement, social participation, and lifelong learning.

Interdisciplinarity has lately been scrutinized in the literature and considered as leading diverse profiles of international learners in age, linguistic and educational background, cultural identity, academic readiness, and career aspirations. Putting this view for ELT domain within interdisciplinary context, English for intercultural relations, English for digital citizenship (Choi, 2016), and English for artistic expression in communication are seen to add deepness and worth to the language-learning process, while simultaneously validating the diverse identities of learners (Byram, 2021). These diverse profiles in ELT echo global citizens as international students. In other words, these citizens are expected to master linguistic standards and also cope with global challenges such as sustainability, social justice, and technological innovation. Interdisciplinary ELT enables them to use English as a medium for participating in debates, engaging with ethical dilemmas in artificial intelligence, or collaborating on cross-border research projects. Language thus becomes both a communicative tool and a transformative resource for engaging with global issues (UNESCO, 2015).

Interdisciplinarity in ELT is considered significant for the educational policy and practice. Recently, the Ministry of National Education (MoNE) has introduced the Century of Türkiye Education Model. This is a revised curriculum emphasizing cross-disciplinary approaches to English learning. Aligned with the Common European Framework of Reference for Languages (CEFR), the English Curriculum integrates themes, learning outcomes, and timetables within a multilingual education model that supports cognitive, social, and cultural growth. It aims to develop learners' competence in using English as a tool for contributing to their societies, engaging globally, and preparing for the future (MEB, 2025, 4). The policy regards both learners and educators to view ELT as an interdisciplinary field rather than solely linguistic instruction. It incorporates the European Commission's Content and Language Integrated Learning (CLIL) approach and promotes digital literacies as part of lifelong learning .

2. Theoretical Framework

2.1 Perspectives in Interdisciplinarity

Interdisciplinary ELT has multiple theoretical frameworks in methodology, literature, instruction, linguistics, and applied linguistics, each of which contributes insights into how language teaching can be shaped with broader disciplinary knowledge. Within this broader disciplinary knowledge, theories and approaches gain importance. Initially, socio-cultural theory by Vygotsky (1978) takes place within the context of social interaction and cultural interconnection. Especially, the *zone of proximal development (ZPD)* by Vygotsky engages interdisciplinary activities, wherein learners are scaffolded to perform tasks such as conducting a geographical survey in English or presenting cultural analyses in multicultural perspectives. In the same vein, communicative language teaching, (CLT), focuses on use of language as interdisciplinarity within (CLT) to let students inverse socially and engage in disciplinary communication such as writing lab reports, debating ethical issues, or designing multimedia presentations (Richards, 2006). Additionally, content and language integrated learning (CLIL), that combines language learning with subject matter instruction. This approach is also interrelated with interdisciplinarity, as learners simultaneously develop linguistic competence and subject-specific knowledge, thereby enhancing both scientific literacy and language proficiency (Coyle et al., 2010). The other theory that leaves its place to interdisciplinarity is Translanguaging Theory. This emerges from usage of multiple linguistic resources by bilingual and multilingual learners because international students often navigate between English, their mother tongue, and other languages (Liu & Fang, 2022). Interdisciplinary ELT creates natural spaces for translanguaging so as students to analyze their first language and cultural phenomena while employing English for academic presentation. This practice confirms students' linguistic repertoire and bridges language with disciplinary knowledge (García & Wei, 2014).

2.2 Interdisciplinarity and global citizenship

Interdisciplinarity and global citizenship are the most compelling theoretical justifications in ELT because they emphasize values such as intercultural understanding, respect for diversity, and active participation in global issues (UNESCO, 2015). For international students, interdisciplinary ELT becomes a platform for acquiring the linguistic, cognitive, and ethical tools necessary to engage as global citizens. Integrating science with English allows students to discuss different issues, and combining social studies with English creates opportunities to debate various issues, as well. Linking technology with ELT provides learners with the language and digital literacies needed to critically engage with artificial intelligence, social media, and online security. In each case, interdisciplinarity situates language learning within broader questions of social

relevance, thereby cultivating not only communicative competence but also civic responsibility. Moreover, global citizenship in interdisciplinary ELT also fosters identity negotiation. International students often adapt of being part of the society, hybridity, and cultural adaptation and becoming aware of their cultural backgrounds as both local and global actors. This dual identity formation enhances motivation, reduces feelings of marginalization, and prepares students to thrive in multicultural academic and professional contexts (Byram, 2021).

3. Interdisciplinary Dimensions of English Language Teaching

For international students, the integration of interdisciplinarity into ELT is not surprising as they come from diverse backgrounds and diverse domains somehow intersect language with other fields of knowledge and practice. No doubt, these intersections globally expand the scope of ELT for international students as they bring up unforeseen dynamic and diverse-based-dimensions within various disciplines. These dimensions in ELT might be listed as language and technology, language and culture, language and translation, language and communication, language and arts, language and multiculturalism, psychology and language, and linguistics, and intensive language, language and science, STEM. Each one reveals how international students could be exposed to language learning in enriched ways of context-based forms, and cross-disciplinary experiences.

3.1 Intertwinement of English Language with Technology

The digital transformation of education has intertwined technology and ELT as an indispensable component. From this intertwinement international students benefitted because technology provided access to resources and opportunities for collaboration across borders in native and non-native speakers of English. Interdisciplinary ELT takes role of connecting digital tools to create personalized learning environments with digital artefacts such as blogs, podcasts, and multimedia presentations. Therefore, integrating digital literacy into ELT leads students to have not only linguistic competence but also the skills necessary to participate in global digital economies (Ng, 2012).

With intertwinement, another benefit arises because technology enables blended learning models give opportunities by combining synchronous and asynchronous learning. In other words, these models where face-to-face instruction is combined with online platforms save time for international students, who may access to resources due to varying time zones, work commitments, or adjustment challenges. Interdisciplinary ELT designs lessons that, allowing students to practice English while engaging with content from multiple disciplines such as science videos, history podcasts, or online art exhibitions (Garrison & Vaughan, 2008). Moreover, in interdisciplinary ELT, AI can support

international students in refining academic writing, improving pronunciation, and receiving instant feedback according to their needs.

3.2 Intertwinement of English Language and Culture

ELT addresses not only linguistic forms but also cultural practices, values, and perspectives as inseparable items from language, and for international students. An interdisciplinary approach in English is a way for exploring ‘cultural studies and intercultural communication’. By integrating cultural studies, ELT learners are encouraged to compare, contrast, and reflect upon their own cultural identities as they are also exposed to multiple identities. This is how they learn empathy, tolerance, and adaptability, which are critical components of global citizenship (Deardorff, 2006). Additionally, interdisciplinary ELT encourages learners to question stereotypes, challenge ethnocentric assumptions (Lebedko, 2010), and analyze media representations of culture (Guyot, 2021). For example, students may study how climate change is portrayed differently in various cultural contexts and use English to present comparative analyses. Such practices not only improve language proficiency but also enhance critical thinking and social responsibility. In brief, culture-based ELT can simultaneously highlight global phenomena while also learning to engage with global events. This dual focus validates learners’ identities while promoting global awareness (Byram, 2021).

3.3 Intertwinement of English Language and Arts

ELT enhances a powerful interdisciplinary path to enable international students to engage with affective, imaginative, and deeply personal expressions through arts. For instance, drama-based techniques (i.e., improvisation, pantomime, role-play and so on.) create safe spaces for students to experiment with language (Lee, 2015). Thus, students practice authentic communication while developing empathy and collaborative skills that reduces anxiety, and promotes intercultural understanding (Stinson & Winston, 2011). As a result, literature could be expressed to serve as a powerful medium for immersing students in diverse linguistic patterns, literary forms, and cultural contexts (Akin, 2020). Thus, international students catch insights of different life-based reflections related to personal experiences mirrored in novels and poetry. They expand their vocabulary and also become aware of their cultural richness. Likely, music supports language learning by blending rhythm, intonation, and memory into the acquisition process. Songs and chants performances are also facilitators to teach pronunciation, vocabulary, and idiomatic expressions. Similarly, visual arts offer international students multimodal opportunities for strengthening both linguistic skills and also aesthetic sensibilities and multimodal literacies (Eisner, 2002).

3.4 Intertwinement of English Language and STEM

One of the critical domains for interdisciplinary ELT is STEM (Science, Technology, Engineering, Mathematics), especially for international students enrolled in academic studies. In this manner, as a lingua franca, English facilitates scientific communication because it integrates STEM in itself so that learners could acquire the language necessary for academic and professional success (Block & Moncada-Comas, 2022). Interdisciplinary ELT fosters scientific literacy by teaching students how to read scientific texts, interpret data, and communicate findings in English (Ting, 2022). Norris & Phillips (2003) elucidates how activities that include research articles, experiments, or results through posters and PowerPoint presentations are beneficials and align language learning with the practices of scientific communities. In addition to activities that support STEM integration on problem-based learning, where students collaborate to solve real-world challenges, Hutchinson & Waters (1987) underline specific courses linkage with ELT create professional identity formation and employability, which raises demands for many international students to enroll in discipline-specific academic programs in the practical application of interdisciplinarity in ELT.

Conclusion

The interdisciplinarity plays an important role in education. So does interdisciplinary. ELT reveal a fundamental alignment for international students in dual way: it teaches communication skills, grammar and vocabulary, and it integrates language with technology, culture, arts, STEM, and global citizenship. Therefore, it turns acknowledge beyond communicative competence and includes critical thinking, intercultural awareness, and different domains to make them ready for academic and professional contexts in their future career. In conclusion, both of dimensions or majors have contributed them. Nonetheless, in addition to all these afore-mentioned benefits, it should be remembered that interdisciplinary ELT have also several challenges. These challenges arise from the diversity of learners, teachers who might be inexperienced in interdisciplinarity, the institutional restrictions, and the nature of combining language learning with interdisciplinary knowledge. Yet, regarding pros and cons, professional development programs, and communities of practice can help teachers expand their competencies and confidence in implementing interdisciplinary approaches (Richards & Farrell, 2005). In conclusion, interdisciplinary ELT seems to evolve through advances in AI, personalized learning, digital citizenship, sustainability in curricula, and the bridging of research and practice. From this point of view, interdisciplinarity in ELT is not a passing innovation but a long-term paradigm shift. For international students, it provides a pathway to academic success, cultural adaptation, and active participation in global communities of the 21st century.

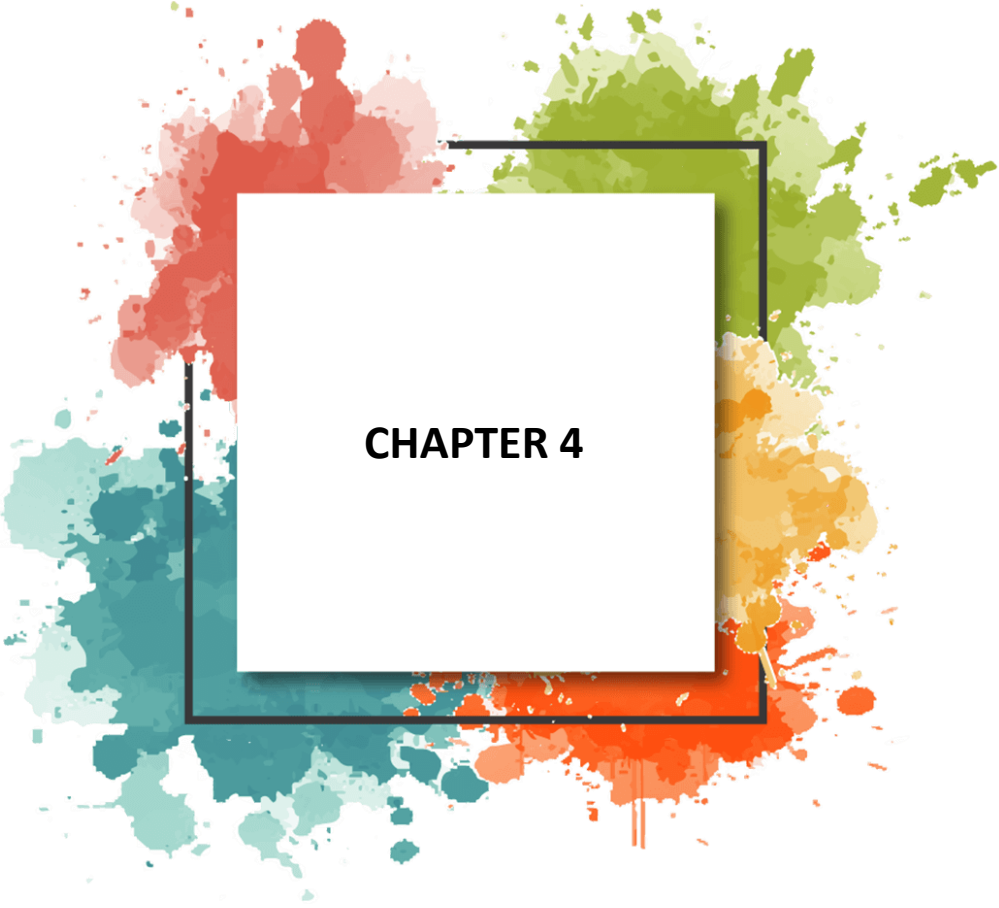
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CHAPTER 4

Pre-Service Teachers' Experiences in Solving Skill-Based Mathematics Questions in the High School Entrance Exam (Lgs)

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In recent years, there has been a significant transformation in national and international assessment systems. In Turkey, the high school placement system, higher education entrance exams, and exams such as ALES have shifted from traditional short questions based on direct processing to new-generation “skill-based” questions that measure reading comprehension, contextualization, problem-solving, and logical reasoning skills (MoNE, 2018a). This change requires students to use not only procedural knowledge, but also higher-level cognitive and analytical skills (Atasoy, 2019; Erden, 2020).

Skill-based questions, unlike traditional problem types, are mostly related to everyday life contexts and aim to activate students' higher-order thinking skills (Korkmaz et al., 2020). These questions require not only the application of mathematical operations, but also critical thinking, problem solving, and logical reasoning. Polya's (1945) classic but fundamental problem-solving steps—understanding the problem, developing a plan, implementing the solution, and evaluating it—are regaining importance in this context. Students' ability to solve problems depends not only on their computational skills but also on their ability to understand the context of the problem and develop strategies. The critical role of reading comprehension in mathematical achievement has also been demonstrated repeatedly. Cai and Lester (2010) emphasize that reading skills are decisive in students' process of solving math problems. New generation questions with long paragraphs and context-based questions require students to have not only mathematical knowledge but also strong linguistic and cognitive skills.

International exams (PISA, TIMSS) also reflect a similar transformation (Çepni, 2019). In these exams, the central role of science, mathematics, and reading skills is emphasized; students' ability to apply knowledge in different contexts has become a fundamental measure of success (Mullis et al., 2020; OECD, 2019). Education policies in Turkey have also been updated in this direction. The Ministry of National Education (2018b; 2018c) and the recently

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announced Turkey Century Education Model (MoNE, 2025) emphasize that critical thinking, problem solving, and 21st-century skills will be central to assessment processes. Therefore, equipping students with these skills has become one of the fundamental goals of the education system.

Teachers, and especially teacher candidates, play a critical role in this transformation process. Exposing teacher candidates to competency-based questions early on, developing problem-solving strategies, and enriching their pedagogical content knowledge (Shulman, 1986) in this direction will contribute to them starting their profession better equipped (Akyüz, 2020). However, it is observed that such practices are limited in current teacher education programs. It is also noteworthy that there are very few studies in the literature examining pre-service teachers' experience in solving new generation questions. Atasoy (2019) emphasized that new generation questions are often seen as “unfamiliar” by students and teachers, and therefore, special solution strategies need to be developed. Erden (2020) revealed that teachers experience difficulties with skill-based questions, particularly in the processes of reading comprehension and interpretation. Uzun and Ağaç (2023) stated that structured practices for teacher candidates increased their pedagogical awareness and self-confidence. These studies reveal the necessity of systematic educational practices for teacher candidates.

This study aims to address the aforementioned gap in the literature. The training program conducted to help middle school mathematics pre-service teachers develop strategies for solving skill-based questions on the high school entrance exam (LGS) contributes to the field of teacher education and supports pre-service teachers in their preparation for the profession. In this context, the study sought answers to the following questions:

- a. What are pre-service teachers' views on teacher training for solving skill-based LGS mathematics questions?
- b. What are pre-service teachers' views on the solution steps and strategies for skill-based LGS mathematics questions?

METHOD

Research Design

This research was conducted within the framework of a single-group pretest–posttest experimental design. This design allows for the comparative evaluation of participants' views before and after a specific educational intervention using the same measurement tools (Büyüköztürk vd., 2008).

Participants

The participants in the study consisted of teacher candidates enrolled in the Mathematics Education undergraduate program at Biruni University during the spring semester of the 2022–2023 academic year. A total of 73 pre-service teachers enrolled in the first, second, third, and fourth grades participated in the study on a voluntary basis. Due to the transition to online education at universities following the earthquake that occurred on February 6, 2023, during the period when the study was conducted, all applications were carried out in a distance learning environment. An appropriate sampling method was preferred in the selection of participants (Fraenkel et al., 2012).

Data Collection Process

In the study, a training program consisting of two sessions was conducted to reveal prospective teachers' views on solving skill-based mathematics questions.

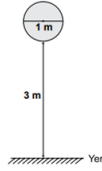
In the first session, LGS mathematics questions from previous years were examined, and questions from the pre-pandemic and post-pandemic periods were evaluated comparatively. The distribution according to learning areas, difficulty level, and question structure were analyzed and conveyed to the participants. Below are a few screenshots from the topics covered in this session.

Kareköklü İfadeler

Kasım 2015 TEOG 1.Dönem

Kasım 2016 TEOG 1.Dönem

9.



Bir okçu, yukarıda gösterildiği gibi çapı 1 metre olan daire şeklindeki bir hedef tahtasına atış yapmaktadır. Hedef tahtasının yerden yüksekliği 3 metredir.

Atılan ok hedef tahtasına isabet ettiğine göre, saplandığı noktanın yerden yüksekliği, metre cinsinden aşağıdakilerden hangisi olabilir?

- A) $\sqrt{6}$ B) $\sqrt{8}$ C) $\sqrt{15}$ D) $\sqrt{18}$

13. $\sqrt{18}$ sayısı aşağıdaki sayılardan hangisi ile çarpılırsa sonuç bir doğal sayı olur?

- A) $\sqrt{15}$ B) $\sqrt{27}$ C) $\sqrt{48}$ D) $\sqrt{50}$

15. $m\sqrt{11} = \sqrt{99}$ ve $n\sqrt{10} = \sqrt{1000}$ olduğuna göre $m + n$ kaçtır?

- A) 13 B) 19 C) 103 D) 109

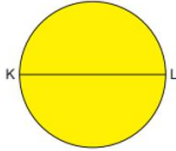
20. $\frac{\sqrt{27}}{\sqrt{12}} \div \frac{\sqrt{18}}{\sqrt{32}}$ işleminin sonucu kaçtır?

- A) 2 B) $2\sqrt{2}$ C) $2\sqrt{3}$ D) 4

2021 LGS

2. a, b birer doğal sayı olmak üzere

$$a\sqrt{b} = \sqrt{a^2 b} \text{ dir.}$$



Yukarıda, çapı KL doğru parçası olan daire şeklinde bir karton ve eş bölmelere ayrılmış 10 santimetrelik bir cetvel verilmiştir. KL doğru parçası, K noktası 2'ye karşılık gelecek şekilde cetvelin kenarı ile çakıştırıldığında L noktası 6 ile 7 arasında, 7'ye daha yakın bir noktaya karşılık gelmektedir.

Buna göre KL doğru parçasının uzunluğu, santimetre cinsinden aşağıdakilerden hangisi olabilir?

2022 LGS

3. a, b, c, d birer doğal sayı olmak üzere

$$a\sqrt{b} = \sqrt{a^2 b}$$

$$a\sqrt{b} + c\sqrt{b} = (a + c)\sqrt{b}$$

$$a\sqrt{b} - c\sqrt{b} = (a - c)\sqrt{b}$$

$$a\sqrt{b} \cdot c\sqrt{d} = (a \cdot c)\sqrt{b \cdot d} \text{ dir.}$$



Çevresinin uzunluğu $\sqrt{800}$ cm olan dikdörtgen şeklindeki kâğıt, yukarıdaki gibi dikdörtgen ve kare şeklinde iki parçaya ayrılıyor.

Kare şeklindeki parçanın bir kenarının uzunluğu $\sqrt{8}$ cm olduğuna göre dikdörtgen şeklindeki parçanın bir yüzünün alanı kaç santimetrekaredir?

- A) 16 B) 24 C) 32 D) 40

Figure 1. Sample questions related to square roots

The second session focused on the solution methods and strategies for skill-based questions; example solution processes for converting problems into mathematical language were discussed. Examples from the educational application content for solving skill-based mathematics questions in the LGS are provided below.

- To solve new generation questions, it is essential to thoroughly understand the necessary topics first. To successfully solve new generation questions, you must first grasp the learning outcomes associated with that topic. In other words, you must understand the topic very well. So what should you do to achieve this? After listening to the topic, you should solve at least 40-50 questions at the beginner level from books. You must also solve any questions you cannot answer and learn their solutions.
- Once you have comprehended the concepts, you can now move on to the new generation questions. You can solve the questions in the medium difficulty level question books.
- At first, you may not be able to solve many skill-based math questions. It may also take a long time. If you have never solved new generation questions before, don't worry about it and try to read the questions carefully and understand them. You can spend 1 minute on each question reading and understanding it. You can then spend the remaining 1-1.5 minutes solving the question. Understanding the question is half the battle. Therefore, you must carefully understand what is given to you and what is required.
- At the same time, having children read books regularly from a very young age is one of the most important factors. The new generation questions are long paragraphs, so your reading comprehension skills must be well developed. For this, you should read 20-30 pages of a book every day.
- The fundamental method for solving these questions is to ensure that topics are well understood from an early age, beyond rote memorization. For example, concepts covered in the questions can be written down in a notebook.
- Detailed examination of images and reading graphs allows for easier understanding of the questions.
- Most importantly, learning to read quickly is of great importance. The faster the questions are read, the more time is left for solving them.

- After each topic, you should solve past LGS exam questions. Also, be sure not to neglect solving the MoNE sample questions.

After both sessions, an interview form consisting of the same questions was administered as a pre-test and post-test to gather the opinions of the teacher candidates. The interview forms were distributed to participants online via Google Forms.

Data Collection Tool

An Interview Form consisting of six open-ended questions was used as the data collection tool. The form included questions regarding pre-service teachers' educational needs related to competency-based questions, the difficulties they encountered, their solution strategies, and the tactics they used. The questions were administered in the same manner before and after the training program to observe change.

The questions on the interview form are as follows:

1. Is it necessary for pre-service teachers to be trained in solving skill-based mathematics questions? If so, explain why.
2. What kind of support would you like to be supported with when solving skill-based mathematics questions?
3. When solving skill-based mathematics questions, what are the main areas where you generally encounter problems?
4. What do you think are the key points to consider when solving skill-based mathematics questions?
5. Could you briefly describe the steps you follow when solving skill-based mathematics questions?
6. Do you have a specific strategy you use when solving skill-based mathematics questions? If so, could you describe it?

Data analysis

The data obtained were analyzed using descriptive analysis methods (Yıldırım and Şimşek, 2011). The responses given by the teacher candidates were arranged in tables for comparative analysis in the form of pre-test and post-test, and sample student statements were included under each theme. Thus, changes in participants' views before and after training were demonstrated directly through quotations.

Ethical Principles

Participation in the research is voluntary. Informed consent has been obtained from participants, and data has been anonymized and used solely for scientific purposes. The research process has been conducted in accordance with ethical principles.

FINDINGS

This section presents a comparative analysis of pre- and post- participation views of pre-service teachers. The data have been organized using a descriptive analysis approach, presented in tables according to each research question, and supported by sample student statements.

The first three questions in the interview form were analyzed within the scope of the research question, “What are pre-service teachers’ views on teacher training for solving skill-based LGS mathematics questions?” The results are presented below.

1. Opinions on pre-service teachers receiving training to solve skill-based mathematics questions

Before the training, a significant portion of the participants emphasized the need for training in solving skill-based questions, citing the fact that these questions are challenging even for pre-service teachers as the reason. After the training, the vast majority of the pre-service teachers underscored this need, highlighting the professional necessity of gaining familiarity with new-generation questions. The findings are presented in Table 1.

Table 1. Pre-service teachers’ views on receiving training related to solving skill-based mathematics questions

Examples of student opinions before training	Examples of student opinions after training
It exists because the new generation of questions can be challenging even for teacher candidates. It is essential to understand the logic behind them, as they require not only mathematical skills but also reading comprehension and the ability to structure the question.	Yes. I’ve met many math teachers whose AYT scores were excellent, but they struggled with the TYT, which led to disrespect from students.
Yes, there is. The reason is that teachers, like everyone else, have been confronted with these questions over the past few years.	Yes, there is. Because all the questions we face now are emerging as a new generation, and we need to be familiar with them.
Yes, there is. Because we haven’t encountered enough questions like this before.	It exists. Questions are now based more on understanding logic than on formulas, so training is needed to both understand and explain this.

Yes, there is. Because LGS and YKS questions are now new generation questions, and in order to teach them to students, teachers must first know them.	This is true for my generation because the problems of the new generation are complex questions that really require thinking, and receiving education on this will be very useful in our future teaching careers.
I don't think so. Because we didn't take any special training while preparing for the YKS either. By solving questions, we both sped up and saw most of the question types. I think solving lots of questions is better than taking training.	I think so, because it is important to adapt to the changing dynamics of education.
No, there isn't any.	Yes, because there are many pre-service teachers who wouldn't be able to solve LGS questions if they were given them.

2. Pre-service teachers' views on the support they would like to receive when solving skill-based mathematics questions

Participants emphasized the need to “learn solution methods” and “see examples” before the training. After the training, the topics of “step-by-step explanations,” “concretization,” and “transfer in the classroom” came to the fore. This finding shows that the training process adds a pedagogical dimension to the solution process of teacher candidates. The findings are presented in Table 2.

Table 2. Pre-service teachers' views on the support they would like to be supported with when solving skill-based mathematics questions

Examples of student opinions before training	Examples of student opinions after training
I would like to learn the solutions to the questions and the key points.	See examples
I don't feel the need to.	I want to practice with questions that have explanations.
Methods for solving questions more quickly and practically	Plenty of problem solving
How to solve the problem in a short time	How we will convey more questions and how we will manage the class at that moment
It would be nice to have support on how to explain the questions step by step and how to make the abstract part of the questions understandable to students.	I would like to receive training on solution methods according to subject and problem types.
To understand logic and improve interpretation skills.	Material that can be explained with concrete examples, games, etc.
I would prefer them to be clear and concise.	I think that since these types of questions are based on comprehension, we see the importance of Turkish here. You should read a lot of books to develop your memory and mind.

3. Pre-service teachers’ views on the difficulties they experience when solving skill-based mathematics questions

Before the training, most students mentioned problems such as “difficulty understanding questions,” “long paragraph structures,” and “struggling with time constraints.” After the training, it was observed that these types of problems had largely decreased, with participants stating that they only experienced problems in certain areas. This situation shows that the training improved the pre-service teachers’ ability to understand questions. The findings are presented in Table 3.

Table 3. Pre-service teachers’ views on the areas where they struggle when solving skill-based mathematics questions

Examples of student opinions before training	Examples of student opinions after training
I may have difficulty understanding what the question is asking.	I don't experience it.
Not understanding the question	In the long time it takes
Sometimes I can't even understand what the question means, and because the question is so long, I may get stressed thinking about the time constraint.	To make sense of the problem described
I don't usually have problems, but in advanced questions, the paragraphs become overly complicated, and extracting the information from them is harder than using mathematics.	I don't experience many problems, and if I do, it's usually because I don't understand the question.
I haven't had any significant problems.	Once I understand the question and figure out what needs to be done, I can solve it, but sometimes the questions are too long, making them difficult to understand.
Sometimes I can't visualize it.	Because some questions are long, it's hard to fully understand them and use the time efficiently.
Simplifying the question, or rather, understanding it.	I have to strip the question down to its mathematical essence and break it down into steps.
Even if the process for some questions is easy, I can have trouble understanding what they want because they make the question longer.	I struggle more with conveying these questions to the student than with solving them.
The part where it gets complicated with storytelling.	I have trouble converting verbal expressions into numerical data.

The last three questions in the interview form under the research question “What are the pre-service teachers’ views on the solution steps and strategies for skill-based LGS mathematics questions?” were analyzed, and the findings are presented below.

4. Pre-service teachers’ views on points to consider when solving skill-based mathematics questions

Participants emphasized the importance of carefully reading questions before the training, while after the training they indicated that they turned to methods such as “strategy development,” “identifying key information,” and “simplifying the question.” This finding shows that pre-service teachers developed systematic problem-solving approaches. The findings are presented in Table 4.

Table 4. Pre-service teachers’ views on points to consider when solving skill-based mathematics questions

Examples of student opinions before training	Examples of student opinions after training
It is necessary to read the question carefully and not fall for the wordplay in the question.	Understand what you read and transfer it to paper
New generation questions have taught us that Turkish is as important as mathematics. It is necessary to quickly understand the paragraph and see the most practical solution.	Understand the question and use the correct solution method
It is necessary to correctly understand the information provided for the question and to be able to process and express it correctly.	The question is actually simple, but the student exaggerates it. We should point out to the student that half of the question is just a story.
It is necessary to fully understand what the question is trying to convey.	Key points
It is necessary to comprehend all the information from a single perspective.	Key words
I think the most important point is to know the order in which the information given in the question should be presented.	We must break our preconceptions and try to understand the question for new generation questions.
We need to pay attention to what exactly they want us to answer.	I make sure I fully understand the question.
The story part of the question.	Carefully reading the question and developing strategies to solve it.
Understanding the question fully.	Careful and attentive reading and identifying extra important points.
It should be approached step by step.	Each sentence must be carefully examined without skipping any, and the shapes must be examined.
I think it needs to be solved with focus.	The simplest way to solve the questions should be preferred. The length of the question should not be intimidating; important points should be considered and the simplest solution should be preferred.

5. Pre-service teachers' views on the steps they follow when solving skill-based mathematics questions

Before the training, participants generally focused on the steps of “reading the question and performing the operation,” while after the training, they developed more planned approaches such as “distinguishing important information, taking notes, and simplifying the question.” This change indicates that the participants began to act more consciously and systematically in their problem-solving processes. The findings are presented in Table 5.

Table 5. Pre-service teachers' views on the steps they follow when solving skill-based mathematics questions

Examples of student opinions before training	Examples of student opinions after training
First, I read the question in its entirety to see what it requires of me, then I proceed step by step.	Understand the question and use the information provided.
Once I understand the question, everything else follows.	First, I read and solve the question part, then the paragraph part or the main part of the question.
Understanding the question and proceeding step by step	First, I try to understand the question by breaking it down, then if there are any diagrams, etc., I plan what I need to do on them and try to solve the question that way.
First, understand the question, then proceed with the solution.	I take notes on the parts that will be useful for my work, and finally, I combine them all to reach the conclusion.
I start solving the problem by underlining the important information as I read it.	Understand the problem well, summarize the information given, and proceed to the solution in light of that.
I try to understand the question, focusing on the question itself without getting distracted by the story part.	Rather than reading the entire problem, I read the information given piece by piece and put it into a table. This way, all the numerical data is gathered in one place, making the task easier.
First, I read the question and understand what it means. I try to visualize it in my mind. I follow the steps required to solve the problem from start to finish.	First, I read the main part of the problem written in bold to see what it is asking for. Then, I read the question, noting down the important parts on the diagram or on the side. I combine what is given with what is asked for and proceed to the solution.
First, I read and try to understand, write down all the given information, try to simplify the question, and proceed using this information.	While reading the question, I write down the given information in a corner to make it clearer and more transparent. Then, I reread the question and design in my mind which operation to use, which information

	to use, and in what order, before applying the operations.
I proceed by expressing each step mathematically rather than reading the question as a whole.	First, we must separate the question from its story and write down the necessary information on paper in a way that we can understand and do ourselves. Then, we should focus on the operations and what we can do, just like solving a normal math problem, without any preconceptions.
First, I fully understand the question and visualize it in my mind, then I concretize it according to the question.	As I mentioned in the other question, I pay attention to the commas in the questions, separating each comma with a line. I read calmly and take mathematical notes on the given information, and in this way, I try to solve most of my questions using mathematical thinking.

6. Pre-service teachers' views on the strategies they use when solving skill-based mathematics questions

Before the training, most participants stated that they did not use any specific strategies. After the training, various methods such as “concretizing the question, simplifying it, and distinguishing between question types” emerged. This finding shows that pre-service teachers began to develop their own strategies by gaining experience in the solution process. The findings are presented in Table 6.

Table 6. Pre-service teachers' views on the strategies they use when solving skill-based mathematics questions

Examples of student opinions before training	Examples of student opinions after training
No, I don't.	Simple thinking
No.	I write down every piece of information given in the question as I read it.
I don't have any special strategies, I just try to read carefully so I don't make mistakes.	It varies from question to question. But generally, when there are complex problems, I summarize them in a simpler structure and then adapt them to the problem by generalizing.
Unfortunately, I don't have any strategies.	After a while, as soon as you start the question, you understand whether it's about speed, age, ratio, proportion, or fractions, and seeing many questions at the solution stage helps you solve them practically by understanding the logic behind the solution methods.
Unfortunately, no. I try to solve problems by understanding them.	If the questions are long and abstract like Turkish questions, I immediately focus on the shape above the question to make it concrete and show what is given there.

I try to simplify them from simple to complex.	As I solve questions, the question patterns that form in my head actually turn into tactics at a certain point, and when I see the question pattern, I know what to do.
When you solve a lot of questions, you get a good grasp of the question types, so as soon as I see a question, I have an idea of where it's going, and that's why I don't struggle.	When solving new-generation mathematics questions, I tend to solve them in quiet environments to focus more. Once I create this environment, solving the questions is generally straightforward.
I read the first question stem and look at the general question in broad strokes, then I read the question.	Although it may not be unique to me, I try to use the method of deriving the answer from a sense of numbers rather than guessing it.

In general, the findings show that pre-service teachers typically perceive new generation mathematics questions as complex and challenging before training; after training, however, they understand solution methods more clearly and begin to develop their own strategies. The training process is seen to develop skills such as “understanding the question, identifying key information, and translating problem statements into mathematical language.”

DISCUSSION AND CONCLUSION

1. Opinions on Educational Needs

The vast majority of pre-service teachers indicated that they needed special training to solve skill-based mathematics questions. After the training, this view became even stronger, with pre-service teachers emphasizing that familiarity with such questions was a critical requirement in the teaching process. This finding is consistent with studies in the literature. Korkmaz et al. (2020) revealed that skill-based questions create a new learning area not only for students but also for teachers. Therefore, the fact that pre-service teachers express their need for training indicates that teacher training programs should systematically include this content.

2. Support Needed in the Solution Process

Participants expressed expectations for support in learning solution methods, seeing examples, and gaining speed prior to the training. After the training, pre-service teachers focused on pedagogical dimensions such as “explaining questions step by step” and “transferring knowledge to students.” This finding shows that the training program shifted the perspective of pre-service teachers from merely “their own problem-solving skills” to “teaching skills.” Similarly, Uzun and Ağa  (2023) stated that structured training programs increase pre-service teachers’ professional skills by raising their pedagogical awareness.

3. Challenges Encountered in the Solution

Before the training, pre-service teachers frequently mentioned problems such as the length of the questions, difficulty in understanding them, and insufficient time. After the training, it was stated that these problems had largely decreased, with difficulties only experienced at certain points. This finding reveals that the training improved the pre-service teachers' skills in "understanding the question" and "translating it into mathematical language." Erden (2020) also showed that new generation questions appear complex to students, but this perception can be reduced with strategic teaching approaches. Therefore, it can be said that teacher candidates find such questions more manageable as they gain experience.

4. Opinions on Points to Consider

Before the training, participants focused more on "reading the question carefully." After the training, more advanced skills such as "developing strategies, identifying key information, and simplifying the question" came to the fore. This result parallels Polya's (1945) problem-solving steps. The fact that pre-service teachers did not just read the question but moved on to the stages of strategy development and planning shows that the training deepened cognitive processes.

5. Solution Steps Taken

Participants mostly adopted the "read the question and do the calculation" approach before the training. After the training, they developed planned steps such as "identifying important information, taking notes, and simplifying the question." This finding shows that pre-service teachers adopted a more systematic approach in their problem-solving processes. Evaluations conducted by Mullis et al. (2020) on TIMSS data reveal that it is critical for teachers to model systematic strategies in order for students to acquire higher-level skills.

6. Strategies Used

Before the training, most of the pre-service teachers stated that they did not use any strategies. After the training, methods such as "concretizing the question, simplifying it, and distinguishing question types" came to the fore. This result shows that pre-service teachers developed their own repertoire of solutions during the training process and created personal strategies by gaining experience. Atasoy (2019) emphasizes that success in new generation questions depends not only on procedural skills but also on original solution strategies. In this context, the strategies acquired by pre-service teachers will strengthen their capacity to guide students in their professional lives.

LIMITATIONS

This study has certain limitations. First, the research was conducted exclusively with 73 pre-service teachers enrolled in the Mathematics Education program at Biruni University. Therefore, the findings obtained cannot be generalized to pre-service teachers at other universities or to larger samples. Furthermore, the study only collected the subjective views of pre-service teachers and did not measure their performance in actual practice. This means that the findings are limited to the perceptions expressed by the pre-service teachers.

Another limitation is that the training program was conducted online. Due to post-earthquake conditions, the remote process lacked the interaction and observation that would have been possible in face-to-face training. Therefore, the nature of the training environment may have affected the quality of the results. Finally, the data collection tool used in the study is limited to an interview form consisting of open-ended questions; the fact that different data collection tools (observation, video analysis, performance tasks) were not used narrows the scope of the research.

RECOMMENDATIONS FOR FUTURE RESEARCH

Similar studies can be conducted with pre-service teachers at different universities and in different regions to increase the generalizability of the findings.

Studies can be conducted that measure pre-service teachers' practical performance, not just subjective opinions. For example, they can be observed in real classroom settings to see how they convey new generation questions to students.

Comparing online and face-to-face applications can reveal how different learning environments affect pre-service teachers' strategy development.

In addition to qualitative findings, mixed-method research can be conducted using quantitative methods (e.g., scale development, achievement tests). This allows for the simultaneous evaluation of pre-service teachers' perceptions of competency-based questions and their performance.

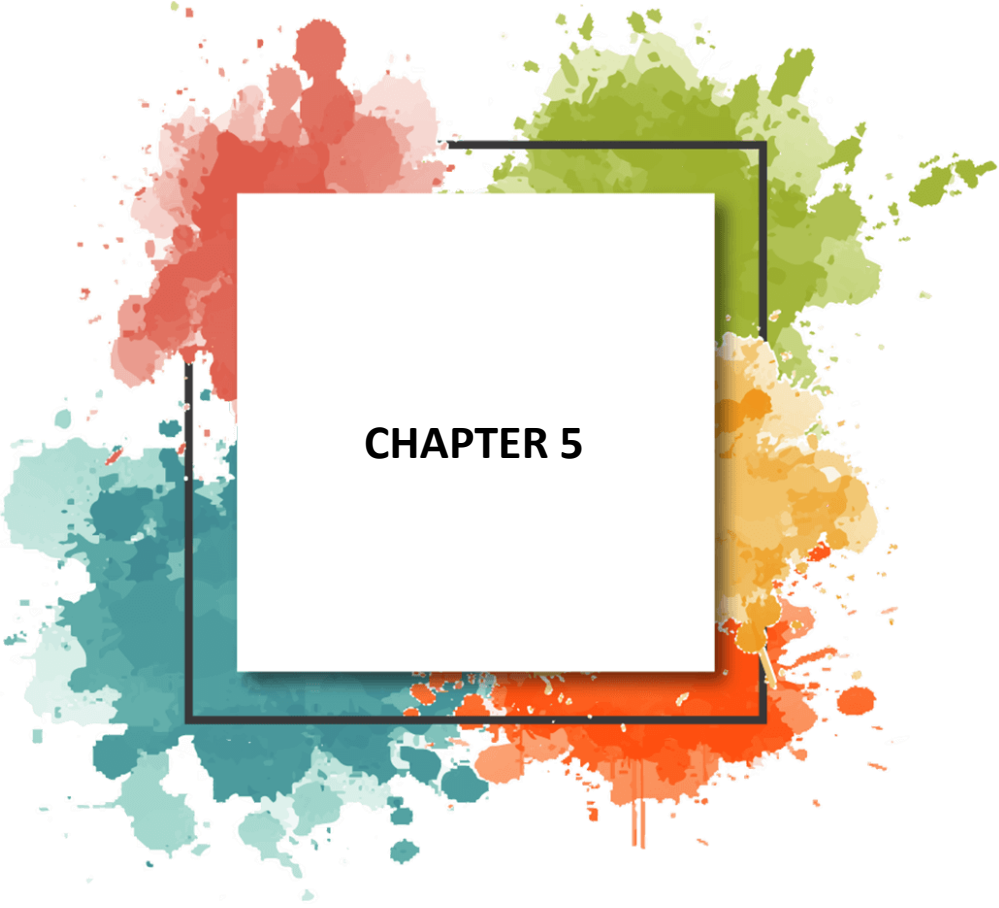
Work with pre-service teachers, in-service teachers, and middle school students can offer a multidimensional perspective on solving new-generation questions.

Finally, future research could examine the integration of the pre-service teachers' developed strategies into the teaching process and, accordingly, develop concrete recommendations for teacher education programs.

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CHAPTER 5

The Impact of Fear Culture on Teacher Silence: The Role of Psychological Safety

Huseyin Akar¹

Educational institutions are among the fundamental structures that preserve and develop the cultural identity of a society, promote social cohesion, and support economic development (Basaran, 2008). The effectiveness of these institutions in achieving their goals largely depends on the quality of teachers and their ability to fulfill their roles within institutional processes (Sisman, 2016). In this context, teachers represent the cornerstone of educational organizations, playing a critical role both in achieving institutional objectives and maintaining organizational functioning. Their active engagement is essential for fostering effective communication, sharing innovative ideas, and sustaining institutional development within educational organizations (Demirtas, 2010). However, factors such as managerial pressures, negative organizational climates, or lack of trust can hinder teachers from openly expressing their opinions and suggestions, leading to organizational silence (Morrison & Milliken, 2000). Organizational silence is defined as employees' deliberate avoidance of expressing work-related ideas, suggestions, knowledge, or concerns for various reasons (Ahmadvand & Taghvaei, 2017; Van Dyne, Ang, & Botero, 2003). This behavior is influenced by individual, managerial, organizational, and cultural factors. At the individual level, low self-efficacy, negative experiences, personality traits, and fear can trigger silent behavior among employees (Lam & Xu, 2019; Brinsfield, 2013; Tangirala & Ramanujam, 2008). Managerial factors such as abusive or authoritarian leadership, low leader-member interaction, and lack of trust increase organizational silence, whereas transformational, empowering, and ethical leadership reduce it (Xu, Loi, & Lam, 2015; Hassan, DeHart-Davis & Jiang, 2019; Li, 2018). At the organizational level, injustice, a culture of fear, psychological contract breaches, and workplace exclusion can inhibit employees from voicing their ideas (Colquitt, Conlon, Wesson, Porter & Ng, 2001; Coyle-Shapiro, Pereira Costa, Doden & Chang, 2019; Ferris, Brown, Berry & Lian, 2008). Culturally, high power distance and reluctance to challenge authority further reinforce silence (Vakola & Bouradas, 2005). Conversely, when psychological safety and job autonomy are high, employees feel more comfortable speaking up while considering potential consequences (Ju, Ma, Ren, & Zhang, 2019). Organizational silence negatively affects job satisfaction,

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motivation, and commitment, while increasing burnout, stress, absenteeism, and turnover intentions (Nikolaou, Vakola & Bourantas, 2011; Knoll, Hall & Weigelt, 2019; Dong & Chung, 2021). Additionally, it undermines task performance, organizational citizenship behavior, and innovative behaviors, thereby reducing organizational effectiveness and fostering counterproductive work behaviors (Mao, Chang, Johnson & Sun, 2019; Fatima, Salah-Ud-Din, Khan, Hassan & Hoti, 2015). Therefore, organizational silence is a critical phenomenon with negative implications at both individual and organizational levels (Morrison & Milliken, 2000). The literature indicates that understanding the causes, manifestations, and consequences of organizational silence is essential for ensuring the healthy functioning of organizations, preventing suppression of innovative ideas, and maintaining employee motivation. In this context, investigating the effects of fear culture and psychological safety on organizational silence is crucial to comprehend employees' tendencies to remain silent and to promote open communication in organizations.

Fear culture refers to a social and organizational climate in which individuals conceal their thoughts due to fear of punishment, exclusion, or mistakes, and unconditional obedience to authority prevails (Cuceloglu, 2008; Eren, 2005). Fundamentally, it involves those in power exerting control through fear to maintain a culture of compliance (Cakır, 2007; Cetin, 2012). Within organizations, fear culture manifests through authoritarian and punitive management approaches, low tolerance for mistakes, and lack of trust among employees; consequently, employees avoid criticism, refrain from expressing innovative ideas, and prefer silence (Kish-Gephart, Detert, Treviño & Edmondson, 2009; Morrison & Milliken, 2000). The roots of fear culture emerge at both individual and organizational levels. Individual factors include personality traits, past experiences, and fear of making mistakes (Oestreich, 1995; Oran & Akan, 2017), while organizational factors include autocratic and indifferent leadership styles, punitive practices, uncertainty, mobbing, and fear of injustice (Kahraman, 2019; Thongsukmag, 2003; Novicevic, Harvey, Ronald & Brown-Radford, 2006; Delibas & Gorkey, 2009; Hillcroft House, 2012). Economic and environmental changes can also exacerbate fear (Appelbaum, Bregman & Moroz, 1998). In educational settings, such dynamics are reflected in authoritarian managerial attitudes toward teachers, which may be mirrored in teachers' interactions with students (Kahraman, 2019). The consequences of fear culture are negative for employees, reducing their motivation, commitment, and creativity while increasing stress, burnout, and turnover intentions (Ersu & Akar, 2023; Sincer, 2016; Kanten, Kanten, Durmaz & Arda, 2019). Furthermore, fear culture undermines organizational trust, job satisfaction, and perceptions of justice, promoting performative behaviors and negatively impacting value systems (Erdem, 2007; Cakiroglu, 2013). Accordingly, fear culture is a

phenomenon that reinforces organizational silence and diminishes trust, openness, and creativity at both individual and organizational levels.

Psychological safety is another concept closely related to organizational silence. It is defined as a shared belief that individuals in a work environment can express their ideas, ask questions, or admit mistakes without fear of negative consequences (Edmondson, 1999; Kahn, 1990). Psychological safety generally develops through supportive leadership, trust among colleagues, autonomy in task planning, and an inclusive, collaborative work environment. A fair organizational climate, transparent communication, and leaders' trust-promoting behaviors are also critical for fostering psychological safety (Nembhard & Edmondson, 2011; Seibert, Wang & Courtright, 2011; Dirks & Ferrin, 2002; Appelbaum et al., 2022). Factors that negatively affect psychological safety include authoritarian management, injustice, mobbing, uncertainty, and fear of punishment for mistakes (Richard, Boussif & Paglia, 2021; O'Donovan, De Brún & McAuliffe, 2021). In such environments, employees may refrain from sharing ideas, hesitate to engage in innovative behaviors, and prefer silence. Conversely, psychological safety encourages employees to express themselves, share knowledge, collaborate, and develop creative solutions (Edmondson, 1999; Amabile, 1998; Edmondson & Lei, 2014). When employees are not afraid of making mistakes, they invest emotionally, cognitively, and physically in their roles, which enhances job commitment and satisfaction (Meyer & Allen, 1991; Detert & Burris, 2007). Psychological safety also strengthens learning behaviors and collective problem-solving processes. As knowledge sharing and collaboration increase, task performance improves, facilitating the attainment of organizational goals (Baer & Frese, 2003; Frazier, Fainshmidt, Klinger, Pezeshkan & Vacheva, 2017). Employees who feel safe are more likely to engage in organizational citizenship behaviors and propose innovative ideas (Van Dyne & LePine, 1998; Madjar & Ortiz-Walters, 2009). Overall, psychological safety functions as a key mechanism that enhances individual well-being, organizational effectiveness, learning, innovation, and sustainable performance (Frazier et al., 2017; Edmondson & Lei, 2014).

The ability of educational institutions to provide quality education, implement innovative practices, develop effective solutions, and meet students' needs relies on an environment where teachers can freely express their opinions. Teachers' contributions are critical for improving educational quality and for fostering innovative and effective solutions in school operations. However, in environments dominated by a culture of fear, teachers may refrain from sharing their thoughts, resulting in organizational silence. This can negatively affect both individual motivation and organizational performance, reducing information sharing and limiting innovative behaviors. Therefore, the study titled "The Impact

of Fear Culture on Teacher Silence: The Role of Psychological Safety” aims to explore how psychological safety can prevent organizational silence among teachers and foster an open, trust-based communication climate by mitigating fear culture. The findings can guide educational institutions in developing strategies that promote teacher voice and participative, supportive management. Such strategies can enhance teachers’ motivation, job satisfaction, and creative contributions, positively impacting both individual development and overall school performance.

Research Hypotheses

- H1: Fear culture has a positive and significant effect on organizational silence.
- H2: Fear culture has a negative and significant effect on psychological safety.
- H3: Psychological safety has a negative and significant effect on organizational silence.
- H4: Psychological safety mediates the effect of fear culture on organizational silence.

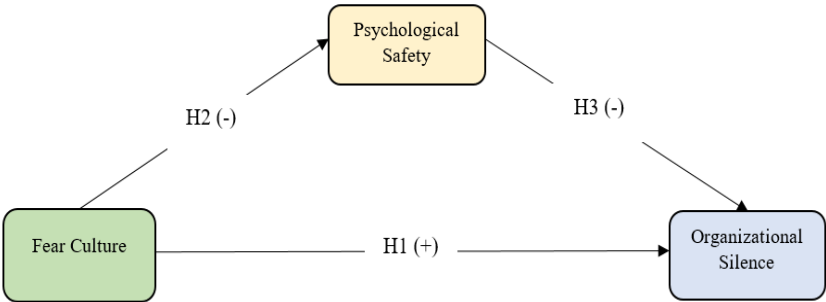


Figure 1. Research Model

Method

This study employed a correlational research design to examine the mediating role of psychological safety in the effect of fear culture on teachers’ organizational silence in schools. Correlational research is a quantitative method used to determine the existence, direction, and strength of relationships between two or more variables (Karasar, 2020). In this study, fear culture was considered the independent variable, organizational silence the dependent variable, and psychological safety the mediating variable. A research model was developed to reveal the relationships among these variables, and this model was subsequently tested.

Population and Sample

The population of the study consisted of teachers working in preschool, primary, secondary, and high schools affiliated with the Kilis Provincial Directorate of National Education. The sample comprised 352 teachers who agreed to participate in the study. The demographic characteristics of the participating teachers are presented in Table 1.

Table 1. Demographic Characteristics

Demographic Variable	Category	Frequency	Percent (%)
Gender	Male	164	46.6
	Female	188	53.4
Age	21-30 years	101	28.7
	31-40 years	114	32.4
	41-50 years	102	29.0
	51 years and above	35	9.9
School Level	Preschool	29	8.2
	Primary School	167	47.4
	Middle School	99	28.1
	High School	57	16.2

According to Table 1, 53.4% of the teachers participating in the study are female, while 46.6% are male. Regarding age distribution, 28.7% of participants are between 21–30 years, 32.4% are 31–40 years, 29% are 41–50 years, and 9.9% are 51 years and older. Additionally, 8.2% of the teachers work at the preschool level, 47.4% at primary schools, 28.1% at secondary schools, and 16.2% at high schools.

Data Collection Instruments

The data were collected using the Fear Culture Scale, Organizational Silence Scale, Psychological Safety Scale, and Personal Information Form.

Fear Culture Scale: Developed by Celik and Kahraman (2019), this scale consists of 18 items and 3 sub-dimensions. It uses a 5-point Likert-type rating

scale. The Cronbach's Alpha for the overall scale was reported as 0.92, while in the present study, it was calculated as 0.88.

Psychological Safety Scale: Developed by Edmondson (1999), this scale includes 7 items and a single dimension. The Turkish adaptation was carried out by Bulbul, İsiacık, and Aytac (2022). The validity and reliability analyses conducted by Bulbul et al. (2022) confirmed the unidimensional structure of the scale. It employs a 5-point Likert-type rating, with a reported Cronbach's Alpha of 0.87, and a Cronbach's Alpha of 0.85 in the present study.

Organizational Silence Scale: Developed by Kahveci and Demirtas (2013) to measure teachers' perceptions of organizational silence, the scale comprises 18 items across 5 dimensions and uses a 5-point Likert-type rating. The overall Cronbach's Alpha of the scale was reported as 0.89, and 0.83 in this study.

Data Collection and Analysis

The data collection instruments were uploaded to Google Drive, and the link was sent to teachers via e-mail, requesting responses within two weeks. After two weeks, the responses were analyzed using SPSS 25. Before analysis, skewness and kurtosis values were checked to examine the normality of each variable, and all values were found to be within the range of -2 to +2, indicating univariate normality (George & Mallery, 2010). Multivariate normality was assessed using Mardia's multivariate kurtosis coefficient and its critical ratio, which was found to be below 5, suggesting that the multivariate normality assumption was met (Bentler, 2006). After examining univariate and multivariate normality assumptions, descriptive statistics were first calculated to determine teachers' perceptions of the study variables. Subsequently, correlation analyses were conducted to examine the relationships among the variables. Finally, the mediating role of psychological safety in the effect of fear culture on organizational silence was tested using the Process Macro developed by Andrew Hayes and integrated into SPSS. Model 4 of the Process Macro, suitable for testing the relational structure defined in this study, was used. To determine the significance of the indirect effect, 5,000 bootstrap samples were generated, and a 95% confidence interval was applied.

Results

Descriptive statistics and correlation values regarding teachers' perceptions of fear culture, organizational silence, and psychological safety are presented in Table 2.

Table 2. Descriptive Statistics and Correlation Values of Study Variables

Variable	M	SD	1	2	3
1. Fear Culture	3.20	0.72	1	—	—
2. Psychological Safety	2.91	0.66	-0.54**	1	—
3. Organizational Silence	3.07	0.51	0.68**	-0.57**	1

** $p < 0.01$

According to Table 2, teachers' perceptions of fear culture ($M = 3.20$), psychological safety ($M = 2.91$), and organizational silence ($M = 3.07$) were at a moderate level based on the 5-point Likert scale. This finding indicates that teachers neither perceive high nor low levels of fear, psychological safety, and silence in their institutions, but rather a moderate level. The correlation analysis revealed a significant, moderate, negative relationship between teachers' perceptions of fear culture and psychological safety ($r = -0.54$; $p < 0.01$). Furthermore, a significant, moderate, positive relationship was observed between fear culture and organizational silence ($r = 0.68$; $p < 0.01$). In addition, teachers' perceptions of psychological safety were found to have a significant, moderate, negative relationship with organizational silence ($r = -0.57$; $p < 0.01$). These findings suggest that as teachers' perception of fear culture increases, psychological safety tends to decrease and organizational silence tends to increase, whereas higher levels of psychological safety are associated with lower levels of perceived organizational silence.

The model and analysis results examining the mediating role of psychological safety in the effect of fear culture on organizational silence are presented in Figure 2.

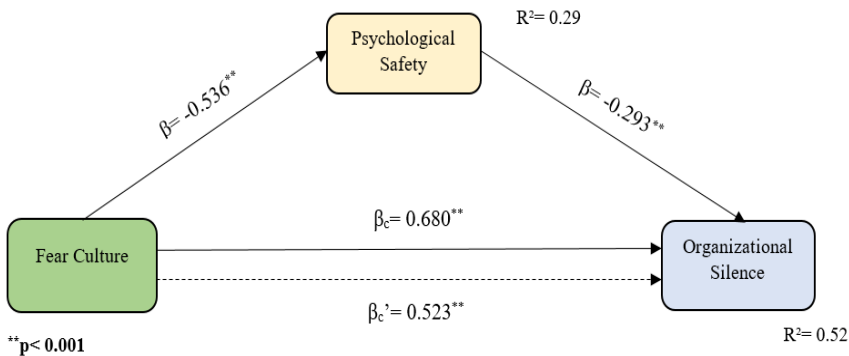


Figure 2. Model Illustrating the Mediating Role of Psychological Safety in the Effect of Fear Culture on Organizational Silence and Standardized β Values

As shown in Figure 2, the total effect of fear culture on organizational silence is significant ($\beta_c = 0.680$; $p < .001$). Similarly, the effect of fear culture on the mediating variable, psychological safety, is also significant ($\beta = -0.536$; $p < .001$). Additionally, the effect of psychological safety on organizational silence is significant ($\beta = -0.293$; $p < .001$). When the mediating variable is included in the model, the direct effect of fear culture on organizational silence decreases but remains significant ($\beta_c = 0.523$; $p < .001$). These findings indicate that psychological safety partially mediates the relationship between fear culture and organizational silence. In other words, fear culture influences organizational silence both directly and indirectly through psychological safety. Furthermore, fear culture explains 29% of the variance in psychological safety, while fear culture and psychological safety together account for 52% of the variance in organizational silence.

The total, direct, and indirect effects of fear culture on organizational silence are presented in Table 3.

Table 3. Total, Direct, and Indirect Effects of Fear Culture on Organizational Silence

Effects / Paths	β	t	p	95% CI (LLCI – ULCI)	R ²
Total Effect					
FC → OS	0.680	17.348	< 0.001	(0.593, 0.745)	0.46
Direct Effects					
FC → PS	-0.536	-11.877	< 0.001	(-0.570, -0.408)	0.29
FC → OS	0.523	11.951	< 0.001	(0.430, 0.599)	
PS → OS	-0.293	-6.683	< 0.001	(-0.408, -0.223)	
Indirect Effects					
FC → PS → OS	0.157	—	—	(0.105, 0.211)	

Note: FC = Fear Culture, PS = Psychological Safety, OS = Organizational Silence; 95% CI (LLCI–ULCI) = 95% Confidence Interval (Lower Limit Confidence Interval – Upper Limit Confidence Interval).

Table 3 summarizes the total, direct, and indirect effects of fear culture on organizational silence. The findings indicate that the direct effect of fear culture on organizational silence is significant (Direct effect = 0.523; 95% CI [0.430, 0.599]), and its indirect effect via psychological safety is also significant (Indirect effect = 0.157; 95% CI [0.108, 0.211]). Although the indirect effect is smaller than the direct effect, it remains significant, supporting the mediating role of psychological safety. Accordingly, all research hypotheses (H1, H2, H3, and H4) can be considered confirmed.

Conclusion and Discussion

The primary aim of this study was to examine the effect of teachers’ perceptions of fear culture on organizational silence and the mediating role of psychological safety in this relationship.

According to the results, teachers' perceptions of fear culture, psychological safety, and organizational silence were at moderate levels. This finding suggests that while teachers occasionally share their opinions and suggestions openly, they may experience some hesitation and do not always feel completely safe. The moderate perception of fear culture indicates that managerial pressures, negative organizational climate, or lack of trust may influence teacher behaviors. Similarly, the moderate level of psychological safety suggests that teachers have limited confidence in taking risks, sharing innovative ideas, and exchanging knowledge. When comparing the results with the existing literature, it is observed that the findings regarding fear culture do not fully align with some previous studies. For example, Kahraman (2019) and Ersu & Akar (2023) reported low levels of fear culture perception among teachers. Likewise, Sincer (2016) found that academics perceived fear culture at a low level. This variation suggests that perceptions of fear culture may differ depending on the context, participant group (teachers vs. academics), or measurement methods. Regarding psychological safety, previous studies indicate varied perceptions among teachers. Bas & Tabancali (2020), Kurt & Duyar (2023), and Sagnak (2017) reported high levels of psychological safety, whereas Cemaloglu & Yasar (2018) and Yildirim & Yenipinar (2017) emphasized moderate levels. This variation highlights that teachers' psychological safety perceptions may be influenced by multiple factors, including school environment, leadership style, organizational culture, and individual characteristics. Similarly, the literature on organizational silence shows diversity in findings. Sezgin Nartgun & Kartal (2013), Gungor & Gunduz (2021), and Kiranli Gungor & Potuk (2018) found moderate levels of organizational silence perception among teachers, whereas Alemdar & Cemaloglu (2024) reported low levels. This indicates that organizational silence perceptions may vary based on environmental, cultural, or institutional factors.

Correlation analyses revealed a negative relationship between fear culture and psychological safety, a positive relationship between fear culture and organizational silence, and a negative relationship between psychological safety and organizational silence. These results suggest that higher levels of fear culture are associated with lower psychological safety and increased organizational silence. In environments dominated by fear, teachers may be more reluctant to share ideas, which reduces trust and increases silence. Findings related to psychological safety and organizational silence are consistent with previous studies. For instance, Derin & Dogan (2022), Ucock & Torun (2016), Kassandrinou, Lainidi, Mouratidis & Montgomery (2023), and Khalijian, Shams, Pardakhtchi & Mirkamali (2023) found a significant negative relationship between employees' psychological safety perceptions and organizational silence. Conversely, studies by Tunc & Yilmaz (2024), Bas (2019), Cetin Kilic (2021), Kurt (2025), and Sagnak (2017) reported a positive and significant relationship

between psychological safety and voice behavior, highlighting its potential to influence silence and promote participation. Studies examining the relationship between fear culture and organizational silence also support the current findings. Rashid & Rizvi (2020) and Liang, Zhang, Feng, Huang & Zhang (2024) identified positive and significant relationships between fear culture and employee silence. Similarly, Guo et al. (2018) reported positive and significant correlations between fear and defensive silence. These findings indicate that fear culture can influence employees' tendency to remain silent, as individuals in fearful environments may refrain from sharing ideas or providing feedback due to concerns about negative consequences. Although few studies have directly addressed the relationship between fear culture and psychological safety, the literature frequently emphasizes their interaction. Specifically, fear culture tends to reduce employees' psychological safety perceptions. For example, Remtulla et al. (2021) showed that authoritarian leadership and hierarchical structures negatively affect psychological safety. These findings suggest that environments dominated by fear may diminish employees' sense of psychological safety.

Model results indicate that fear culture has a significant impact on organizational silence. Furthermore, it is observed that fear culture negatively affects employees' psychological safety, which in turn has a negative impact on organizational silence. These findings align closely with results from other studies in the existing literature (Bas, 2019; Cetin Kilic, 2021; Dogan & Derin, 2022; Guo, Decoster, Babalola, De Schutter, Garba, & Riisla, 2018; Khalijian, Shams, Pardakhtchi, & Mirkamali, 2023; Liang, Zhang, Feng, Huang, & Zhang, 2024; Rashid & Rizvi, 2020; Remtulla, Hagana, Houbby, Ruparell, Aojula, Menon, Thavarajasingam, & Meyer, 2021; Tunc & Yilmaz, 2024; Ucock & Torun, 2016; Kassandrinou, Lainidi, Mouratidis, & Montgomery, 2023). When psychological safety was included as a mediating variable in the model, the direct effect of fear culture on organizational silence decreased but remained statistically significant. These results suggest that psychological safety plays a partial mediating role in the effect of fear culture on organizational silence. This implies that psychological safety is a key mechanism in the relationship between fear culture and organizational silence. In other words, the impact of fear culture on employees' tendency to remain silent is partly mediated through psychological safety. In environments characterized by a strong fear culture, when employees' perception of psychological safety decreases, organizational silence increases; however, the direct effect of fear culture still persists. Additionally, fear culture accounts for 29% of the variance in psychological safety, while fear culture and psychological safety together explain 52% of the variance in organizational silence. These findings are consistent with the theoretical frameworks presented in the literature. For instance, Edmondson (1999) suggests that environments with high psychological safety foster open sharing of ideas, reduce the fear of making

mistakes, and promote collaborative communication. In this context, the reduction in psychological safety in organizations dominated by a fear culture may increase employees' tendency to remain silent. Similarly, Van Dyne, Ang, and Botero (2003) emphasize that defensive silence is often triggered by the perception of fear and threat, and that employees may remain silent as a means of self-protection. Furthermore, the psycho-social safety climate framework proposed by Dollard and Bakker (2010) suggests that organizational support and a safe environment can enhance employees' psychological safety perception, thereby reducing silence.

Based on these findings, the following recommendations can be made:

- ✓ Since fear culture affects teachers' psychological safety and organizational silence, school administrators are encouraged to adopt supportive and participatory leadership styles instead of authoritarian approaches.
- ✓ To increase teachers' voice, safe communication channels such as instant feedback systems, suggestion boxes, or digital platforms can be established.
- ✓ Given the significant effect of psychological safety on organizational silence, improvements in leadership style and school culture should be implemented to create an environment where teachers feel secure.

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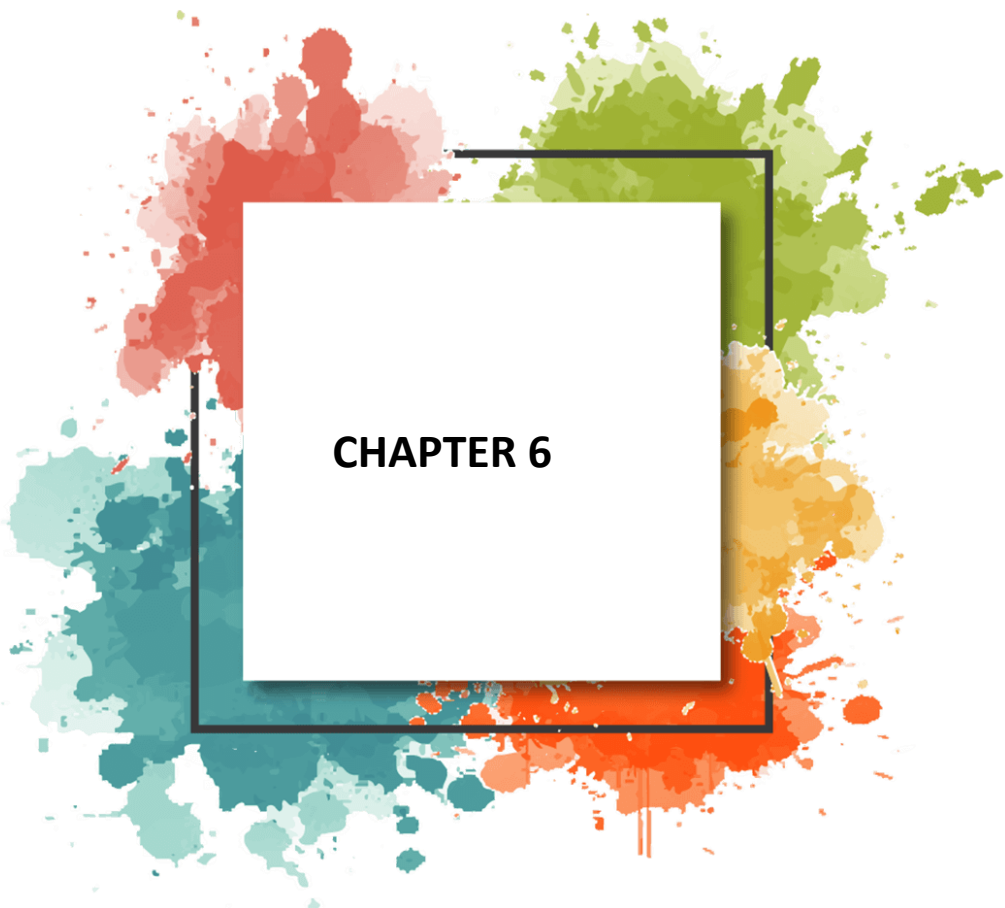
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CHAPTER 6

An Investigation into the Relationship Between Reading Strategies, Cognitive Awareness Levels, Reading Motivation, And Self-Efficacy*

Emel Erol¹ & Hasan Hüseyin Şahan²

Introduction

Reading has long been the most basic and easiest way to access information in human life. In a world where technology and information are considered primary sources of power (İşeri, 2016), reading continues to serve as a central tool for learning and contributes significantly to individual development. Reading is outlined as the process of understanding the meaning of a text either through silent analysis or by translating it into sounds simultaneously (TDK, 2005). Demirel (1999) described reading as the activity of interpreting written symbols through the integration of mental processes and motor skills, while Sever (2004) emphasized that reading involves intellectual effort beyond merely vocalizing words, sentences, and paragraphs. Building on these definitions, reading can be understood as a multidimensional process of comprehension and interpretation, which entails quickly and fluently grasping the grammatical, semantic, and visual features of written texts to achieve specific purposes (Epçaçan, 2012).

To comprehend a text, readers engage in various mental processes, utilizing the language system and cognitive strategies in a simultaneous and integrated manner (Singhal, 1999). The reading strategies employed in these mental processes can be defined as deliberate, systematic plans that individuals consciously adopt and apply (Duffy, 1993; Harris & Hodges, 1995;). One of these strategies, metacognitive strategies, is a combination of students' skills in planning, implementing, organizing and evaluating their own learning process (Oxford, 1990).

Some studies suggest that motivation to read is also important to get the necessary efficiency from reading (Wigfield & Guthrie, 1997; Guthrie & Wigfield, 2000). Reading motivation is the willingness to start and continue reading (Guthrie, 1997). It serves as a fundamental component in achieving the

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goal of independent information access (Bozgün, 2021) and is essential for making meaningful interpretations of the text.

The self-efficacy level of a reader is a key factor in increasing reading motivation. That is, one of the ways to promote motivation to read is by perceiving oneself as capable. In this context, people with high self-efficacy perception have higher motivation and effort levels than those with low self-efficacy perception (Saracoğlu, Yenice, Karasakaloğlu, & Gencel, 2008; Senemoğlu, 2011).

It can be argued that one of the best educational levels at which to acquire the reading habit is developed at middle school and continued throughout life regarding the importance of family at an early age (Dilidüzgün & Genç, 2019) and one of the most appropriate courses through which to do this is Turkish, that is to say child's native/first language (Gökdoğan, 2019). Arslan (2023) revealed in her research that motivation towards Turkish language lessons is a significant determinant in shaping students' cognitive awareness of reading strategies. It has been determined that the studies on this theme in the relevant literature mostly focus on metacognitive reading strategies and reading and reading comprehension strategies (Dinçel and Sanlav, 2023). The existing literature highlights studies on metacognitive strategies (Karasakaloğlu, Karacaoğlu, & Özelçi, 2012; Bozkurt & Memiş, 2013; Akın & Çeçen, 2014; Kana, 2014; Karabay, 2015; Yalız Solmaz, 2015; Azizoglu & Okur, 2020; Bayram & Kanmaz, 2022), reading motivation (Gottfried, 1990; Akyol & Yıldız, 2010; Yıldız, 2010; Guthrie & Wigfield, 2000; Kızgım & Baştuğ, 2020), and self-efficacy perceptions (Özonat, 2015; Manay, Türkel, & Savaş, 2017; Bulut, 2017; Aytunga, 2018) in relation to assorted variables. In addition, the relationships between reading motivation and metacognitive reading strategies (Akbaboğlu & Duban, 2020), and between reading strategies and self-efficacy (Shang, 2010; Zare & Mobarakeh, 2011; Tobing, 2013; Mohammed, 2022) are discussed in the literature. It is expected that this research will contribute to the evaluation and reorganization of teaching processes in terms of reading habits.

In this context, this study examined whether the levels of cognitive awareness of reading strategies, reading motivation and self-efficacy of 5th grade secondary school students differ significantly in terms of some variables and the relationships between these characteristics. The following questions were tried to be answered in the research below:

1. What is the level of students' cognitive awareness regarding reading strategies?
2. Students' cognitive awareness levels regarding reading strategies:

- a) Status of income
 - b) Daily reading time,
 - c) Difficulty in reading comprehension?
3. What are the reading motivation levels of your students?
 4. Students' reading motivation levels:
 - a) Status of income
 - b) Daily reading time,
 - c) Difficulty in reading comprehension?
 5. What are the self-efficacy levels of your students?
 6. Self-efficacy levels of students:
 - a) Status of income
 - b) Daily reading time,
 - c) Difficulty in reading comprehension?
 7. Is there a relationship between students' reading strategies, cognitive awareness levels, reading motivation, and self-efficacy perceptions?

Method

Research Design

In this study, the general screening model was used to determine the levels of students for the mentioned characteristics; the causal-comparative model was used to compare these levels in terms of the determined independent variables; and the relational screening model was used to examine whether the characteristics were related to each other.

Population and Sample

The universe of this study consists of 5219 students studying in the 5th grade. Data collection tools were applied to 813 students selected from this universe by simple random sampling method. 139 of the 813 data records were not evaluated because they were not filled in properly and the data obtained from a total of 674 students were analyzed. According to the sampling table, when the p-value was determined as .05 and the t-value as 1.96 (Bartlett, Kotrlik, & Higgins, 2001), it was seen that the sample size was sufficient for this study. Demographic information about the students in the sample is presented in Table 1.

Table 1. Personal information of the sample

Variables	Groups	n	%
Status of Income	Low	5	.7
	Middle	514	76.3
	High	155	23.0
Daily Reading Time	1 hour or less	224	33.2
	2-3 hours	402	59.6
	4-5 hours	36	5.3
	6 hours or more	12	1.8
Difficulty in Reading Comprehension	Yes	61	9.1
	No	613	90.9
Total		674	100

Measures

The data for this study were collected using four data collection instruments: the Personal Information Form, the Reading Strategies Cognitive Awareness Scale, the Motivation for Reading Questionnaire, and the Children's Self-Efficacy Scale.

In the first part, the Personal Information Form was used to determine the demographic characteristics of the students regarding the independent variables of the research.

In the second part, the Reading Strategies Cognitive Awareness Scale was used to determine the students' cognitive awareness regarding reading strategies. This scale, developed by Karatay (2009), consists of three dimensions and 32 items. The fit indices obtained from the original development process were evaluated to be at an acceptable level. The item-total score correlations in the scale ranged from 0.35 to 0.54, and the reliability coefficients for the sub-dimensions were calculated as 0.65 for planning strategies, 0.66 for organizing strategies, 0.78 for evaluation strategies, and 0.88 for the entire scale (Karatay, 2011).

The Reading Motivation Scale was used in the third section of the data collection tool. The scale was originally developed by Wigfield and Guthrie (1997), revised with various analyses (Baker and Wigfield, 1999; Wang and Guthrie, 2004) and adapted by Yıldız (2010). The 21-question scale consisting of

two categories, intrinsic and extrinsic motivation, met acceptable limits in terms of CFA fit indices. In the calculations during the adaptation process, Cronbach's alpha internal consistency coefficients were found to be 0.68 for Intrinsic Motivation, 0.82 for Extrinsic Motivation and 0.86 for the entire scale (Yıldız, 2010).

In the last part of the data collection tool, the Children's Self-Efficacy Scale was used. The scale, developed by Martinelli et al. (2009) and adapted to Turkish by Başol (2010), consists of 2 dimensions and 19 items. In the adaptation study, Cronbach's alpha values of the scale were calculated as .85 for self-solving ability, .80 for self-efficacy in academic performance, and .89 for the entire scale.

Cronbach's alpha values derived from the analysis of the data collected for this study are presented in Table 2.

Table 2. Reliability results of data collection tools

Scales	Factors	n	A	Skewness	Kurtosis
Reading Strategies Cognitive Awareness Scale (RSCAS)	Planning	9	.8	-.761	-.136
	Organizing	1	.8	-.628	-.378
	Evaluation	9	.8	-.712	-.477
Motivation for Reading Questionnaire (MRQ)	Intrinsic Motivation	7	.7	-.484	-.554
	Extrinsic Motivation	1	.7	-.525	-.242
Children's Self-Efficacy	Self-Efficacy for Studying	1	.8	.830	.377

Scale (CSE S)	Self-Efficacy for Acad emic Perfo rman ce				
		9	.7	.684	.059

When the values calculated for the scales used in this study were examined, it was determined that the reliability coefficients were above the acceptable lower limit of .70 (Tavşancıl, 2002) and the scales were reliable.

Data Collection

Data was collected from students who were in the classroom at the time the data collection tools were applied, in accordance with the research permit (13.04.2023-E-99191664-605.01-74379956) and Ethics Committee approval (01.03.2023-E.233665).

Data Analysis

To determine which of the techniques would be more appropriate for the data analysis process, it was determined that the scale scores were normally distributed, and therefore parametric tests were used for subsequent analyses. In interpreting the means calculated for five-point Likert-type scales (Reading Strategies Cognitive Awareness Scale and Self-Efficacy Scale for Children), ranges (1.00-1.80 / 1.80-2.60 / 2.60-3.40 / 3.40-4.20 and 4.20-5.00) were used, and these values were interpreted as very low, low, medium, high and very high, respectively, and the limit values were evaluated in the upper group. Given that the Motivation for Reading Questionnaire is a four-point Likert-type scale, the calculated mean scores were interpreted according to the following score ranges: 1.00–1.75 is *low*, 1.75–2.50 is *moderate*, 2.50–3.25 is *above average*, and 3.25–4.00 is *high*. Scores at borderline values were interpreted in the upper group. For the analysis of significant differences between groups based on independent variables, independent samples t-tests and ANOVA tests were employed. The Tukey test was applied to identify which groups contributed to significant differences in the ANOVA results. The level and direction of the relationship between variables were identified by Pearson Correlation analysis, and statistical significance was determined using the $p<.05$ criterion.

The method section of the research is visualized as follows.

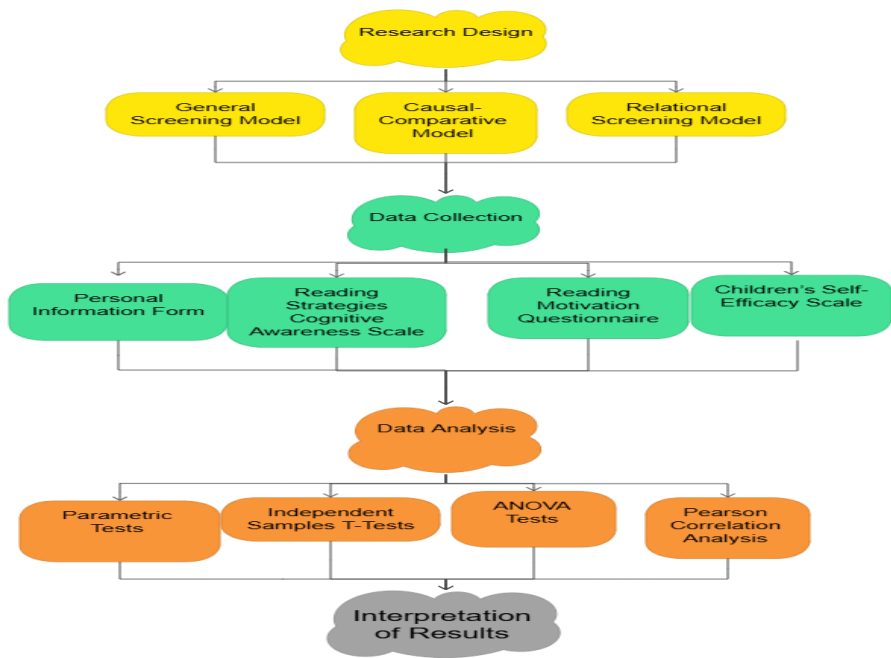


Figure 1. Summary of the method section

Findings

In this section, the findings obtained from the data analysis are presented in tables and interpreted according to the order of the questions sought in the research.

Findings Related to Cognitive Awareness of Reading Strategies

The findings in this section include the results regarding the levels of cognitive awareness regarding reading strategies and whether these levels differ significantly according to different variables.

Descriptive statistical results regarding the students' cognitive awareness levels of reading strategies are visualized in Table 3.

Table 3. Descriptive statistics for cognitive awareness of reading strategies

Scale	Sub-dimensions	Number N	Min.	Max.	$\bar{X}$	SD	Skewness	Kurtosis	
RSCAS	Planning	9	674	1.11	5.00	3.65	.93	-.761	-.136
	Organizing	14	674	1.29	5.00	3.67	.88	-.628	-.378
	Evaluation	9	674	1.22	5.00	3.64	.98	-.712	-.477

RSCAS: Reading Strategies Cognitive Awareness Scale

Examining Table 3, it was seen that the minimum response value in the 9-item planning dimension of the scale with three sub-dimensions was 1.11, while the maximum was 5. The arithmetic mean for this dimension was 3.65, with a standard deviation of 0.93. When reviewing the descriptive results for the 14-item organizing dimension, which represents the second sub-dimension of the reading strategies cognitive awareness scale, it was found that the minimum response value was 1.29 and the maximum was 5. The arithmetic mean for the responses in this dimension was 3.67, with a standard deviation of 0.88. In the 9-item evaluation dimension, another sub-dimension of the reading strategies cognitive awareness scale, the minimum response value was 1.22 and the maximum was 5. The arithmetic mean was 3.64, with a standard deviation of 0.98. Given that the mean scores for the reading strategies cognitive awareness range from 3.64 to 3.67, it can be concluded that the participants' cognitive awareness of reading strategies is relatively high

The results of the analysis comparing reading strategies cognitive awareness levels based on status of income are indicated in Table 4.

Table 4. Comparison of Cognitive Awareness of Reading Strategies According to Status of Income

Scale	Sub-dimensions	Income	N	$\bar{X}$	SD	F	p	Tukey
RSCAS	Planning	1.Low	5	3.00	.00	5.375	.005	3>1
		2.Middle	514	3.60	.94			
		3.High	155	3.84	.88			
	Organizing	1.Low	5	2.14	.00	11.534	.000	3>1
		2.Middle	514	3.63	.87			3>2
		3.High	155	3.84	.83			2>1
	Evaluation	1.Low	5	3.00	.00	5.822	.003	3>1
		2.Middle	514	3.58	.99			3>2
		3.High	155	3.86	.91			2>1

**p<0.05; RSCAS: Reading Strategies Cognitive Awareness Scale*

Upon examining Table 4, when the students' perception of income status is compared, statistically significant differences were found in favor of students with high income perception in all 3 dimensions of cognitive awareness of reading strategies ($p<0.05$).

The analysis results obtained by comparing the reading strategy cognitive awareness levels of the students according to their daily reading hours are given in Table 5.

Table 5. Comparison of reading strategies cognitive awareness according to daily reading hours

Scale	Sub-dimensions	Daily Reading	n	$\bar{X}$	SD	F	p	Tukey
RSCAS	Planning	1 hour and less	224	3.79	1.59	4.994	.002	1>2,4 3>4
		2-3 hours	402	3.59	.85			
		4-5 hours	36	3.72	.94			
		6 hours and more	12	2.92	.93			
	Organizing	1 hour and less	224	3.75	1.16	4.479	.004	1,2,3>4
		2-3 hours	402	3.63	.87			
		4-5 hours	36	3.88	.87			
		6 hours and more	12	2.95	.78			
	Evaluation	1 hour and less	224	3.82	1.52	5.845	.001	1,3>2 1,3>4
		2-3 hours	402	3.53	.89			
		4-5 hours	36	3.88	1.00			
		6 hours and more	12	3.22	.84			

* $p<0,05$; RSCAS: *Reading Strategies Cognitive Awareness Scale*

When Table 5 was examined, significant differences were found in the reading strategies cognitive awareness levels of students based on their daily reading hours ($p<0.05$). When significant differences are examined, it can be interpreted as an indicator that what is important for the level of cognitive awareness is the quality of the reading act rather than the reading time, considering that daily reading time and cognitive awareness level do not follow a parallel course.

The analysis results comparing reading strategies and cognitive awareness levels based on students' difficulty in reading comprehension are exhibited in Table 6.

Table 6. Comparison of Reading Strategies Cognitive Awareness According to Difficulties in Reading Comprehension

Scale	Sub-dimensions	Difficulty	n	$\bar{X}$	SD	t	P
RSCAS	Planning	Yes	61	3.46	1.11	-	.149
		No	613	3.67	.91	1.459	
	Organizing	Yes	61	3.48	.96	-	.072
		No	613	3.69	.86	1.801	
	Evaluation	Yes	61	3.49	1.14	-	.273
		No	613	3.66	.96	1.105	

**p<0.05; RSCAS: Reading Strategies Cognitive Awareness Scale*

When Table 6 is examined, it is seen that there is no statistically significant difference in the cognitive awareness levels of reading strategies according to the difficulties experienced by the students in understanding what they read ($p>0.05$). The findings obtained can be interpreted as an indication that difficulty in understanding what is read is not an important determinant of cognitive awareness of reading strategies.

Findings Related to Reading Motivation

This section presents the descriptive results of reading motivation and the findings on whether motivation levels differ significantly among the specified variables.

Descriptive statistical results on the reading motivation levels of 5th grade middle school students are seen in Table 7.

Table 7. Descriptive Statistics regarding Reading Motivation

Scale	Sub-dimensions	Number n	Min.	Max.	$\bar{X}$	SD	Skewness	Kurtosis	
MRQ	Intrinsic Motivation	7	674	1.57	4.00	3.11	.62	-.484	-.554
	Extrinsic Motivation	14	674	2.07	3.93	3.29	.40	-.525	-.242

MRQ: Motivation for Reading Questionnaire

Examining Table 7, the participants' intrinsic motivation levels were observed to be above average, and their extrinsic motivation levels were high, as indicated by the mean scores for the sub-dimensions of reading motivation.

The analysis results comparing reading motivation levels based on students' perception of income status are presented in Table 8.

Table 8. Results of the comparison of reading motivation according to status of income

Scale	Sub-dimension	Income	N	$\bar{X}$	SD	F	p
MRQ	Intrinsic Motivation	1. Low	5	3.23	.64	.131	.877
		2. Middle	514	3.11	.63		
		3. High	155	3.10	.62		
	Extrinsic Motivation	1. Low	5	3.01	.42	1.613	.200
		2. Middle	514	3.30	.39		
		3. High	155	3.27	.43		

* $p < 0,05$; MRQ: Motivation for Reading Questionnaire

When Table 8 is examined, it is seen that reading motivation does not differ significantly according to income status ($p > 0.05$). This shows that income status is not a significant determinant on reading motivation.

The analysis results comparing reading motivation levels based on students' daily reading hours are demonstrated in Table 9.

Table 9. Results of the comparison of reading motivation according to daily reading hours

Scale	Sub-dimension	Daily Reading	n	$\bar{X}$	SD	F	p
MRQ	Intrinsic Motivation	1 hour or less	224	3.13	.64	.438	.726
		2-3 hours	402	3.10	.61		
		4-5 hours	36	3.14	.61		
		6 hours and more	12	3.95	.74		
	Extrinsic Motivation	1 hour or less	224	3.28	.39	.823	.482
		2-3 hours	402	3.30	.40		
		4-5 hours	36	3.25	.43		
		6 hours or more	12	3.44	.31		

**p<0,05; MRQ: Motivation for Reading Questionnaire*

Upon examining Table 9, it was seen that the reading motivation levels of students based on their daily reading hours did not differ statistically significantly ($p > 0.05$). This suggests that daily reading hours are not a significant determinant of reading motivation.

The results of the analysis comparing reading motivation levels based on students' difficulty in reading are demonstrated in Table 10.

Table 10. Results of the comparison of reading motivation according to difficulty in reading

Scale	Sub-dimension	Difficulty	n	$\bar{X}$	S.S.	t	P
MRQ	Intrinsic Motivation	Yes	61	3.02	.68	-	.255
		No	613	3.12	.62	1.139	
	Extrinsic Motivation	Yes	61	3.24	.40	-	.263
		No	613	3.30	.40	1.121	

**p<0,05; MRQ: Motivation for Reading Questionnaire*

As seen in Table 10, it was discovered that students' reading motivation did not differ statistically significantly based on their difficulty in reading comprehension ($p > 0.05$). This suggests that difficulty in reading comprehension is not a significant determinant of reading motivation.

Findings on Self-Efficacy Levels

Under this heading, descriptive results regarding students' self-efficacy levels and findings regarding whether the differences in self-efficacy levels are significant in terms of various variables are included.

Descriptive statistical results regarding the self-efficacy levels of 5th grade secondary school students are tabulated below.

Table 11. Descriptive Statistics of Self-Efficacy

Scale	Sub-dimensions	Number n	Min.	Max.	$\bar{X}$	SD	Skewness	Kurtosis
CSES	Self-Efficacy for Studying	10	674	1.00	4.20	2.03	.70	.830
	Self-Efficacy for Academic Performance	9	674	1.00	4.78	2.18	.77	.684

CSES: Children's Self-Efficacy Scale

As seen in Table 11, it was observed that the participants' self-efficacy levels were low.

The results of the analysis comparing the self-efficacy levels of the students according to their income perceptions are given in the table below.

Table 12. Results of the Comparison of Self-Efficacy Levels Based on Income Perception

Scale	Sub-dimension	Income	n	$\bar{X}$	SD	F	p	Tukey
CSES	Self-Efficacy for Studying	1.Low	5	3.20	.00	13.013	.000	1>2
		2.Middle	514	1.97	.62			1>3
		3.High	155	2.18	.89			3>2
	Self-Efficacy for Academic Performance	1.Low	5	4.22	.00	44.408	.000	1>2
		2.Middle	514	2.06	.71			1>3
		3.High	155	2.51	.76			3>2

**p<0,05; CSES: Children's Self-Efficacy Scale*

As demonstrated in Table 12, a significant difference was observed in the ability to manage activities independently and in self-efficacy levels for academic performance based on income perception ($p < 0.05$). These findings suggest that income level is a key determinant in both the ability to undertake activities independently and self-efficacy for academic performance.

Table 13 presents the analysis results comparing students' self-efficacy levels according to their daily reading hours.

Table 13. Results of the comparison of self-efficacy levels according to daily reading hours

Scale	Sub-dimension	Daily Reading	n	$\bar{X}$	S.S.	F	P	Tukey
CSES	Self-Efficacy for Studying	1 hour or less	224	2.06	.00	6.894	.000	1,2,3>4
		2-3 hours	402	2.01	.52			
		4-5 hours	36	2.23	.74			
		6 hours or more	12	1.20	1.08			
	Self-Efficacy for Academic Performance	1 hour or less	224	2.47	.97	17.900	.000	1>2,3,4
		2-3 hours	402	2.03	.72			
		4-5 hours	36	2.11	.72			
		6 hours or more	12	1.90	.86			

* $p < 0.05$; CSES: *Children's Self-Efficacy Scale*

When Table 13 was examined, statistically significant differences were observed in students' self-efficacy levels based on their daily reading hours ($p < 0.05$). Specifically, in terms of self-efficacy related to the ability to complete activities independently, reading for less than one hour, 2–3 hours, and 4–5 hours were found to be more effective than reading for six or more hours. In the other sub-dimension, academic performance self-efficacy, it was concluded that reading for less than one hour was more effective than reading for two or more hours ($p < 0.05$). Therefore, keeping daily reading time under one hour may be a key factor in improving self-efficacy for academic performance.

The results of the analysis of self-efficacy levels based on students' difficulties in reading are revealed in Table 14.

Table 14. Results of the Comparison of Self-Efficacy Levels according to Difficulties in Reading Comprehension

Scale	Sub-dimension	Difficulty	N	$\bar{X}$	SD	t	P
CSES	Self-Efficacy for Studying	No	61	2.40	.75	4.379	.000
		Yes	613	1.99	.69		
	Self-Efficacy for Academic Performance	No	61	2.62	.76	4.877	.000
		Yes	613	2.13	.75		

* $p < 0.05$; CSES: Children's Self-Efficacy Scale

As shown in Table 14, students' self-efficacy levels differed significantly based on their difficulty in reading comprehension ($p < 0.05$). Specifically, students who experienced difficulties in reading comprehension exhibited higher self-efficacy levels than those who did not, both in terms of their ability to solve challenges independently and their academic performance. These findings suggest that reading comprehension is a key factor influencing self-efficacy levels.

The Relationship between Reading Strategies Cognitive Awareness Levels, Reading Motivation, and Self-Efficacy Levels

The results of the analysis of the relationship between reading strategies cognitive awareness levels, reading motivation, and self-efficacy levels are visualized in Table 15.

Table 15. The relationship between reading strategies cognitive awareness levels, reading motivation, and self-efficacy levels

Scale	Dimensions	1	2	3	4	5	6	7
RSCAS	1. Planning	1						
	2. Organizing	.874**	1					
	3. Evaluation	.841**	.884**	1				
MRQ	4. Intrinsic Motivation	.032	.010	.014	1			
	5. Extrinsic Motivation	.009	-.020	.000	.726**	1		
	6. Self-Efficacy for Studying	.022	-.021	-.005	-.031	-.041	1	
CSES	7. Self-Efficacy for Academic Performance	-.022	-.028	-.001	-.023	-.045	.580**	1

**. Significant at 0.01 level (2-tailed).

RSCAS: Reading Strategies Cognitive Awareness Scale

MRQ: Motivation for Reading Questionnaire

CSES: Children's Self-Efficacy Scale

Table 15 indicates the Pearson correlation analysis examining the relationships among reading strategies cognitive awareness levels, reading motivation, and self-efficacy levels. The sub-dimensions of the scales were found

to be interrelated. Accordingly, a significant positive correlation was found between planning and organization sub-dimensions, planning and evaluation sub-dimensions, and organization and evaluation sub-dimensions. Similarly, a significant positive relationship was found between the intrinsic and extrinsic motivation sub-dimensions of reading motivation, as well as between the self-efficacy sub-dimensions of the ability to complete activities independently and self-efficacy for academic performance.

However, in this study, dimensions were also identified for which no statistically significant relationship was found. Based on these findings, it can be interpreted as evidence that the characteristics in question do not significantly affect each other or that changes in one characteristic do not have the capacity to significantly increase or decrease the other.

Discussion, Conclusion and Recommendations

The findings of this study, which aims to examine whether the reading strategy cognitive awareness levels, reading motivation and self-efficacy levels of 5th grade secondary school students differ significantly according to various variables and the relationships between these features, are presented below.

The results show that the participants have a high level of cognitive awareness regarding reading strategies. Consistent with these results, studies conducted by Bayram and Kanmaz (2022) and Muhtar (2006) concluded that meta-cognitive reading strategies were used at a moderate level, while Kızılay (2011) and Aghabalazadeh (2014) emphasized that students' awareness levels regarding meta-cognitive reading strategies were high.

The study found that cognitive awareness in reading strategies changed significantly according to perceived income level. In addition, it was observed that reading efficiently in a short period of time played a more critical role in shaping cognitive awareness of reading strategies compared to reading for long periods of time. However, the results of the study also revealed that the difficulties experienced by the participants in understanding what they read did not have a significant effect on their cognitive awareness of reading strategies. These results are consistent with previous studies in literature. Similarly, in a study conducted by Kana (2014), a statistically significant connection was established between the metacognitive awareness levels of middle school students and their book reading habits. Karasakaloğlu et al. (2012) concluded that reading strategies varied according to the rate of book reading.

This study found that the motivation levels of the participants were high and that their motivation levels did not differ significantly according to income perception, daily book reading hours and difficulty in understanding what they read. The result of Yıldız and Akyol (2011) that students' income perception did

not have a determining effect on reading motivation is consistent with the results of this study. In addition, the current study found that daily reading hours and difficulty in understanding what they read did not significantly affect reading motivation. However, the study conducted by Yıldız and Akyol (2011) found that students who read more books daily had higher reading motivation and that students who did not have difficulty in understanding what they read had higher motivation levels. The study conducted by Gottfried (1990) also found a similar relationship between students' reading motivation and reading comprehension. The differences between these findings may be due to differences in sample characteristics or data collection methods between studies.

The study found that participants exhibited low self-efficacy levels. Additionally, self-efficacy levels were significantly influenced by participants' perceptions of income status, daily reading hours, and difficulty in reading comprehension. Similarly, Aytunga (2018) found that the amount of book reading was a determining factor in students' self-efficacy perceptions.

In the study, it was determined that there was no significant relationship between reading strategies cognitive awareness, reading motivation and self-efficacy levels. Akbabaoğlu and Duban (2020), Koç and Arslan (2017), Wang et al. (2009), Bozkurt and Memiş (2013), Li and Wang (2010), Shang (2010), Tobing (2013), Mohammed (2022) and Aytunga (2018) reached the conclusions in their studies that there were significant and positive relationships between the mentioned features, albeit at different rates. The difference between the findings obtained from this study and the findings determined in the existing literature can be explained by the fact that the studies were conducted with different sample groups and in different time periods. In addition, the differences between the results should be considered important in terms of contributing to the field by providing new perspectives and insights.

In general, the study's findings revealed that participants' perceptions of income status and daily reading time significantly affected their reading strategies, cognitive awareness, and self-efficacy levels. However, difficulty in reading comprehension was found to be an identifying factor only for self-efficacy levels. Based on these findings, students should be encouraged to recognize the extent to which reading strategies enhance their understanding of various aspects of life. In reading instruction, teachers should enhance the use of various reading strategies rather than focusing solely on isolated skills such as silent reading or reading comprehension.

Furthermore, future research could expand the scope of this study by including a broader sample of schools and students at more than one grade level to enhance

the generalizability of the findings. Such a study could also go over the impact of school and grade-level variables. Additionally, mixed-method research designs could be employed to explore potential differences between variables in greater depth.

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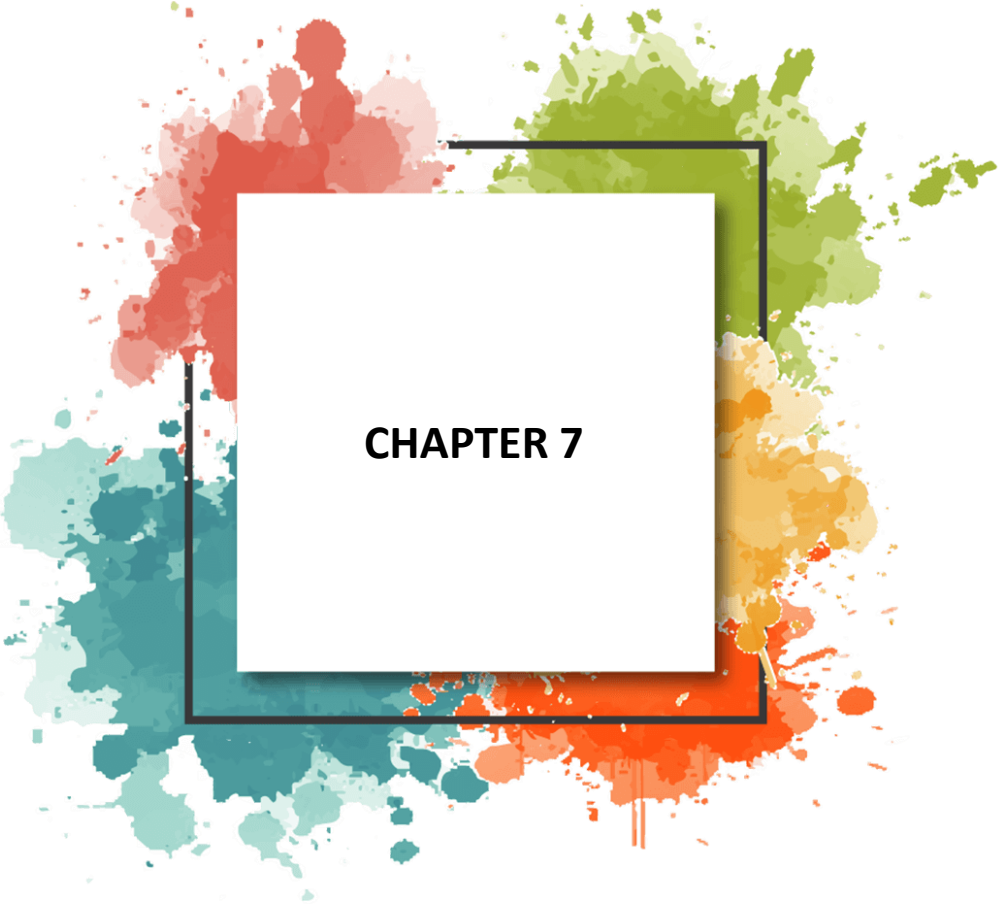
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CHAPTER 7

A Comparative Analysis of the 2013 and 2024 Preschool Education Programs

Elvan Gökçen¹

INTRODUCTION

Preschool education encompasses planned educational activities that aim to support the mental, emotional, social, and physical development of individuals from birth until the beginning of primary school. This period represents a critical stage in which the most rapid progress and highest sensitivity in child development are observed. Research in developmental psychology reveals that the foundations of an individual's personality structure are established during these early years (Ömeroğlu, 2001). During this stage, language, physical and psychomotor skills, moral, sexual, and personality development begin to take shape and can progress more healthily with the support provided by parents, families, and educators (Kekil & Dirlik, 2024). Early childhood is one of the most fundamental stages of education, characterized by the fastest emotional, social, and cognitive growth. This period plays a decisive role in both the individual's academic performance and their adaptation to social life (Shonkoff & Philips, 2000). Scientific studies indicate that high-quality education provided at an early age contributes not only to individual development but also to the long-term economic prosperity of societies (Heckman, 2011). This is because, during early childhood, children become more sensitive to environmental stimuli and tend to learn and internalize the influences from their surroundings more rapidly (Dirlik, 2024).

The preschool period is one of the most critical and formative stages in an individual's life; therefore, the education provided during this period is of great importance for the child's holistic development. The quality of early childhood education is largely determined by the quality of the curriculum being implemented. An effective and comprehensive preschool education approach should foster an environment of trust between the child and the adult, support the child's self-concept, and promote the development of self-confidence. While children's active participation in learning processes should be encouraged, the involvement of families in the process must also be emphasized. In addition, teachers implementing the curriculum should have subject-area expertise, and the personnel structure should be organized in accordance with children's individual developmental needs. Moreover, physical environments should support

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children's growth, exploration, and learning processes, while also promoting health, safety, and nutrition habits (Gordon & Browne, 2007).

Quality education can only be ensured through a well-structured, scientifically grounded, and developmentally appropriate curriculum. In this context, curriculum development efforts in the field of preschool education play a fundamental role in supporting children's cognitive, socio-emotional, language, and physical development domains. Updating educational programs to align with contemporary requirements affects not only instructional content but also the teacher's guiding role, the quality of learning environments, and the depth of children's learning experiences. Therefore, every curriculum development initiative in preschool education should be considered a strategic process that shapes future individuals' lifelong learning skills and their capacity for social adaptation (Albrecht & Miller, 2004: 293; Kandır & Kurt, 2010; Tuncer, 2015).

Accordingly, educational programs implemented in schools should be designed in alignment with the general objectives of Turkish National Education while also taking into account contemporary global educational developments. These programs should be developed by harmonizing universal educational principles with national culture and civilizational values (Altunkaya, 2010). Furthermore, the renewal and improvement of educational programs influence not only the content but also teachers' instructional approaches, students' learning processes, and the quality of classroom environments (Ünsal, 2013). Regular, systematic, and continuous review and improvement of educational programs are essential for enhancing the overall quality of the education system (Malhotra, 2006). In this context, the present study aims to compare the 2013 and 2024 Preschool Education Programs implemented in Turkey in terms of their learning outcomes, indicators, explanations, and pedagogical orientations related to developmental domains.

METHOD

In this study, the document analysis method, one of the qualitative research designs, was employed. Document analysis is considered one of the fundamental sources of data collection in qualitative research processes (Hoepfl, 1997). In the literature, any written material that provides information related to the research topic is defined as a document (Balci, 2016). The purpose of this method is to systematically collect various types of written documents, analyze, evaluate, and interpret them (O'Leary, 2017).

The data obtained in this study were analyzed using a descriptive analysis approach. In line with the research purpose, the Preschool Education Program books published by the Ministry of National Education in 2013 and 2024 were

used as the primary data sources. The study was conducted through the systematic examination and comparison of the contents of these programs.

FINDINGS

The 2013 Preschool Education Program structured physical development primarily through motor skills and self-care abilities, including a total of 13 learning outcomes. In contrast, the 2024 program reorganized this domain under the title “Physical Development and Health” with a holistic approach, increasing the number of learning outcomes to 23 and introducing significant content-based and pedagogical transformations. This change reflects not only a quantitative increase but also a qualitative restructuring of developmental domains within a contemporary theoretical framework.

A notable difference also exists between the two programs in terms of indicator format. The 2013 program primarily employed one-dimensional and behavior-based indicators, whereas the 2024 program presents indicators that are multidimensional, functional, and cognitively supported. This design aims not only for the child to perform a movement but also to understand its quality and develop self-awareness.

In terms of explanatory focus, a clear shift in orientation can be observed. While the 2013 program emphasized correct movement patterns and safety, the 2024 program incorporates scientific reasoning and includes elements such as sensory-based awareness, self-regulation, neuro-pedagogical foundations, and life skills. Pedagogically, this indicates that the 2024 program adopts not only an instructional focus but also a developmental and sensory-integration-based perspective.

A significant evolution is also evident in the conceptual framework. The 2013 program focused on motor development, addressing physical growth mainly through movement skills, while the 2024 program integrates physical development with health, safety, disaster awareness, and breathing exercises—domains directly linked to daily life—thus providing a broader theoretical foundation. Consequently, children’s physical, cognitive, emotional, and social development are supported simultaneously.

A striking transformation can also be seen in pedagogical orientation. While the 2013 program concentrated on skill acquisition, the 2024 program centers on fostering awareness, responsibility, and self-regulation. This reflects the contemporary educational philosophy that seeks not only to equip children with knowledge and skills but also to nurture individuals who know themselves, make healthy decisions, and are prepared for real-life situations. Thus, a paradigm shift has occurred from a classical physical development model to a neuro-pedagogical and life-based learning model (MoNE, 2013; 2024).

In the 2013 Preschool Education Program, the social and emotional development domain comprised 17 learning outcomes, focusing on essential social-emotional skills such as self-awareness, self-confidence, appreciation of aesthetic values, recognition and expression of emotions, empathy, respect for rights, and activities related to Atatürk. However, this structure primarily emphasized behavioral representation and did not provide a comprehensive framework for the internalization of emotional processes. In contrast, the 2024 Preschool Education Program conceptualizes social and emotional development more broadly, integrating it with values education and structuring it around at least 22 unique learning outcomes. Presented under the title “Social-Emotional Development and Values Education,” this domain aims to help children understand their social roles, internalize ethical values, and express their emotions in healthy ways.

When examining the structural dimension of indicators, in the 2013 program, each learning outcome is supported by an average of 2–4 short, observable behavioral statements. These indicators are generally one-dimensional, behavior-oriented, and lack cognitive depth. For instance, indicators such as “States their name, surname, and age” or “States others’ emotions” focus solely on observable behavior and do not allow for a deep analysis of children’s emotional processes. In contrast, the 2024 program adopts a multidimensional approach, assigning an average of 5–8 indicators per learning outcome. These indicators encompass not only behavior but also children’s cognitive processes, emotional responses, and social interaction patterns. Examples include “Attempts to understand others’ perspectives” or “Reflects on the consequences of their behavior,” which demonstrate a pedagogical understanding that fosters social-cognitive awareness.

When comparing the explanation sections of the programs, the 2013 program’s explanations focus mainly on examples of activities, points of attention, and general environmental suggestions to support the learning outcome. However, these explanations do not provide teachers with comprehensive guidance for implementation. In contrast, the 2024 program structures its explanations to guide both teachers and families. The explanations detail how each learning outcome can be supported, which pedagogical strategies should be employed, how individual differences should be considered, and how children’s development should be monitored. This structure provides strong instructional guidance for teachers at the implementation level.

A clear paradigm shift is also evident in the integration of values education into the curriculum. In the 2013 program, values education was not explicitly included under a specific heading but was indirectly related through themes such as empathy and respect for rights. Conversely, the 2024 program directly integrates values education with social-emotional development, strengthening

this domain through learning outcomes based on “core values” such as justice, respect, compassion, and responsibility. Learning outcomes such as “Shows respect for differences in social life” and “Takes responsibility for sustainable living” exemplify the goal of raising individuals aligned with 21st-century values.

Although both programs include representations of Atatürk, the nature of these representations differs. In the 2013 program, the expression “Takes responsibility in activities related to Atatürk” reflects a more symbolic and activity-oriented approach. In contrast, the 2024 program adopts a more conceptual perspective by associating Atatürk with democratic and modern citizenship values, as seen in statements such as “Appreciates Atatürk’s contributions to a modern and democratic way of life in our country.” This shift reflects an aim not only to raise awareness of historical figures but also to foster a value system based on civic consciousness.

In conclusion, the 2024 program demonstrates significant advancement over the 2013 program in terms of content, pedagogical orientation, conceptual depth, integration of values education, and teacher guidance within the domain of social-emotional development. This transformation underscores that preschool education should not be limited to behavioral instruction; rather, it should present a contemporary structure that supports ethical, emotional, and social development. Additionally, the teacher’s role has evolved from being a transmitter of knowledge to becoming a facilitator who emotionally supports children, guides their social interactions, and helps them internalize core values.

The 2013 Preschool Education Curriculum includes 21 learning outcomes in the cognitive development domain. These outcomes are primarily based on traditional cognitive processes such as attention, memory, classification, pattern formation, and cause–effect reasoning—typical of classical learning domains. Mathematical awareness, including counting, sequencing, and graphing, is also integrated into the program. However, the curriculum does not address higher-order cognitive skills; instead, it focuses mainly on children’s basic knowledge acquisition and application processes. For instance, cognitive content such as “recognizing and explaining Atatürk” is addressed in the context of citizenship but remains limited in scope.

In contrast, the 2024 Preschool Education Curriculum expands beyond these traditional areas to align with contemporary educational paradigms. With 28 learning outcomes in total, it explicitly incorporates 21st-century skills such as metacognition, critical thinking, and decision-making. This approach aims not only for children to acquire knowledge but also to become aware of their thinking processes, conduct analysis, and develop alternative solutions. Thus, the 2024 program supports cognitive development that is not merely knowledge-based but

also conceptual and inquiry-oriented, fostering problem-solving and reflective thinking.

A comparison of indicators (performance criteria) further reveals this transformation. In the 2013 program, each learning outcome is supported by an average of 3–5 behavioral indicators that are observable, concrete, and practice-oriented, yet limited in variety and cognitive depth. Conversely, the 2024 program provides more than six indicators per outcome on average, focusing not only on what children do but also on how they think. For instance, indicators such as “explains differences between predictions and actual outcomes” or “questions the positive and negative aspects of alternatives” reflect an emphasis on process evaluation rather than mere output, offering a more layered and analytical system for tracking children’s cognitive growth.

Regarding curriculum explanations, the 2013 program includes basic implementation suggestions (e.g., examples like “clothespin + bead pattern” for pattern formation activities) but offers limited pedagogical flexibility or guidance for adapting activities. In contrast, the 2024 curriculum anchors its explanations in developmental psychology, educational technology, and interdisciplinary foundations. Each explanation provides concrete strategies for teachers, detailing how to guide learning, accommodate individual differences, and foster diverse learning pathways. Consequently, the new curriculum serves as a comprehensive pedagogical guide, addressing not only what to teach but also how and why.

At the content level, the 2024 program demonstrates greater depth in cognitive progression. For example, while the 2013 program focuses on counting up to ten and number recognition, the 2024 version emphasizes understanding numerical language in real-life contexts. Similarly, geometric concepts in 2013 are limited to basic two-dimensional shapes (circle, square, triangle), whereas the 2024 curriculum includes both two- and three-dimensional forms, emphasizing identification and classification. In problem-solving, the 2013 version centers on producing a single solution, while the 2024 version encourages evaluating multiple solutions, reasoning, and making informed decisions. Moreover, concepts such as critical thinking and metacognition, absent in 2013, are explicitly embedded in the 2024 structure—defining a modern learner profile.

Overall, the 2013 program provides a traditional framework focused on building foundational cognitive skills, whereas the 2024 program offers a multi-dimensional and dynamic structure aligned with contemporary educational needs. By integrating higher-order thinking, algorithmic reasoning, and critical inquiry, the new program reflects a significant cognitive evolution in Turkey’s early childhood education approach—aiming to nurture flexible, problem-solving thinkers equipped for future challenges.

In the language development domain, the 2013 Preschool Education Curriculum features 12 learning outcomes aimed at enhancing both receptive and expressive language skills. These focus on basic linguistic processes such as sound discrimination, vocabulary building, and pre-literacy skills. However, the curriculum does not directly address advanced language competencies like creative expression, original storytelling, or multimodal communication. Instead, it prioritizes standard language acquisition processes related to communication.

The 2024 curriculum, by contrast, includes 13 learning outcomes, expanding both quantitatively and qualitatively. It focuses not only on correct language use but also on creative expression, narrative construction, and multisensory communication. Outcomes such as “creating original verbal products” and “producing narratives using visual materials” aim to enhance children’s linguistic creativity and expressive skills. Moreover, language outcomes are more integrated with cognitive processes—such as sequencing, predicting, and planning—encouraging children to articulate their thought processes through language.

The indicator structures also differ substantially. In 2013, each outcome includes 4–5 mostly behavioral indicators, emphasizing correct language usage (e.g., sentence formation, asking questions, using appropriate address forms). However, cognitive depth is limited. In the 2024 curriculum, each outcome is supported by 7–10 indicators that blend behavioral and cognitive dimensions. For example, “infers the meaning of an unfamiliar word from context” or “expresses emotions in a story through words” illustrate how indicators now target conceptual vocabulary and linguistic reasoning. Phonological awareness, grammatical sensitivity, and contextual word choice are also embedded in these indicators.

Regarding curriculum explanations, the 2013 program provides general classroom recommendations but lacks detailed guidance to foster creative implementation. In contrast, the 2024 program offers highly detailed, application-oriented, and example-rich explanations. These include strategies for material use, children’s literature integration, digital tools, and play-based learning. For instance, phonological awareness activities are recommended to involve movement, objects, and games—highlighting an embodied and engaging approach to language learning.

From a theoretical and pedagogical perspective, the 2013 program is primarily based on the constructivist learning theory, emphasizing acquisition-level language development with limited productive use. The 2024 curriculum, however, blends constructivist, socio-cultural, multiple intelligences, and creative thinking theories. It promotes cultural sensitivity, inclusion, and differentiated instruction aligned with children’s readiness levels.

In conclusion, both programs aim to foster children's language development; however, the 2024 Preschool Education Curriculum presents a more holistic, inclusive, and pedagogically rich framework. Its learning outcomes support creative expression, its indicators expand cognitive diversity, and its detailed explanations provide actionable guidance for teachers. This structure not only enhances children's language use but also empowers them to use language as a tool for meaning-making, emotional expression, cognitive structuring, and effective communication—redefining language development as a core component of holistic growth in early childhood education.

DISCUSSION, CONCLUSION AND RECOMMENDATIONS

When educational curricula fail to adapt to global social, scientific, and technological changes, they gradually lose functionality and relevance, drifting away from the intended learning outcomes. This necessitates the periodic renewal, restructuring, or—in some cases—complete replacement of curricula (Akkaya, 2023). Therefore, the continuous development and systematic evaluation of educational programs have become fundamental requirements of contemporary education. Each new program serves to address the shortcomings of its predecessor while integrating current knowledge and pedagogical approaches. This process also helps teachers—the implementers of these programs—stay informed about changing educational paradigms and global transformations. In Turkey, the preschool education curriculum has undergone several revisions and updates between 1998 and 2024 to align with evolving educational needs and societal transformations (Ocak & Yılmaz, 2025). In this context, the present study conducted a comprehensive comparison of the 2013 and 2024 Preschool Education Curricula in terms of developmental domains. The findings reveal significant pedagogical, theoretical, and practical transformations over time in the structure and orientation of preschool education programs.

In the Physical Development and Health domain, the 2024 Curriculum extends beyond motor skills to include health education, disaster awareness, sensory perception, and neuro-pedagogical foundations—presenting an expanded and modern framework. This approach aligns with contemporary paradigms that view physical development not merely as bodily movement but as a means of fostering holistic life skills. The multidimensional and cognitively grounded structure of the indicators supports the development of higher-order competencies such as self-awareness, responsibility, and self-regulation. According to Sönmez and Seyhan (2016), the 2013 Curriculum addressed the concept of health only in a very limited capacity. Yet, healthy lifestyle habits are directly linked to an individual's ability to cope with everyday challenges, and the preschool years are particularly critical for developing such awareness (Sabaz

& Yiğit, 2023). Thus, the reorganization of health-related outcomes under the Physical Development domain in the 2024 Curriculum represents a significant improvement aligned with children's developmental needs. This change meets the contemporary requirement of fostering health awareness, safe behavior, and self-care skills from an early age. Furthermore, studies by Çalışandemir, Bencik, and Artan (2010) indicate that children's awareness of their bodies enhances self-concept and confidence, while Deniz and Yıldız (2018) found that increased bodily awareness supports healthy sexual development. These findings from the literature highlight the importance of the new learning outcomes included in the 2024 Curriculum within the Physical Development and Health domain.

In the Social-Emotional Development and Values Education domain, the restructuring has not only deepened the pedagogical framework but also provided teachers and families with practical implementation guidance. Unlike the behavioral and one-dimensional outcomes in the 2013 Curriculum, the 2024 Curriculum adopts a multilayered structure aimed at fostering children's social cognition, emotional awareness, and internalization of moral values. The explicit integration of core values ensures that children's adaptation to social life is guided not only by external rules but also by an intrinsic ethical understanding. The theoretical shift reflected in the representation of Atatürk also reinforces democratic citizenship awareness. The preschool period, therefore, represents a critical developmental stage in which children make rapid progress across multiple domains. Programs designed for this period must align with children's cognitive, physical, social-emotional, and individual characteristics, emphasizing process-oriented and developmentally supportive approaches (Dikmen-Ada, 2019). Preschool education aims to help children achieve key developmental milestones. The knowledge, skills, and attitudes acquired during this stage form the foundation for future academic success and strengthen subsequent developmental phases by supporting both cognitive and affective competencies (Kandır et al., 2022).

Language plays a crucial role in communication, allowing individuals to express themselves effectively (Kekil & Dirlik, 2024). Linguists emphasize that early childhood is a critical period for language acquisition and that delays during this stage can impact an individual's lifelong development. Therefore, preschool curricula that are not designed with consideration for children's cognitive and linguistic characteristics may fail to support optimal development in this area (Aydoğan & Koçak, 2003). In this regard, the cognitive development component of the 2024 Curriculum represents a significant transformation—shifting from classical learning domains to a structure emphasizing metacognition, critical thinking, algorithmic reasoning, and decision-making, all essential 21st-century skills. This evolution enables children not only to acquire knowledge but also to

become aware of how they use it, promoting flexibility and problem-solving competence. The inclusion of indicators that assess both process and outcome reflects a broader transformation in the culture of assessment and evaluation.

In the Language Development domain, the inclusion of outcomes related to creative expression, multimodal communication, and visual-supported narrative construction in the 2024 Curriculum allows children to use language not merely as a means of communication but as a tool for structuring thought, expressing emotions, and generating meaning. The use of digital materials, multiple learning modalities, and pedagogical strategies provides teachers with a flexible and differentiated instructional framework. Additionally, play activities play a critical role in language development. Structured and well-planned play environments enriched with diverse stimuli enhance children's expressive skills, fluency, and vocabulary development (Kekil, 2024; Özen, 2008). Therefore, creating learning environments enriched with materials that support cognitive growth and integrating activities that promote language development are of great importance (Kol, 2011).

Overall, the analysis demonstrates that the evolution of preschool education programs in Turkey reflects not only a structural revision but also a theoretical and pedagogical paradigm shift. The 2024 Preschool Education Curriculum adopts a multidimensional approach, addressing not only cognitive or motor development but also emotional awareness, social interaction, values education, and life skills. The literature on the 2013 curriculum frequently emphasizes the need for improvement in learning outcomes and indicators. Tuğluk and Özkan (2019) noted the inadequacy of the 2013 curriculum in these respects, while Köksal et al. (2016) highlighted the necessity of revising the program based on teacher feedback. Conversely, Özsırkıntı et al. (2014) reported that teachers generally viewed the program positively but recommended clearer articulation of outcomes and indicators for ease of implementation.

In this regard, the 2024 Curriculum represents a more comprehensive, modern, and inclusive educational model—not only in terms of learning outcomes and content but also in its pedagogical depth, conceptual coherence, and implementation guidance. The program redefines the teacher's role—not merely as a transmitter of knowledge but as a guide, emotional supporter, and ethical leader who respects individual differences and facilitates each child's developmental journey. Particularly, the integration of values education across all developmental domains signifies a critical advancement in nurturing individuals with ethical awareness and social responsibility—an essential goal of 21st-century preschool education.

Recommendations

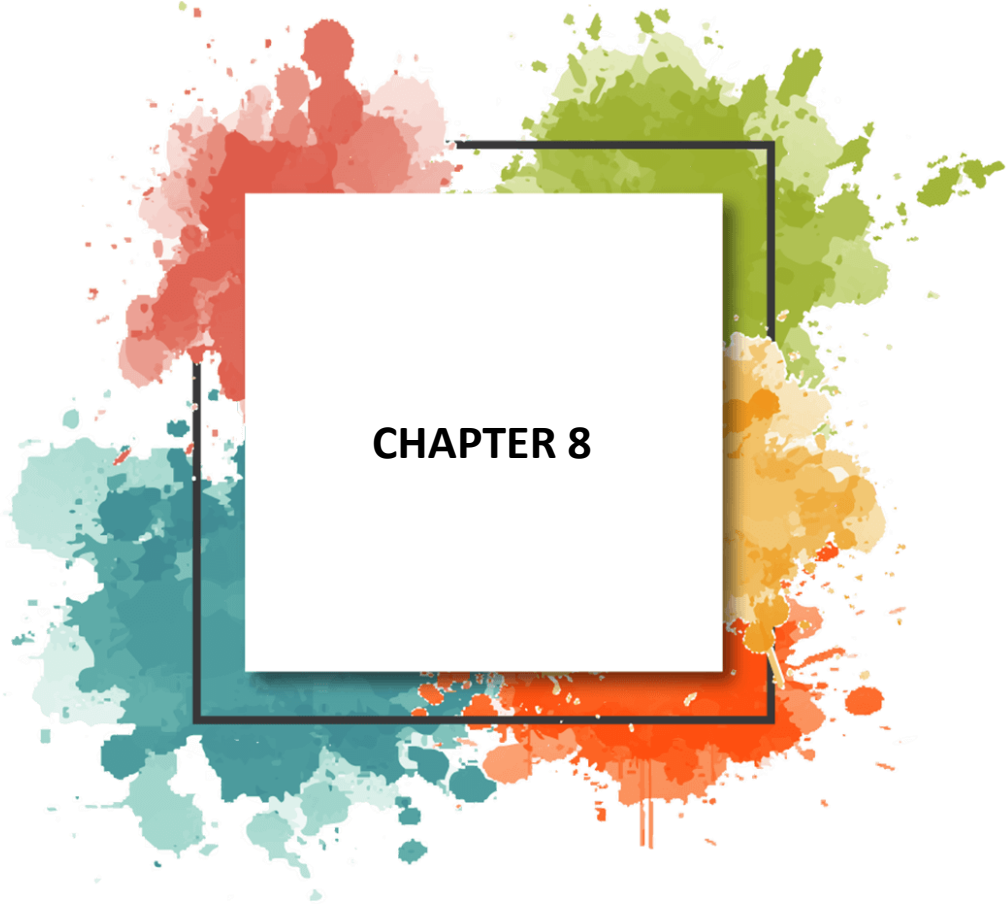
- Comprehensive in-service training programs can be organized for preschool teachers to enhance their competencies in effectively implementing the curriculum.
- In line with the theoretical foundations and implementation principles of the program, detailed guidebooks for each developmental domain can be prepared and supported with materials that enrich teachers' daily plans.
- Parental involvement in each developmental area can be encouraged to ensure that the child experiences a consistent developmental process both at home and at school.
- Alternative assessment tools suitable for monitoring development in accordance with multidimensional indicators can be developed, thereby promoting a culture of process-oriented rather than outcome-oriented evaluation.
- The curriculum can be continuously updated by monitoring it through scientific research to ensure responsiveness to emerging needs.

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CHAPTER 8

The Process of Developing an Achievement Test for Measuring Cognitive Domain Behaviors in Education

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Introduction

Achievement tests are widely used tools in education to measure and evaluate students' knowledge and skill levels. Multiple-choice tests, in particular, are frequently preferred due to their advantages such as ease of scoring, objectivity, and applicability to large groups of students. This section will cover the development process of a multiple-choice achievement test, sample items based on cognitive domain levels, and content validity. The aim is to provide the reader with both theoretical knowledge and guidance on the steps that can be followed in practice.

1. Cognitive domain behaviors in education

Although many definitions of education have been proposed, the most comprehensive one was provided by Ertürk (1972). According to Ertürk (1972), education is “the process of bringing about desired changes in an individual's behavior in a planned and programmed manner through their own experiences.” One of the points emphasized in this definition is the process of behavior change. These behaviors, which are at the center of the educational process and are desired to be brought about in the individual, have been addressed by Bloom and colleagues (1956) in three areas: “cognitive domain, affective domain, and psychomotor domain.” Each domain is classified into stages within itself. The behaviors in these three domains are also classified into stages within themselves, resulting in a taxonomic approach.

The area we have worked on the most and also have the most knowledge about is the cognitive domain (Doğan, 2015). The cognitive domain can be defined as mental behaviors related to knowledge and skills (Tan, 2012). Cognitive domain behaviors are more important in teaching programs than the other two domains (affective and psychomotor) (Yeşilyurt, 2012). Bloom (1956, p. 62) classified cognitive domain behaviors into six levels: (i) knowledge, (ii) comprehension, (iii) application, (iv) analysis, (v) synthesis, and (vi) evaluation. Tests are administered to determine whether the desired behavioral changes have occurred

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in individuals. For the items in the tests to measure these behaviors, the instructional objectives must first be clearly defined and converted into observable behaviors. Then, the appropriate item type must be determined and written in a way that measures these behaviors (Tekin, 2008).

A systematic and planned approach should be followed in the process of developing valid and reliable tests to measure cognitive domain behaviors. The steps in the test development process have been addressed in different ways in the literature (Baykul, 2010; Crocker & Algine, 1986; Doğan, 2021; Tekin, 2008; Turgut, 1995). According to Baykul (2010), test development can be explained in eight steps.

1. Determining the purpose for which the scores obtained from the developed test will be used,
2. Identifying the characteristics to be measured,
3. Writing the test items,
4. Revising test items,
5. Preparing the pilot (preliminary) application form,
6. Conducting the pilot (preliminary) application,
7. Item analysis,
8. Finalizing the test.

2. Test development process

2.1. Determining the purpose for which the scores obtained from the developed test will be used

At this stage, the purpose for which the scores obtained from the test will be used must first be determined (Doğan, 2021). Baykul (2010, p. 314) summarizes these purposes in five different ways: determining student achievement, identifying students' learning difficulties, making educational decisions about students, defining psychological structures, and selection and placement. Özçelik (2013) states that tests used in classroom lessons have two purposes. The first is to identify students' learning deficiencies in units or topics and to monitor their learning. The second is to determine students' learning levels and thus their success.

2.2. Determining the characteristics to be measured

After deciding on the purpose of the test to be developed, it is necessary to determine the scope of the test, i.e., the learning products (characteristics) to be measured with the test items (Özçelik, 2013). The learning products referred to

here are generally behaviors (Baykul, 2010). The test scope can be determined in different ways. One of these is to use a specification table, and the other is to obtain expert opinion (Doğan, 2021). This process also aims to ensure the content validity of the test.

2.2.1. Specification Table

A specification table is a matrix that relates the behaviors to be acquired in a course to both topics and cognitive behavior levels (knowledge, comprehension, application, etc.) (Tan, 2012). An example of a specification table prepared according to Bloom's taxonomy is presented in Table 1.

Table 1. Example of a specification table

Topics	Cognitive domain levels						Total
	Knowledge	Comprehension	Application	Analysis	Synthesis	Evaluation	
Topic A	3	4	2	1	1	2	13
Topic B	5	5	4	2	2	2	20
Topic C	2	5	3	2	3	2	17
Total	10	14	9	5	6	6	50

Table 1 shows three three topics related to a course and their relationship with the cognitive domain levels. There are a total of 50 behaviors in these three topics, and when examined according to cognitive domains, it is seen that most behaviors are at the comprehension level (28%), followed by knowledge (20%) and application (18%). When examined by topic, it is seen that topic B has more behaviors.

2.3. Writing test items

At this stage, appropriate items for assessing the behaviors identified in the previous step should be created based on the specification table. When writing these items, it is necessary to select the appropriate item type (multiple choice, short answer, etc.) for the behavior, ensure that the items are appropriate for the cognitive domain levels, and ensure that the number of items is appropriately distributed across topics (Baykul, 2010).

The number of items in the test varies depending on the type of test (Tan, 2012), the level of the respondent, the duration of the exam, the type of item, and the difficulty level of the items (Tekin, 2008; Turgut, 1995). The literature suggests that the number of items to be prepared should be three items to examine each behavior (Atılğan, 2015; Kan, 2008), at least two or three items (Doğan, 2021), and as many as possible (Tan, 2012). Therefore, writing multiple items to measure each behavior allows for the selection of the most appropriate and discriminative items that best measure that behavior during the item analysis process.

The points to consider when writing test items to ensure the test is valid and reliable are summarized below (Baykul, 2010).

- The person(s) preparing the item must be knowledgeable about the subject area to be measured.
- The person preparing the item must be knowledgeable about the characteristics of the item types to be used (multiple choice, short answer, true/false, etc.) and the rules for writing items.
- Writing and language rules must be followed.
- The item stem should be written to target the behavior to be measured, and the characteristic measured by the item should not be narrower than the scope of the behavior.
- The item stem should be clearly stated, and ambiguous expressions should not be used.
- Long and unnecessary expressions should not be used in the item stem.
- Expressions that give clues to the options should not be used in the item stem.

2.4. Revision of test items

After writing the items, they must be checked from various perspectives before conducting a pilot application. These are summarized below (Başol, 2015; Baykul, 2010; Kan, 2008).

- Compliance with writing rules in terms of language and expression, absence of expression errors, and appropriate use of punctuation marks,
- Suitability for the age level of the target audience to whom the test will be administered,
- Suitability of the items for the behavior to be measured,
- The accuracy of the information in the items from a scientific perspective,
- Whether the items are written in accordance with technical rules according to the type of item.

2.5. Preparation of the pilot (preliminary) application form

Following the revision of the items, the test form for the pilot application must be prepared. The preparation of the test form can be summarized as follows: (i) preparation of instructions, (ii) sequencing and placement of items on the test form, and (iii) page layout and font size adjustment.

The test instructions are the section that clearly and simply explains how students should answer the test items. The instructions should clearly provide information such as the purpose of the test, the sections of the test (if any), the number of items, item scores, the time allowed for answering, the type of pen to be used, whether incorrect answers affect correct answers, and how answers will be recorded (Atılğan, 2015; Baykul, 2010; Kan, 2008).

It is important how the items are ordered and arranged on the test form. Doğan-Gül and Bökeoğlu (2018) found that when multiple-choice test items were ordered differently according to their difficulty levels (from easy to difficult, from difficult to easy, and random order), some item difficulty and discrimination indices differed. Furthermore, presenting items that measure the same behavior in sequence may result in items at the end of the test being left unanswered due to time constraints or respondent fatigue (Baykul, 2010). In this context, it is recommended that items be numbered in the test by systematically randomizing or randomly ordering them (Atılğan, 2015; Baykul, 2010).

At the final stage, the test form should be designed to suit the developmental levels and ages of the respondents. In this context, it is necessary to select an appropriate font, write in an appropriate font size, and provide appropriate spacing between items (Kan, 2008). Considering the test takers' exam anxiety or concerns, warnings such as “go to the next page” can be provided at the end of each page of the test form (Atılğan, 2015).

2.6. Conducting the pilot (preliminary) application

A pilot application is conducted to calculate the item statistics of the developed test (item discrimination, item difficulty, etc.) and to select appropriate items. In the pilot application, it is important that respondents do not receive help from others or cheat (Baykul, 2010). Otherwise, this situation will affect the test and item statistics. In addition, it is important to motivate students in the pilot application of the test to ensure that they answer all the items and to provide an appropriate exam environment (Atılğan, 2015; Baykul, 2010).

2.7. Item analysis

After the pilot application, the test forms of the respondents are scored and analyses related to the items are performed. With item analysis, items suitable for the characteristics to be measured are selected. In the context of Classical Test Theory (CTT), in item analysis, certain statistics such as item discrimination index, item difficulty, and item total correlation are calculated separately for all items in the test. Furthermore, it is extremely important to examine the functionality of the options other than the correct answer (distractors) in multiple-choice tests. This is because, when conducting item analysis, the discrimination and difficulty indices are calculated by considering the number of respondents

who marked the correct option for that item (Tekin, 2008). Functional distractors are options that are preferred more often by students who lack sufficient knowledge about the measured characteristic. In this regard, distractor analyses provide more accurate and complete information about the item (Tekin, 2008), enabling the evaluation of item quality.

2.8. Finalizing the test

After the item analysis process, the final version of the test is created by selecting the items that best measure each behavior. At this stage, the final form of the test is prepared by first determining the items that measure each behavior with discrimination index values of 0.40 and above and item difficulty indices around 0.50 (Başol, 2015). In addition, including a few easy items in the final form, especially at the beginning of the test, will increase student motivation (Atılğan, 2015).

3. Validity

It is crucial to provide evidence regarding reliability and validity, two important characteristics that measurement results must possess. Validity refers to a test's ability to measure the desired characteristic without confounding it with other characteristics (Thorndike & Hagen, 1959). Validity is generally addressed under three main headings: construct validity, criterion validity, and content validity.

3.1. Content Validity

Content validity provides particularly important evidence in achievement tests (Başokçu, 2021). Furthermore, content validity in achievement tests refers to the extent to which the test covers the behaviors it aims to measure (Baykul, 2010). In this context, content validity indicates the closeness of the item sample to the behavior universe to which the result can be generalized (Özbek, 2008). Studies should be conducted with serious expert opinions to determine content validity, and in this regard, the criterion table is very important (Başokçu, 2021). Based on expert opinions, content validity ratios and content validity indices developed by Lawshe (1975) are obtained. According to this method, which recommends having between 5 and 40 experts, the content validity ratio is calculated as shown in Equation 1 (Lawshe, 1975).

$$CVR = \frac{n_e - N/2}{N/2} \quad \text{Equality (1)}$$

According to Equality 1;

n_e : the number of experts who rated the item as essential

N: total number of experts

The content validity ratio takes values between -1 and +1. If the obtained values are negative or 0 [$-1 \leq \text{CVR} \leq 0$], these items are eliminated. When the coverage validity ratio is positive, additional assessments are made to determine whether the coverage validity is statistically significant. In this assessment, Veneziano and Hooper (1997) presented criteria showing the minimum values of coverage validity criteria according to the number of experts.

The coverage validity index is obtained by averaging the coverage validity ratios of the items to be tested. If the characteristic to be measured is multidimensional, the coverage validity index must be calculated for each dimension (Yurdugül, 2005).

4. Sample items according to cognitive domain levels

4.1. Knowledge

Behavior example: *“Identifies traditional assessment tools.”*

Sample question: Which of the following is a traditional assessment tool?

- A) Performance task
- B) Portfolio
- C) Project
- D) Multiple-choice tests

4.2. Comprehension

Behavior example: *“Explains the purpose of using complementary measurement tools.”*

Sample question: Which of the following is the most appropriate example of the purpose of using complementary measurement tools?

- A) To determine the level of learning
- B) To develop students' creativity
- C) To assess social skills
- D) To measure group activities

4.3. Application

Behavior example: *“Calculates the reliability coefficient of test results.”*

Question example: As a result of separate reliability analyses conducted for two subtests, it was determined that the reliability coefficient of the 20-item

subtests was 0.75. Which of the following is the reliability coefficient for the entire 40-item test?

- A) 0.37 B) 0.75 C) 0.85 D) 0.90 E) 0.95

4.4. Analysis

Behavior example: *“Analyzes the elements of the assessment in the given examples.”*

Question Example: Ali, who wants to join the school's soccer team, has had his height (179 cm) and weight (80 kg) measured. Ali, who has examined the team's entry requirements that height must be 180 cm or above, has lost motivation because he cannot join the team.

Which elements of the evaluation are present in the above example?

- A) Measurement result and decision
- B) Criterion and decision
- C) Measurement result and criterion
- D) Measurement result, criterion, and decision

4.5. Synthesis

Behavior example: *“Develops new and original achievement tests in accordance with measurement and evaluation principles.”*

Question Example: Develop an achievement test to measure students' cognitive levels within the scope of the statistics course.

4.6. Evaluation

Behavior example: *“Makes judgments about the reliability, validity, and usability of different measurement tools.”*

Sample Question: The statistics course includes a “short-answer test, multiple-choice test, written exam, and oral exam.” Considering the students' cognitive level, application conditions, and measurement objectives, which tool would you choose and why? Explain your choice with reasons.

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